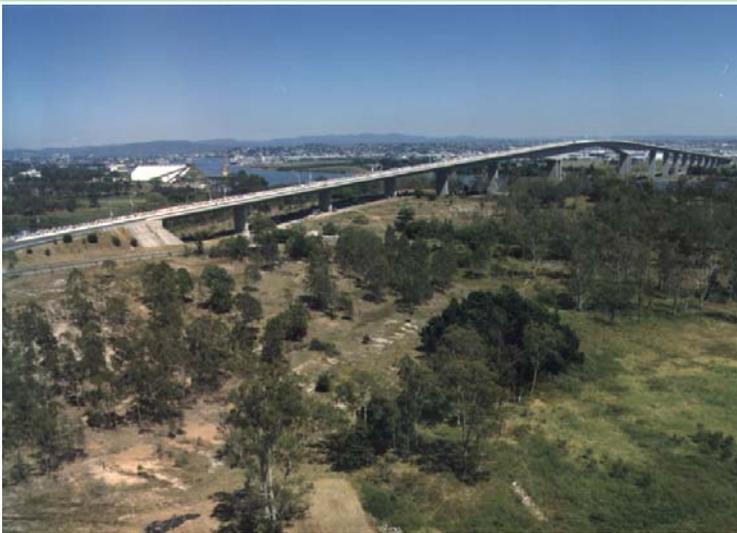




# Gateway Upgrade Project



## 21. Hazard and Risk

# 21

## 21. Hazard and Risk

### 21.1 Introduction

#### TOR Requirements:

This section is to describe the potential hazards and risk that may be associated with the project. The transportation of dangerous goods and the storage of fuels are issues to be considered in the EIS. Due regard to the safe movement of 'dangerous goods' in accordance with the Transport Operations (Road Use management) Act 1995, the Transport Operations (Road Use management- Dangerous Goods) Regulations 1998 and the Dangerous Goods Safety Management Act 2000 is required.

The environmental values likely to be affected by any hazardous materials and actions incorporated in the project are to be detailed, as should the degree and sensitivity of each risk. Reference should be made to the Department of Emergency Services Disaster Management Book.

The Gateway Motorway is a designated dangerous and hazardous transport corridor as a result of its direct accessibility to the industrial areas surrounding the Motorway, the Port of Brisbane and due to its intended function as a major bypass of the CBD area of Brisbane City. Dangerous and hazardous goods are transported along the Gateway Motorway on a daily basis.

In Queensland, the packaging and transportation of hazardous and dangerous goods is administered through the *Transport Operation (Road Use Management) Act 1995* and the associated *Transport Operation (Road Use Management - Dangerous Goods) Regulation* and at a national level by the *Australian Dangerous Goods Code (ADG Code)*. The ADG Code sets out technical requirements and guidelines for the transport of dangerous goods by road and rail and is implemented by State and Territory legislation.

### 21.2 Potential Hazards and Risks

Dangerous and hazardous goods are substances or articles with hazardous properties, which may, if handled incorrectly:

- Explode;
- Asphyxiate;
- Burn;
- Make explosive mixtures;
- Poison;
- Eat skin or metal;
- Pollute the environment; or
- Become unstable if mixed with other products.

Depending on their properties, dangerous goods are assigned a number known as its United Nations (UN) number and a class number. Dangerous goods classes are represented by a distinctive and specific class label in the shape of a diamond sign attached to any consignment and vehicle. Examples of materials and their classification are:

Class Description	Example
1 Explosives	Gelignite, fireworks, ammunition, marine flares
2.1 Flammable gas	LPG, acetylene
2.2 Non-flammable – Non-toxic gas	Carbon dioxide, refrigerant gas
2.3 Toxic gas	Chlorine (gas), ammonia
3 Flammable liquids	Paint thinners, kerosene, petrol
4.1 Flammable solids	Matches, sulfur
4.2 Spontaneously combustible	White phosphorus, activated carbon

4.3	Dangerous when wet	Calcium carbide, sodium metal
5.1	Oxidizing substances	Sodium peroxide, calcium hypochlorite, (pool chlorine), ammonium nitrate
5.2	Organic peroxides	Methyl ethyl ketone peroxide (MEKP)
6.1	Toxic substances	Sodium cyanide
6.2	Infectious substances	Clinical or medical waste
7	Radioactive substances	Uranium
8	Corrosives	Sodium hydroxide (caustic soda), hydrochloric acid
9	Miscellaneous dangerous goods	Asbestos, dry ice

A qualitative risk assessment of the potential hazards and risks associated with the construction and operational phases of the GUP was undertaken as part of the EIS. As a part of the risk assessment consultation was undertaken with the *Executive Manager and the Risk Initiatives Officer – Operations, Risk and Planning of Queensland Fire and Rescue Service (QFRS)*. The assessment included a review of available accident data between 1997-2004 for accidents/incidents along the Gateway Motorway or in the immediate vicinity of the Motorway.

