

CrossRiver*Rail*



Appendix J Hazard and Risk

Cross River Rail

APPENDIX J

Hazard and Risk Register

JULY 2011

Risk Matrix:	
Almost Certain	Severe
Likely	Extreme
Possible	High
Unlikely	Medium
Rare	Low

Ref.	Date	Risk/Opportunity	Category	Hazard	Without Mitigation				After Mitigation Strategy				
					Description of Risk	Impact	Likelihood	Consequence	Risk	Mitigation Measure	Likelihood	Consequence	Residual Risk
1	12/10/2010	Risk	Air Quality	Generation of dust during construction	Earthworks generate excessive dust emissions during construction	Health impacts affecting nearby residents Dust nuisance	Likely	Major	High	Ongoing community consultation with affected landowners. Provide opportunities for affected landowners to have input into mitigation measures to create ownership in the process. Possible techniques could include the use of water trucks, dust screens, water trucks, dust screens, washing of houses, air conditioning (to reduce the need to open windows), offset distances, new technologies that reduce the amount of dust produced.	Likely	Moderate	High
2	12/10/2010	Risk	Air Quality	Elevated ground level concentrations at nearest homes	Increased hydrocarbons from construction and transport routes	Health impacts	Likely	Major	High	Standard mitigation measures to be used such as emission controls on plant and equipment during construction. Selection of transport routes to consider air quality impacts on surrounding areas.	Possible	Moderate	High
3	12/10/2010	Risk	Construction	Third party actions	Building developments or other projects (Woolloongabba, Boggo Rd and RNA developments) affect ability of the project to proceed as scheduled through impacts on spoil haulage requirements, traffic diversions or other imposed mitigation measures.	Project delays	Possible	Major	High	Impact of these projects to be considered during the development of the construction methodology. Alternative 'backup' spoil haulage routes and site accesses to be developed where possible. Site works near known development sites to be taken off the critical path where possible.	Possible	Moderate	High
4	12/10/2010	Risk	Construction	Delays in land acquisition including unallocated state land	Processes required for acquiring land from different parties not properly understood and/or implemented inefficiently. Different parties include Brisbane City Council and State Government (including QR) unallocated State land.	Delay in construction	Possible	Major	High	Identification of relevant approvals and approval timeframes to be understood by the project before land acquisition/pre-construction	Unlikely	Moderate	Medium
5	12/10/2010	Risk	Construction	Contaminated land	Unexpected additional treatment of contaminated land.	Environmental contamination and/or human health impacts, project delays	Possible	Moderate	High	Ensure that Construction EMP and Project Construction Safety Plan includes actions that can be quickly implemented to address contaminated land issues. Ensure that sufficient site investigations have occurred for areas that are on the critical path to rail	Possible	Minor	Medium
6	12/10/2010	Risk	Construction	High structure construction equipment (eg cranes)	Equipment and lighting interfering with aircraft	Interruption to air traffic Risk of collision	Unlikely	Severe	High	Compliance with OLS standards for Archerfield Airport and Brisbane Airport Operational Airspace requirements	Rare	Severe	High
7	12/10/2010	Risk	Construction	Interruption/suspension of existing tracks/services	Construction causing interruption to existing rail services	Service delays Commuter impacts	Almost Certain	Moderate	High	Limit construction activities to outside peak travel periods (where possible). Provide alternate transport/services. Pre-arrange off site. Communicate with rail operators and commuters in advance to ensure that commuters can make informed decisions re: advance decisions re: Contractor to develop and implement a Traffic/Public/Commuter management plan. Contractor to implement a safety management plan and an emergency response plan. Communication procedures to be developed and implemented between construction team and rail operator to provide advanced notification of changed conditions to rail operator and staff.	Possible	Moderate	High
8	12/10/2010	Risk	Construction	Construction activity incident	Train accident due to changed conditions during construction.	Injury to QR staff, passengers, public and or construction workers Service delays Project delays	Possible	Severe	High	Contractor to develop and implement a Traffic/Public/Commuter management plan. Contractor to implement a safety management plan and an emergency response plan. Communication procedures to be developed and implemented between construction team and rail operator to provide advanced notification of changed conditions to rail operator and staff.	Rare	Severe	High

