

Chapter 14 Hazards and risk

This chapter examines the hazards and risks associated with hazardous goods during construction and after the Proposal is complete. It also examines the hazards and risk to the public during the construction of the Proposal.

14.1 Background

14.1.1 Proposal background and issues

The Pacific Highway has a road accident history that is generally considered to be unacceptable in today's society. The Pacific Highway Upgrading Program aims to improve the single carriageway sections of the current highway to high standard dual carriageway and thereby reduce accident rates.

Recently completed projects, such as the Taree Bypass, Bulahdelah to Coolongolook and Yelgun to Chinderah, have demonstrated significantly reduced accident numbers, injuries and fatalities within the sections constructed (RTA 2004d).

14.1.2 Hazards and risk assessment

A qualitative assessment has been undertaken to examine the risks associated with accidents involving hazardous goods during construction and after the Proposal is complete, and the risks of accidents affecting the public during the construction of the Proposal.

The assessment has been completed using the concept design for the preferred route as described in Chapters 6 and 7 as a basis.

14.1.3 Dangerous goods

Dangerous goods are as defined by the *Road and Rail Transport (Dangerous Goods) Act 1997* and the *Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998*. They are divided into the following nine classes under the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (Australian Dangerous Goods Code) (National Road Transport Commission 1992), based on their predominant hazard:

- Class 1 - Explosives
- Class 2 - Gases: compressed, liquefied or dissolved under pressure
- Class 3 - Flammable liquids
- Class 4 - Flammable solid substances liable to spontaneous combustion and substances that, in contact with water, emit flammable gases
- Class 5 - Oxidising agents and organic peroxides
- Class 6 - Poisonous (toxic) and infectious substances
- Class 7 - Radioactive substances
- Class 8 - Corrosive substances
- Class 9 - Miscellaneous dangerous goods.

Dangerous goods that may relate to the Proposal are listed in Table 14–1 and Table 14–3.

14.2 Hazards and risks during construction

The Proposal would be constructed as sections of duplication of the existing carriageway and sections of bypass.

Although the sections of the highway that are to be duplicated are away from the immediate vicinity of the townships of Kew and Johns River, they would be built adjacent to traffic using the existing highway and would be close to existing properties along the route. The staging of such works would therefore be critical to ensure that risks to both the public and construction staff are minimised at all times.

Bypass sections would be constructed away from the immediate vicinity of the townships of Kew and Johns River, and away from existing major roads. The likelihood of accidents during construction resulting in potentially dangerous situations for members of the public in these sections is therefore low, although some risk would remain where the Proposal passes close to existing residences and local roads. Risks to construction staff are discussed below.

Even where risks to the public or construction staff are low, appropriate measures would be implemented to ensure such risks are minimised.

14.2.1 Hazardous materials used during construction

Materials to be used during construction would be determined by the final design and by the construction contractor(s) as dictated by the construction methods employed at the time. However, regardless of the construction methods adopted, it is reasonable to assume that the dangerous and hazardous goods listed in Table 14–1 would or could be used.

Based on the use of these dangerous and hazardous materials, there would be a risk of accidents on the construction site during delivery, storage, transportation or use.

Table 14–1 Dangerous and hazardous materials likely to be used during construction

Dangerous goods	Hazardous substances
Explosives	Cement
Distillate Fuel	Fly ash
Petrol	Paints
Oils, grease and lubricants	Epoxies
Additives (e.g. plasticizers and preservatives)	Solvents and thinners
Gases (e.g. oxygen and acetylene)	Lime
Bitumen	

14.2.2 Hazardous activities during construction

There are many common hazards associated with construction activities, which should be well understood by competent contractors. Therefore, this chapter focuses on identification of those construction hazards that are created as a consequence of the selection of the preferred route, or those that would have a potential impact upon the public.

Potential hazards and potential management and mitigation measures are identified in Table 14–2.

The construction contractor(s) would manage hazards that have the potential to occur during construction by undertaking a specific risk assessment and through the implementation of appropriate controls documented in management plans and procedures.

Under NSW State Government guidelines, the construction contractor(s) would be required to develop a Project Occupational Health, Safety and Rehabilitation (OHS&R) Management Plan. The OHS&R Plan would include site-specific Safety Management Plans and Safe Work Method Statements (SWMS) and would identify a range of measures to protect the construction contractor's employees, subcontractors and the general public during construction.

Table 14–2 Construction hazard assessment

Hazard	Example Mitigation Measures
General activity	
General construction hazards	<ul style="list-style-type: none"> Selection of competent construction contractor(s) Development of Safety Management Plans Development of Safe Work Method Statements Development of sound environmental controls Staff induction and training Restriction of public access to work site
Use of Dangerous and Hazardous Goods	<p>Delivery, storage, transportation and use in accordance with <i>Road and Rail Transport (Dangerous Goods) (Road) Regulation, 1998</i> and the <i>Occupational Health and Safety Regulation 2001</i>, including:</p> <ul style="list-style-type: none"> - development of Safe Work Method Statements - compliance with Material Safety Data Sheets - safe and secure storage facility (including bunding) - minimum on-site storage - staff training
Site establishment	
Construction vehicles entering/ leaving live traffic	Traffic study to improve layout of site entrances and exits
Location of site compounds and welfare	<ul style="list-style-type: none"> Ensure construction staging maintains access routes Design to maintain emergency access on to site
Mud on highway	Incorporate wheel washes
Site clearance	
Heavy cutting and mulching equipment	Selection and maintenance of suitable plant and machinery
Earthmoving equipment	Staff training
In ground utility services	Identification of utility services and diversion if required
Creation of topsoil storage stockpiles	Design of temporary stockpiles
Earthmoving	
Earthmoving equipment	Selection and maintenance of suitable plant and machinery
Bulk material haulage	Separation of vehicle and pedestrian movements
Drainage	
Excavation equipment	Selection and maintenance of suitable plant and machinery
Trench work	Use of trench support systems
Lifting and craneage	Use of trained doggers and riggers
Bridges and retaining walls	
Lifting and craneage	Selection and maintenance of suitable plant and machinery
Use of concrete	Planned pours, skin protection etc
Work at height	Use of trained doggers and riggers
Work over water	<ul style="list-style-type: none"> Provide working platforms and edge protection (e.g. scaffold) Design temporary platforms/cofferdams, safety boats etc