The environmental values likely to be affected by any hazardous materials and actions incorporated in the project were identified together with the degree and sensitivity of each risk.

The risk assessment, for the construction and operational phases, was undertaken in accordance with the *Queensland Department of Emergency Services - Disaster Risk Management Guideline – Section (Analyse Risks)* and is presented in Table 21.1. This table describes the potential hazard, describes the likely environmental values that may be affected by the hazard, presents the qualitative assessment and proposes prevention and mitigation strategies to be adopted for the GUP.

Table 21.1 Potential Hazards and Risk Assessment

Description of Environmental Aspect/Hazard	Description of Potential Environmental Impact (Consequence of Environmental Values Likely Affected)	Frequency of Occurrence/ Environmental Impact	Qualitative Risk/Impact Analysis	Assigned Risk/Impact Classification	Risk/Impact Treatment/ Prevention/Mitigation Measures	
					Risk/Impact Treatment Options	Description of Proposed Prevention/ Mitigation Measures
<b>Construction phase</b>						
Operation of site vehicles and construction equipment resulting in a leakage and/or spillage of oils, fuels and other dangerous goods and hazardous materials within the project.	Contamination of soil and groundwater from a leakage/spillage of dangerous goods and/or hazardous materials within the vicinity of the vehicle incident.	Might occur during the project. (Possible - level C).	Small-localised impact on the environment with no lasting effects. (Minor – Level 2).	Moderate risk – management responsibility must be specified.	Risk reduction – Reduction of likelihood and consequence of impacts.	Construction Contractor to ensure all vehicles and construction equipment are maintained in accordance with maintenance schedules. The Construction Contractor is to ensure spill control kits are readily available across project site.

**Table Notes:**

1. Qualitative assessment based on data supplied by the Queensland Fire and Rescue Service Motor Vehicle and Hazard Materials database for the Gateway Motor and supporting road network.
2. The data did not identify the location of the accident along the Gateway Motorway.
3. Data for the qualitative assessment based on the period from 1997 – 2004.
4. The data only differentiates the hazardous material as either a fuel spill or chemical spill. The data did not provide specific information about the dangerous goods classification or type of chemical spill.

Description of Environmental Aspect/Hazard	Description of Potential Environmental Impact (Consequence of Environmental Values Likely Affected)	Frequency of Occurrence/ Environmental Impact	Qualitative Risk/Impact Analysis	Assigned Risk/Impact Classification	Risk/Impact Treatment/ Prevention/Mitigation Measures	
					Risk/Impact Treatment Options	Description of Proposed Prevention/ Mitigation Measures
Construction site office, storage of construction materials and supporting amenities resulting in a leakage and/or spillage of dangerous goods and hazardous materials within the dedicated construction site storage facilities.	Contamination of soil and groundwater from a leakage/spillage of dangerous goods and/or hazardous materials within the vicinity of the dedicated construction site-storage facilities.	Might occur during the project. (Possible - level C).	Small-localised impact on the environment with no lasting effects. (Minor – Level 2).	Moderate risk – management responsibility must be specified.	Risk reduction - Reduction of likelihood and consequence of impacts.	The Construction Contractor should ensure storage of dangerous goods and/or hazardous materials in the dedicated construction site-storage facilities is in accordance with the Construction EMP.  All construction storage facilities used to store dangerous goods and/or hazardous materials will be designed in accordance with dangerous goods standards/ guidelines.

**Table Notes:**

1. Qualitative assessment based on data supplied by the Queensland Fire and Rescue Service Motor Vehicle and Hazard Materials database for the Gateway Motor and supporting road network.
2. The data did not identify the location of the accident along the Gateway Motorway.
3. Data for the qualitative assessment based on the period from 1997 – 2004.
4. The data only differentiates the hazardous material as either a fuel spill or chemical spill. The data did not provide specific information about the dangerous goods classification or type of chemical spill.