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Likelihood	Without Mitigation Consequence	Risk	Mitigation Measure	Likelihood	After Mitigation Strategy Consequence	Residual Risk
9	12/10/2010	Risk	Construction	Construction activity incident	Vehicle accident due to changed conditions during construction	Injury to public (vehicle occupants/pedestrians/cyclists) and/or construction workers	Likely	Major	High	Contractor to develop and implement a Traffic/Public/commuter management plan. Contractor to develop and implement a safety management plan and an emergency response plan. Advanced community notification of changed traffic conditions, appropriate use of road side signage indicating changed traffic conditions. Consideration of the temporary reduction in posted speed limits if required.	Possible	Moderate	High
10	12/10/2010	Risk	Construction	Work within a live rail environment	Electrocution	Possible fatality	Unlikely	Severe	High	Appropriate training provided to people undertaking work within a live rail environment. All necessary working permits obtained by personnel undertaking work prior to work activity commencing. Isolation of rail electrical infrastructure prior to undertaking works (where possible) and Track Protection Officer to be present if required.	Rare	Severe	High
11	12/10/2010	Risk	Construction	Road header conflicts	Contact with unforeseen foundations	Impacts and damage to buildings and other infrastructure, third party litigation claims	Possible	Severe	High	Thorough analysis to confirm subsurface model for geotech, structures and services. Confirm construction methodology for existing structures including building surveys. Incident management procedures to be developed to manage such a situation.	Rare	Severe	High
12	12/10/2010	Risk	Construction	Contact with infrastructure in close proximity such as ICB	Temporary works and equipment such as crane booms, interfering with the operation of other infrastructure. Difficulty in accessing sites near other infrastructure.	Damage to property and other infrastructure. Interference with the operation of other infrastructure ie closures.	Possible	Severe	High	Identify any required closures prior to construction and ensure that alternative routes are identified for the duration of the closure. Construction methodologies to be in place to ensure that appropriate clearances between equipment and existing structures are maintained during construction.	Rare	Major	Medium
13	12/10/2010	Risk	Construction	Construction vehicles/equipment	Road dilapidation due to construction traffic and transport routes	Damage to roads Unsafe road conditions for motorists	Likely	Moderate	High	Ensure construction haulage routes are planned prior to construction using approved haulage routes. Pavement assessment to be undertaken to help determine acceptable haulage routes.	Possible	Moderate	High
14	12/10/2010	Risk	Construction	Falls/slips/trips	Construction staff unaware of risk of falls/slips/trips. Appropriate and safe equipment not utilised during construction.	Injury/possible fatality	Likely	Severe	Extreme	Safety awareness training provided to construction staff. Plant and equipment inspections undertaken prior to their use on site. Mandatory PPE standard to be implemented by Contractor. Ongoing monitoring of compliance by staff.	Unlikely	Major	Medium
15	12/10/2010	Risk	Construction	Changes due to community action	Community take action (including negative publicity and/or political action). Key issues include: community wins injunction to change working conditions (including limiting work hours). Train accidents/collisions due to communication failure or construction occurring at the wrong time/in the wrong location	Project delays resulting in increased time/length of construction Injury to passengers and public Service delays Project delays	Possible	Major	High	Comprehensive public consultation prior to and during construction. Where possible involve the affected community in the development of mitigation measures to create ownership in the process.	Unlikely	Major	Medium
16	12/10/2010	Risk	Construction	Signal failure/construction activity disruptions	Train accidents/collisions due to communication failure or construction occurring at the wrong time/in the wrong location	Injury to passengers and public Service delays Project delays	Possible	Severe	High	Contractor to develop and implement a traffic/public/commuter management plan. Contractor to develop and implement a safety management plan and an emergency response plan. Advanced notification of changed conditions to rail operator and QR staff. Discussion with rail operator regarding the temporary reduction in speed of rail services if required. Construction methodology to comply with QR standards in terms of track isolations.	Rare	Severe	High
17	12/10/2010	Risk	Construction	Spill transport	Transfer of spoil/waste material into trucks/carriages via conveyor	Injury/vehicle accident if spoil material spills off conveyor Dust emissions from transport of spoil	Likely	Moderate	High	Conveyer belts (if used) will be enclosed	Unlikely	Moderate	Medium
18	15/10/2010	Risk	Construction	Tunnel collapse or subsidence	Unexpected engineering fault, natural influence	Death and injury to workers. Property damage at ground level. Time implications to construction/operation schedules. Environmental impact.	Possible	Severe	High	Geotechnical investigations to be analysed to determine most appropriate construction method for the conditions. Best practice construction practices to be employed by construction team. Safety Management Plan and Emergency Response Plan/Procedures to be developed and deployed efficiently. Emergency training and coordination with State emergency departments.	Rare	Severe	High

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Without Mitigation			After Mitigation Strategy			
							Likelihood	Consequence	Risk	Mitigation Measure	Likelihood	Consequence	Residual Risk
19	12/10/2010	Risk	Cultural Heritage	Cultural Heritage	Significant Heritage (including BCC, QLD and Commonwealth Heritage listed properties and places), Landscape and Community Valued corridor elements (including Exhibition/Roma SI/Central stations) are impacted by construction.	Community advocacy or hostility and effects on project program and project delivery Damage to Heritage items.	Possible	Major	High	Communication with the Brisbane community detailing how these important cultural areas/Heritage items are being protected/enhanced by the project. Consider these issues in design and development of the construction methodology and programme. EMP to detail appropriate measures to minimise impacts to properties/places.	Unlikely	Moderate	Medium
20	12/10/2010	Risk	Cultural Heritage	Unknown artefacts	Uncovering or impacting on previously unknown Indigenous/non indigenous cultural heritage artefacts	Loss of heritage values. Breach of approvals and of legislation.	Possible	Major	High	Develop and implement a Cultural Heritage Management Plan that incorporates both Indigenous Traditional Owner negotiated strategies and non indigenous archaeological processes if any items are uncovered.	Unlikely	Minor	Low
21	12/10/2010	Risk	Ecology	Disturbance/loss of flora and fauna along corridor	Impact on fauna and vegetation/ habitat corridors and linkages. Potential for existence of isolated pockets of high-value habitat along corridor.	Loss of biodiversity/project delay/force alteration of corridor/ community concerns	Unlikely	Moderate	Medium	Design to take into consideration the ecological conditions of the area. Where necessary, steps within the EMP will be implemented to reduce impacts such as delineating the project boundary and involving a spotter catcher for removal of any hollow bearing trees. In addition, develop a community consultation strategy/approach to inform the public and stakeholders about the project in relation to ecological systems.	Rare	Minor	Low
22	12/10/2010	Risk	Ecology	Disturbance/loss of protected trees	Trees have high community values attached; potential threat of removal likely to generate strong community resistance	Loss of biodiversity Construction delay Force alteration of corridor Community values	Likely	Moderate	High	Design to take into consideration the relocation of significant trees where feasible. Discuss this issue during design/prior to construction through consultation with BCC and develop a community consultation strategy regarding the removal of any trees/vegetation of significance.	Possible	Moderate	High
23	12/10/2010	Risk	Emergency services	Emergency situation	Ineffective emergency response procedures in place during the construction of the Project	Ineffective response to an emergency situation resulting in increased impact to people and property	Likely	Severe	Extreme	Safety Management Plan and Emergency Response Plan/Procedures to be developed and deployed efficiently. State emergency service departments to be involved in the development of these plans to ensure their access and management requirements are captured appropriately. Roles and responsibilities are to be clearly stated and understood by all parties involved. Training exercises to be undertaken to determine the efficiency of the Emergency Response Plan/Procedures and improvements made where identified.	Rare	Severe	High
24	12/10/2010	Risk	Flooding / Drainage	Land use	Increased flood risk to existing land because of the construction of CRR infrastructure	Adjacent property/infrastructure damage and nuisance. Redirection of existing overland flow paths, environmental impacts.	Possible	Major	High	Design and construction methodology to take into consideration the impact of CRR construction on the flooding and hydraulics of surrounding areas and minimise this impact where possible. Hydraulic modelling to be undertaken during design.	Unlikely	Moderate	Medium
25	12/10/2010	Risk	Flooding / Drainage	Meteorological event, overland stormwater, seepage, river flooding, mechanical failure	Site works flood during construction	Injury to people, damage to property/infrastructure, construction delays	Likely	Major	High	Contractor to undertake hydraulic modelling to ensure that overland flows, underground flows and seepage are appropriately addressed through all phases of construction. Incident management procedures to include flood mitigation measures. Appropriate mechanical redundancies to be included during construction.	Possible	Moderate	High
26	12/10/2010	Risk	Hydrogeology	Groundwater seepage	Tunnelling impacts on groundwater	Seepage volumes may contribute to the flooding of excavated road works, soil erosion, and sediment migration to downstream surface water bodies or reduction of groundwater impacts on adjacent buildings/structures	Possible	Major	High	Develop a pre-dewatering and/or drainage system within elevated groundwater areas. Undertake detailed hydro-geology investigations of the area.	Unlikely	Major	Medium
27	12/10/2010	Risk	Hydrogeology	Dewatering impacts on surface water resources	Lack of integration with BCC zoning and planning processes. Lowered groundwater levels may affect surface water flows.	Drying up of surface water bodies and surface water ecosystems	Possible	Major	High	Undertake detailed hydro-geology investigations of the area prior to construction	Unlikely	Moderate	Medium
28	12/10/2010	Risk	Hydrogeology	Dewatering below ground excavations	Impact on water quality due to a controlled release of groundwater	Quality of surface water may be impacted by the controlled discharge of extracted groundwater from below ground sites	Likely	Moderate	High	Appropriate treatment of water prior to discharge into a surface water body or discharge of water into a stormwater drain.	Unlikely	Moderate	Medium