Description of Environmental Aspect/Hazard	Description of Potential Environmental Impact (Consequence of Environmental Values Likely Affected)	Frequency of Occurrence/ Environmental Impact	Qualitative Risk/Impact Analysis	Assigned Risk/Impact Classification	Risk/Impact Treatment/ Prevention/Mitigation Measures	
					Risk/Impact Treatment Options	Description of Proposed Prevention/ Mitigation Measures
<b>Operation Phase</b>						
Leakage of oils, grease, and other hydrocarbon based pollutants into downstream environments and waterbodies external to the Gateway Motorway corridor from vehicles during normal operation.	Contamination of downstream environments, waterbodies, and sensitive habitats from uncontrolled runoff resulting from leakage of hydrocarbon based wastes and contaminated materials including dangerous goods / hazardous materials.	Is expected to occur in most circumstances (almost certain A). The operations of motor vehicles with defects may result in substantial quantities of oils, grease and other hydrocarbon based pollutants.	The extent of the environmental impact could be significant depending on where a leakage discharges to a receiving environment. Environmental impacts are likely to be significant and long term (Moderate Level 3) if they are not contained and treated.	Extreme risk, immediate action required.	Risk reduction - Reduction of likelihood and consequences of the environmental impact. (Implement measures to prevent the contaminated liquid waste streams from entering a watercourse).	Liquid wastes (hydrocarbon based) containing pollutants will be collected in first flush containment structures and wetland detention basins located within the GUP road reserve. Leakage occurring on bridges (Gateway, Kedron Brook Floodway, and Bulimba Creek) will be collected in first flush containment structures on the bridge and released at locations that are directed away from watercourses.

**Table Notes:**

1. Qualitative assessment based on data supplied by the Queensland Fire and Rescue Service Motor Vehicle and Hazard Materials database for the Gateway Motor and supporting road network.
2. The data did not identify the location of the accident along the Gateway Motorway.
3. Data for the qualitative assessment based on the period from 1997 – 2004.
4. The data only differentiates the hazardous material as either a fuel spill or chemical spill. The data did not provide specific information about the dangerous goods classification or type of chemical spill.

Description of Environmental Aspect/Hazard	Description of Potential Environmental Impact (Consequence of Environmental Values Likely Affected)	Frequency of Occurrence/ Environmental Impact	Qualitative Risk/Impact Analysis	Assigned Risk/Impact Classification	Risk/Impact Treatment/ Prevention/Mitigation Measures	
					Risk/Impact Treatment Options	Description of Proposed Prevention/ Mitigation Measures
Spillage of oils, grease, dangerous goods into downstream environments and waterbodies external to the road corridor from vehicles and dangerous goods vehicles (DGV) involved in an accident.	Contamination of downstream environments, waterbodies, and sensitive habitats from uncontrolled runoff resulting from spillage of hydrocarbon based wastes and contaminated materials including dangerous goods/hazardous materials.	A qualitative assessment of motor vehicle accidents involving dangerous goods/ hazardous materials indicates that MVA occur along the Gateway Motorway and connecting network (1, 2, 3, and 4). It may occur only in exceptional circumstances (Level E rare).	The extent of the environmental impact could be significant depending on where a spillage discharges to a receiving environment. Environmental impacts are likely to be significant and long term (Moderate Level 3) if they are not contained and treated.	Moderate risk – management responsibility must be specified.	<p>Risk reduction – Reduction of likelihood and consequences of the environmental impact. (Implement measures to prevent the contaminated liquid waste streams from entering a watercourse).</p> <p>Risk avoidance - Improved road design and vehicle safety systems should also contribute to minimising DGV accidents.</p>	Spillage of liquid wastes (hydrocarbon based and hazardous materials) containing pollutants will be collected in first flush containment structures and wetland detention basins located within the GUP road reserve. Spillage occurring on bridges (Gateway, Kedron Brook Floodway, and Bulimba Creek) will be collected in first flush containment structures on the bridge and released at locations that are directed away from watercourses.

**Table Notes:**

1. Qualitative assessment based on data supplied by the Queensland Fire and Rescue Service Motor Vehicle and Hazard Materials database for the Gateway Motor and supporting road network.
2. The data did not identify the location of the accident along the Gateway Motorway.
3. Data for the qualitative assessment based on the period from 1997 – 2004.
4. The data only differentiates the hazardous material as either a fuel spill or chemical spill. The data did not provide specific information about the dangerous goods classification or type of chemical spill.