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Likelihood	Without Mitigation Consequence	Risk	Mitigation Measure	Likelihood	After Mitigation Strategy Consequence	Residual Risk
29	12/10/2010	Risk	Hydrogeology	Change in groundwater levels within the vicinity of adjacent bores	Risk of lowering groundwater levels in excavation areas, in adjacent bores	Drawdown of groundwater levels may impact groundwater supply at neighbouring bores	Possible	Moderate	High	Assess the locations of existing bores, bore intake intervals and groundwater levels both prior to and during road works excavation. Undertake detailed hydro-geology investigations of the area.	Unlikely	Moderate	Medium
30	12/10/2010	Risk	Hydrogeology	Impacting groundwater dependent ecosystems	Lowered groundwater levels may affect viability of species / ecosystems dependent on groundwater for survival	Lowering of groundwater levels may result in the lowering of the groundwater table and a reduction in available water for vegetation	Possible	Major	High	Identify groundwater dependent ecosystems during the EIS. Detailed hydro-geology investigations to be undertaken. Determine appropriate design to protect critical ecosystems.	Unlikely	Major	Medium
31	12/10/2010	Risk	Hydrogeology	Lowering groundwater levels within adjacent aquifers	Adverse impact on project of land acquisitions/ concerns of landowners and community. Lowered groundwater levels may affect groundwater levels in adjacent aquifers that are not directly impacted by the excavations	Groundwater levels in bores in adjacent aquifers may decline	Possible	Moderate	High	Undertake detailed hydro-geology investigations to determine appropriate design to minimise impact on adjacent aquifers. Identify users of aquifers. Undertake ongoing community consultation with affected community and residents.	Unlikely	Major	Medium
32	12/10/2010	Risk	Hydrogeology	Lowering groundwater levels within the vicinity of acid sulphate soils	Risk of oxidation and acid production, and mobilisation of acid into ground and surface waters, and consequential pollution of waters	Production of acid seepage through the oxidation of acid sulphate soils Leaching of metals Fish kills in local waterways	Possible	Major	High	Complete detailed ASS and hydrology investigations where ASS has been identified. Contractor to implement an ASS management plan during construction.	Unlikely	Major	Medium
33	12/10/2010	Risk	Hydrogeology	Contaminated water	Uncontrolled release of contaminated water runoff or contaminated groundwater	Environmental harm ANZECC water quality guidelines may be exceeded if impacted water is released to the environment. Release of contaminated water worsens the quality of an existing water body.	Possible	Moderate	High	Ensure appropriate containment measures are implemented during construction. Contractor to develop an incident management plan. Erosion and sediment control plans to be developed by appropriately qualified personnel and implemented. Appropriate water treatment procedures to be implemented and maintained.	Unlikely	Moderate	Medium
34	12/10/2010	Risk	Land	Contaminated sites	Contaminated lands (eg. service stations, land fill sites, existing rail corridor) intercepted by the project. Lack of footprint to stockpile material.	Health impacts affecting construction team and public Construction delays due to lack of stockpile area	Likely	Major	High	Contractor to develop contaminated land management plans for known sites. Approval process and required permits to be organised prior to the commencement of construction. Identification of stockpile locations prior to the commencement of construction.	Possible	Moderate	High
35	12/10/2010	Risk	Land	Contaminated sites	Uncontaminated sites affected by contaminated material	Contamination of previously uncontaminated sites within and surrounding the project area	Possible	Major	High	Contractor to develop contaminated land management plans and monitor compliance of personnel. Appropriate guidelines to be followed.	Unlikely	Major	Medium
36	12/10/2010	Risk	Land	Acid sulphate soil (ASS)	Encountering ASS during construction requiring specific storage, handling and amelioration	Environmental impact Impact to infrastructure and materials	Possible	Major	High	Contractor to develop contaminated land management plans and monitor compliance of personnel. Appropriate guidelines to be followed when dealing with ASS.	Possible	Moderate	High
37	12/10/2010	Risk	Land	Fire ants	Spreading of fire ants due to equipment/vehicles moving between construction zones/transport of spoil to Swanbank	Stings to animals/people Impact on outdoor lifestyle of community Damage to ecosystems	Likely	Major	High	Works to be undertaken in accordance with an approved Fire Ant Management Plan. Spoil to be covered during transportation.	Unlikely	Major	Medium
38	12/10/2010	Risk	Land Use Planning	Failure to make allowance for future development requirements	The construction requirements of any structures restrict the future development potential of land (development of Roma Street precinct, Boggo Road Urban Village, Woodongabba and Bowen Hills UDAS, CBD, Fortitude Valley and Spring Hill)	Potential sterilisation or restriction on land use	Unlikely	Moderate	Medium	Adaptive design of CRR infrastructure to take into account future development potential and requirements where possible	Unlikely	Moderate	Medium
39	12/10/2010	Risk	Noise and Vibration	Vibration during tunnelling	Significant vibration during tunnelling. Construction impacts on existing building and the local community.	Damages to buildings Community nuisance Steep disturbance	Possible	Major	High	Undertake dilapidation surveys prior to construction as well as detailed modelling to determine the area of influence. Relocate affected residents during construction. Provide ongoing consultation with affected communities to assist in determining best mitigations	Possible	Moderate	High

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Without Mitigation			After Mitigation Strategy			
							Likelihood	Consequence	Risk	Mitigation Measure	Likelihood	Consequence	Residual Risk
40	12/10/2010	Risk	Noise and Vibration	Increased vibration during construction	The use of TEMs/road headers creates tunnelling vibration	Damage to buildings/contents Sleep/disturbance Vibration nuisance	Likely	Major	High	Where necessary, residents to be temporarily relocated. Communication procedures developed and implemented which facilitate ongoing community consultation. Complaints process implemented. Monitoring of vibration to be undertaken where appropriate (ie on a complaints basis). Use alternative construction less intrusive construction techniques where practicable. Dilapidation surveys to be conducted prior to the commencement of construction.	Possible	Moderate	High
41	12/10/2010	Risk	Noise and Vibration	Construction noise and vibration	Earthworks generate excessive noise or vibration at sensitive receptors	Community impacts Generation of nuisance Cost implications	Almost Certain	Moderate	High	Noise barriers, appropriate hours of construction, acquisitions, alternative acoustic techniques, monitoring, community engagement, building treatments such as insulation.	Likely	Moderate	High
42	12/10/2010	Risk	Noise and Vibration	Over pressure/ground vibration	If blasting is required for the construction of the infrastructure	Vibration damage to nearby houses/buildings Vibration nuisance Sleep disturbance	Almost Certain	Moderate	High	Construction methodology to include restricted hours of blasting which is acceptable to the community. Use alternative construction less intrusive construction techniques where practicable. Monitoring of vibration to be undertaken where appropriate (ie on a complaints basis).	Possible	Moderate	High
43	12/10/2010	Risk	Social Values	Land acquisition	Land acquisitions required (full and partial)/concerns of landowners and community, negative reaction to land acquisitions	Public and community resistance to project Risk of a rise in value of land to be acquired Impact to livelihood of affected commercial/residential properties	Likely	Major	High	Provide adequate communication channels between potentially affected landholders, community and the CRP Project Team. Resumption requirements to be considered during design and minimised where possible.	Possible	Moderate	High
44	12/10/2010	Risk	Social Values	Visual and residential amenity	Amenity impacts due to size of construction site, proximity to residential areas and long construction duration	Increased noise and dust generation Decrease in property values Introduction of construction traffic Pressure on parking Disruption to existing access	Almost Certain	Major	Extreme	Implement EMP measures. Provide ongoing consultation with affected communities. Provide opportunities for affected landowners to have input into mitigation measures to create ownership in the process. Minimise visual impact of construction sites through appropriate use of screens and integrate the portals into the surrounding areas through appropriate urban design features.	Possible	Moderate	High
45	12/10/2010	Risk	Social Values	Community concern over ventilation stacks	Public protest over the location of ventilation stacks and manner in which they will be used	Human nuisance	Likely	Minor	Medium	Provide ongoing community consultation which addresses the community's concern regarding issues such as air quality and visual impacts.	Possible	Minor	Medium
46	12/10/2010	Risk	Social values	Community concern over shafts	Community concern over the use of shafts during construction	Human nuisance	Likely	Minor	Medium	Provide ongoing community consultation which addresses the community's concern regarding the use of shafts during construction.	Possible	Minor	Medium
47	12/10/2010	Risk	Sustainability	Continued economic activity in area affected by the project	Adverse impact on continued economic activity of the areas affected by the project	Poor community acceptance Loss of income/business	Likely	Moderate	High	Ongoing community consultation including the advanced notification of construction activities and duration. Construction methodology to consider impact to surrounding businesses such as alternative accesses and parking. Economic analysis of the project to consider impacts on surrounding areas from operation of CRP.	Possible	Moderate	High
48	12/10/2010	Risk	Traffic and Transport	Street network disruptions	Negative impacts on road network, due to required changes including closures arising from construction parking and haul route requirements	Road closures Community nuisance	Almost Certain	Moderate	High	Establish designated parking areas for construction team. Consult community on haul route requirements. Ensure construction haulage routes are planned prior to construction and that they are sufficient for the volume of traffic generated by the project. Contractor to monitor compliance with using the approved haulage routes/parking areas. Contingency 'backup' routes to be developed where possible.	Likely	Minor	Medium