### **21.3 Mitigation Measures**

#### **TOR Requirements:**

This section is to outline strategies for hazard and risk management including access and egress for emergency vehicles, the adequate provision of hydrant water systems and the specific details of the traffic management system. Further details on these matters can be obtained from the Manager, Regional Planning, Brisbane Region, Queensland Fire and Rescue Services.

In developing the mitigation measures for GUP in relation to hazard and risk management, consultation was undertaken with the *Executive Manager and the Risk Initiatives Officer – Operations, Risk and Planning of Queensland Fire and Rescue Service (QFRS)*.

#### **21.3.1 Incident Management Strategies – Construction Phase**

Strategies for containment of hazardous or dangerous spills associated with construction activities are presented in Section 12 (Surface Water Quality) and Section 23 (EMP).

#### **21.3.2 Incident Management Strategies – Operational Phase**

The design and operational procedures for the Motorway will provide a safe and reliable route for the transportation of hazardous goods. The existing Motorway is used daily in the transportation of hazardous goods.

Issues to address in the design and operation of the works include:

- Public safety;
- Incident control and management;
- User control and management; and
- User safety.

To provide the required safety levels for the Motorway effective traffic management and incident management procedures will be developed and implemented throughout the life of the project. The final traffic and incident management procedures will be developed to comply with MR's policies and will be integrated with MR's existing traffic management facilities. Onsite and Offsite Emergency Response and Operational Plans will be developed for the operational phase of GUP. The development of the Off-site Emergency Response Plan (ERP) will be undertaken in conjunction with QFRS.

A traffic management system will be installed to monitor the operations of the through carriageway, entry and exits and the shared pedestrian and bicycle pathway, if included within the duplicated bridge. The backbone of the traffic management system will be a state-of-the-art Intelligent Transport System (ITS) utilising latest traffic management hardware and software. The ITS hardware will be connected along the length of the Motorway and to the traffic management centre via fibre optic cables ensuring high reliability of the data transfer.

Proposed features of the ITS system include:

- Variable speed limit signs;
- Closed circuit television (CCTV) cameras with tilt, pan, zoom (TPZ) operations;
- Emergency telephones located at breakdown bays for use by motorists;
- Vehicle detection loop systems;
- Stopped vehicle detection systems;

- Direct communication protocols with emergency services ie. police, fire services, and ambulance;
- Variable Message Signs (VMS) to warn drivers of events such as traffic congestion, accidents etc;
- Vehicle counting sites;
- Dynamic Weigh in Motion (WIM) sites; and
- Traveller information systems.

### **21.3.3 Access and Egress for Emergency Vehicles**

Emergency Services vehicles, such as fire and rescue, ambulance and police vehicles, may use the Motorway in responding to normal emergency operations or indeed may be required to respond to incidents/emergencies on the Motorway. Ready access to the Motorway and along the length of the Motorway is critical in minimising emergency response times.

The concept design of the GUP incorporates the following features to facilitate access for emergency services vehicles. Refer to the concept design drawings in Volume 3:

- Reduced traffic congestion on the Motorway and adjacent road network by maintaining minimum service levels;
- Provision of 3.0m outside shoulder along the full length of both carriageways (except at some bridges) to allow for the storage of broken down vehicles or those involved in an accident, or for the passage of emergency service vehicles in the event of a congested motorway carriageway;
- Emergency vehicle crossing locations by strategically positioned locations within the solid concrete median or landscaped medians to allow emergency service vehicles to undertake "U" turns on the through carriageways;
- Ability of the traffic management centre to control traffic signals provide priority to emergency services vehicles wishing to enter the Motorway via the adjacent road network;
- Ready access at each end of the shared pedestrian and bicycle pathway (if approved) by the use of removable bollards, or the like, to facilitate access for emergency vehicles for either an emergency on the pathway or for additional access to the southbound carriageway. The anti-trash screen proposed to be located between the pathway and the southbound carriageway would be designed with openable panels within the screen that can facilitate the passage of people and equipment in an emergency situation; and
- Fire hydrants to be located at all emergency breakdown bays along the length of the Motorway, including the provision of a fire main and hydrants at 60m centres along the full length of both Gateway Bridges.

## **21.4 Conclusion**

A risk assessment of the potential hazards and risks associated with the construction and operational phases of the GUP has identified that GUP will improve safety for users and the environment by improving traffic operations of the Motorway, affording easier and more direct access for emergency services vehicles and improving current traffic and incident management procedures.