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Likelihood	Without Mitigation Consequence	Risk	Mitigation Measure	Likelihood	After Mitigation Strategy Consequence	Residual Risk
49	12/10/2010	Risk	Traffic and Transport	Project traffic	Congestion and increased traffic generated as a result of the project	Congestion of street network and impacts on curbside activity Safety, capacity and noise issues for local and regional routes Community nuisance.	Possible	Moderate	High	Undertake detailed traffic and intersection analysis to determine traffic impacts of the project. Undertake construction site location assessments. Transport a percentage of spoil via rail to reduce traffic requirements. Ensure construction haulage routes are planned prior to construction and personnel use approved routes. Comply with ADR81 Noise testing for trucks. Choose appropriate travel route and hours of haulage. Building treatments (ie double/triple glazed windows, air conditioning). Cover spoil. Develop contingency site access where possible. Ongoing community consultation.	Possible	Minor	Medium
50	12/10/2010	Risk	Traffic and Transport	Bus operations during construction	Need to modify existing bus infrastructure for construction purposes	Travel time delays Poor level of service	Almost Certain	Minor	High	Consultation with bus operators and community. Implement Traffic Management Plan which incorporates bus network requirements.	Likely	Insignificant	Medium
51	12/10/2010	Risk	Traffic and Transport	Disruption to property access	Construction works requiring removal of property access	Loss of access to residential and commercial property	Likely	Severe	Extreme	Access impacts are identified prior to construction and alternative access arrangements provided where possible. Communication procedures developed and implemented to facilitate community consultation with affected land owners.	Possible	Moderate	High
52	12/10/2010	Risk	Traffic and Transport	Generation of spoil	Spillage of spoil during transportation to spoil placement areas (Svanbank)	Water pollution through sedimentation of waterways	Likely	Moderate	High	Communication with rail operator regarding the temporary reduction in speed of rail services if required. Construction methodology to comply with QR standards in terms of track isolations.	Unlikely	Minor	Low
53	12/10/2010	Risk	Traffic and Transport	Pedestrian and cyclist safety during construction	Safety of pedestrian and cyclists when crossing roads (eg Roma Street/Alice Street/CBD areas) in the vicinity of CRR construction sites and haulage routes	Injury/possible fatality Accident Traffic disruptions	Possible	Severe	High	Contractor to develop and implement a Traffic Management Plan during construction.	Rare	Severe	High
54	12/10/2010	Risk	Urban Design	Community concerns about visual impact during construction and operation of project	Aesthetic value of areas within the project are decreased due to construction areas (eg lay down areas and portals). Community complaints and public scrutiny.	Community hostility and effects on project program and project delivery	Almost Certain	Moderate	High	Provide ongoing consultation with affected communities. Provide opportunities for affected landowners to have input into mitigation measures to create ownership in the process. Minimise visual impact of construction sites through appropriate use of screens. Integrate the portals into the surrounding areas through appropriate urban design features.	Likely	Minor	Medium
55	12/10/2010	Risk	Waste	Asbestos	Asbestos particles in soils	Exposure resulting in injury/illness/possible fatality	Possible	Severe	High	Specialised/licensed contractors to be engaged. Undertake investigations, testing and monitor levels. Appropriate PPE to be worn. Encapsulation. Implement treatment and disposal procedures.	Possible	Minor	Medium
56	12/10/2010	Risk	Waste	Asbestos	Disturbance/demolition of buildings containing asbestos during construction activities (eg QR structures, Government buildings, Albert St sites)	Exposure resulting in injury/illness/possible fatality	Likely	Severe	Extreme	Specialised/licensed contractors to be engaged. Undertake investigations, testing and monitor levels. Appropriate PPE to be worn. Encapsulation. Implement treatment and disposal procedures.	Likely	Minor	Medium
57	12/10/2010	Risk	Waste	Excessive waste generation	Pressure on disposal facilities	Potential health and amenity impacts	Likely	Moderate	High	Adoption of waste hierarchy (reduce, reuse, recycle) Contractor to develop and implement an emergency response plan. Contractor to have adequate spill kits available and conduct spill kit training for all staff. Appropriate PPE to be worn. EIMP to capture approval, license conditions and required permits (consider if volumes trigger the requirement). Contractor to ensure that best practice storage techniques/methodology is implemented. All personnel to be trained in the transportation of dangerous goods and hazardous substances. Where possible, storage of dangerous goods or hazardous substances within the tunnel is to be excluded. Contractor to monitor compliance of personnel with safety procedures.	Possible	Minor	Medium
58	12/10/2010	Risk	Waste	Hazardous substances and dangerous goods	Incorrect storage, handling, use and transportation of hazardous substances or dangerous goods	Contamination of soil and ground or surface water from leakage or emission of fumes Injury to construction personnel or the public	Possible	Major	High	Contractor to develop and implement an emergency response plan. Contractor to have adequate spill kits available and conduct spill kit training for all staff. Appropriate PPE to be worn. EIMP to capture approval, license conditions and required permits (consider if volumes trigger the requirement). Contractor to ensure that best practice storage techniques/methodology is implemented. All personnel to be trained in the transportation of dangerous goods and hazardous substances. Where possible, storage of dangerous goods or hazardous substances within the tunnel is to be excluded. Contractor to monitor compliance of personnel with safety procedures.	Unlikely	Moderate	Medium

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Without Mitigation			After Mitigation Strategy		
							Likelihood	Consequence	Risk	Likelihood	Consequence	Residual Risk
59	12/10/2010	Risk	Waste	Spill disposal	Identified disposal location (Swanbank) does not have available capacity to accept the spill generated by the project	Project delays Additional cost in sourcing alternative disposal location	Possible	Moderate	High	Rare	Moderate	Medium
OPERATIONS												
1	12/10/2010	Risk	Climate Change	Extreme weather conditions (high rainfall, heat)	More frequent or severe flooding and heat wave events due to climate change	Unusable construction sites/disruption to operation, extreme heat causing buckling of tracks/rail infrastructure, electrical fault causing train to stop in tunnel	Possible	Major	High	Possible	Moderate	High
2	12/10/2010	Risk	Emergency services	Emergency situation	Ineffective emergency response procedures in place during the operation of the Project	Ineffective response to an emergency situation resulting in increased impact to people and property	Likely	Severe	Extreme	Rare	Major	Medium
3	12/10/2010	Risk	Flooding / Drainage	Meteorological event, overland stormwater, underground stormwater, seepage, river flooding, mechanical failure	The station accesses, station and/or tunnels flood during operation	Injury to people, damage to property/infrastructure, disruption to commuter services, evacuation of commuters and employees	Possible	Major	High	Unlikely	Major	Medium
4	12/10/2010	Risk	Noise and Vibration	Increased regenerated noise and/or vibration during operation (underground)	Increased vibration due to the operation of CRR (underground)	Nuisance Damage to building/contents	Possible	Major	High	Unlikely	Moderate	Medium
5	12/10/2010	Risk	Noise and Vibration	Increased above ground noise during operation	Increased noise due to operation of CRR (surface)	Noise nuisance	Almost Certain	Moderate	High	Likely	Moderate	High
6	12/10/2010	Risk	Noise and Vibration	Mechanical plant noise from ventilation	Increased noise from operation of tunnel and station ventilation	Noise nuisance	Likely	Moderate	High	Likely	Moderate	High
7	12/10/2010	Risk	Operation	Capacity of stations exceeded	Crowding during public events such as Ekka, Bridge to Brisbane, sporting and entertainment events	Injury to people Community nuisance	Possible	Moderate	High	Unlikely	Minor	Low
8	12/10/2010	Risk	Operation	Major equipment breakdown	Failure of traction power, failure of signalling, broken rail, ventilation system, substation, switchboards, escalators and lifts, failure at Mayne Control Centre	Interruptions to services Commuter delays Community nuisance	Possible	Major	High	Unlikely	Major	Medium
9	12/10/2010	Risk	Operation	Fires	Fires resulting from arson, failure or fault with overhead traction power wiring, maintenance activities and/or equipment	Injury/possible fatality Damage to property/environment	Possible	Severe	High	Unlikely	Major	Medium
10	12/10/2010	Risk	Operation	Acts or 'terrorism'	Terrorist attack on public transport infrastructure due to political unrest	Major fires/explosions Injury/possible fatality Damage to property/environment Water/air pollution with toxic chemicals through smoke emissions	Possible	Severe	High	Rare	Severe	High

Ref.	Date	Risk/Opportunity	Category	Hazard	Description of Risk	Impact	Without Mitigation			After Mitigation Strategy			
							Likelihood	Consequence	Risk	Mitigation Measure	Likelihood	Consequence	Residual Risk
11	12/10/2010	Risk	Operation	Tunnel collapse or subsidence	Unexpected engineering fault, natural influence (ie earthquake)	Possible fatality and injury to operational staff and public Property damage at ground level Construction delays Environmental impact	Possible	Severe	High	Safety Management Plan and Emergency Response Plan/Procedures to be developed and deployed efficiently. Emergency training and coordination with State emergency departments. Maintenance schedule and procedures to be developed and implemented by operator to ensure efficient operation of plant and equipment and stability of infrastructure. Implementation of surveillance technologies, separation techniques ie sliding doors enclosing underground stations/encircling and awareness techniques ie signage, trespassing fines/prosecution.	Rare	Severe	High
12	12/10/2010	Risk	Public Safety	Trespassing	Unauthorised entry to tunnels/tracks, vandalism	Possible fatality and injury Property damage Service delays Visual/aesthetic impacts	Possible	Severe	High		Rare	Severe	High
13	12/10/2010	Risk	Social Values	Community severance	Creating community severance in areas surrounding the project	Community severance Reduced access to community services Nuisance	Possible	Moderate	High	Community consultation. Design to facilitate community access during construction and operation. Inclusion of appropriate urban design features.	Unlikely	Moderate	Medium
14	12/10/2010	Risk	Social Values	Cumulative impact of recent infrastructure projects (eg Clem7 tunnel, Boggio Road Urban Village and tennis court, TOD in southern section) Disabled access	Community concerns regarding ongoing impacts	Nuisance Decreased public health	Likely	Moderate	High	Integration with other projects where possible. Provide ongoing consultation with affected communities. Provide opportunities for affected landowners to have input into mitigation measures to create ownership in the process.	Possible	Moderate	High
15	12/10/2010	Risk	Social Values	Disabled access	Lack of incorporation of access for community members with a disability	Inequity	Unlikely	Major	Medium	All stations to be compliant with the <i>Disability Discrimination Act 1992</i> .	Rare	Moderate	Medium
16	12/10/2010	Risk	Sustainability	Provision of sustainable transport solution	A sustainable transport solution not provided or sustainability guidelines are not complied with eg project does not meet demand/demand does not exist	Railway not utilised to its capacity Infrastructure does not benefit the community	Unlikely	Major	Medium	Business case to confirm viability of project. Best practice to be used to ensure that value for money is achieved.	Rare	Moderate	Medium
17	12/10/2010	Risk	Traffic and Transport	Rail Operations, Network integration	Interim options may not successfully work where delays occur (eg stations, signals if no priority). Closures of passenger lines. Impact on freight services.	Travel time delays Poor level of service	Possible	Moderate	High	Develop operational plans for interim options including alternative services such as rail bus.	Unlikely	Moderate	Medium
18	12/10/2010	Risk	Traffic and Transport	Station entrances	If station entrances are not in the appropriate number of places, passenger experience would be decreased	Transport outcomes not being maximised	Possible	Minor	Medium	Station access designed taking into account integrated transport outcomes.	Unlikely	Minor	Low
19	12/10/2010	Risk	Traffic and Transport	Pedestrian and cyclist safety during operation	Safety of pedestrians and cyclists when accessing CRR infrastructure, specifically when crossing roads to access stations	Injury/possible fatality Accident involving pedestrians/cyclists and vehicles Traffic disruptions	Possible	Severe	High	Design to incorporate appropriate pedestrian and cycle linkages to the stations including the addition of safety features such as traffic islands and designated crossings.	Rare	Severe	High
20	12/10/2010	Risk	Urban Design	Community concerns about visual impact during construction and operation of project	Aesthetic value of areas within the project are decreased due to construction areas (eg lay down areas and portals). Community complaints and public scrutiny.	Community hostility and effects on project program and project delivery	Almost Certain	Moderate	High	Provide ongoing consultation with affected communities. Provide opportunities for affected landowners to have input into mitigation measures to create ownership in the process. Minimise visual impact of construction sites through appropriate use of screens. Integrate the portals into the surrounding areas through appropriate urban design features.	Likely	Minor	Medium