Hazard	Example Mitigation Measures
Pavement	
Crushing plant	Selection and maintenance of suitable plant and machinery
Grading and compaction equipment	Staff training
Concrete batching plant, and paving equipment	Separation of vehicle and pedestrian movements
Asphalt batching plant and paving equipment	
Work adjacent to traffic	
Construction vehicles entering/leaving live traffic	Planned and signed entry and exit points
Site staff crossing live carriageway	Ban crossing of carriageway, except at designated 'safe' crossing points
Site staff hit by errant vehicle from highway	Review separation zone or barriers between live traffic and workforce
Temporary highway alignments/staging	Traffic Management Plan
Work adjacent to railway	
Construction methods endangering railway	Compliance with RailCorp safety requirements
Site staff crossing railway	Rail safety training (Track Safety Awareness)
Site staff hit by trains	Development of specific safety plans

14.2.3 Dangerous goods handling procedures during construction

As identified in Section 14.2.1, there is potential for various dangerous goods to be used during construction of the Proposal.

The construction contractor(s) and subcontractors would be required to comply with legislative requirements for the transport, storage and use of dangerous goods during construction, in accordance with the *Occupational Health & Safety Regulation 2001* and *Road and Rail Transport (Dangerous Goods) (Road) Regulation 1998*.

Under the *Occupational Health and Safety Act 2000* and *Occupational Health and Safety Regulation 2001* the construction contractor(s) would also be required to undertake a formal risk assessment of the hazards associated with the handling of dangerous goods, and to only use hazardous or dangerous substances where a Material Safety Data Sheet (MSDS) is available from the supplier.

Measures the construction contractor(s) would be anticipated to use to ensure the safe handling of dangerous goods during construction of the Proposal include:

- ensuring quantities of dangerous goods stored on site are kept to a minimum, and that only compatible dangerous goods are stored adjacent to each other
- providing suitable safe storage for dangerous goods
- providing suitable safe methods of disposal for dangerous goods in a manner appropriate to the particular material
- training employees in the storage, handling, use and safe disposal of dangerous goods
- procedures, training and equipment for emergency containment in the event of a spillage or accident, and notification to the relevant authorities
- establishment and maintenance of appropriate records.

14.2.4 Risk to the public related to different methods of construction

The Proposal would not be constructed in very close proximity to major residential areas, however a significant length is constructed adjacent to the existing highway and railway line.

Public safety is paramount. The construction contractor(s) would be required to comply with all health and safety legislation to ensure that the worksite remains safe and secure from risk to the public. Generally, this would be achieved by constructing the permanent boundary fencing in order to provide physical separation between the public and the construction site, as soon as sufficient clearing has been undertaken during the site preparation phase.

Key areas where it is anticipated the construction contractor(s) would undertake a detailed assessment of the risks to the public include:

- where the Proposal is constructed adjacent to the existing highway, a detailed study of traffic staging and temporary works required to construct the works with minimum risk to both the public and construction staff
- construction adjacent to the railway line, which would be undertaken in accordance with RailCorp safety requirements
- construction of interchanges and the tie-ins to existing roads
- construction of bridges, both during construction of piers (which may be in water) and working at height during deck construction.

Precise methods of construction would be determined by the successful construction contractor(s), however it is anticipated that measures to manage and mitigate hazards would generally be those identified in Section 14.2.2.

14.3 Hazard and risk during operation

The main sources of risk during operation of the Proposal that would potentially affect road users or natural systems are:

- Environmental:
 - contaminants arising from normal operation of the highway carried by surface runoff
 - spills of dangerous goods and other pollutants as a result of accidents or similar events.
- Safety:
 - accidents affecting road users
 - accidents involving dangerous goods affecting both road users and adjacent residents and the environment.

14.3.1 Environmental risks

Contaminants that may be carried by surface run-off due to normal operation of the highway may include:

- exhaust products from vehicle engines
- wear products from brakes, tyres and other mechanical parts
- minor discharges from braking vehicles or loads
- litter or other waste.

Typically, contaminants of this nature are mobilised through run-off during rainfall events. Measures to treat or mitigate the effects of these contaminants are discussed in Chapter 9 of this EIS.

Hazards and risks associated with the transport of dangerous goods are discussed in Section 14.4.

14.3.2 Safety

Principal highway-related safety risks to the travelling public are detailed in Chapter 4 of this EIS and are briefly discussed in Section 14.4.2.

Risk that which could affect local residents are most likely to be accidents involving dangerous goods. This is discussed in Section 14.4.

14.4 Hazards and risks in the transport of dangerous goods

In Australia, few serious transport incidents involving dangerous goods have occurred, and only small numbers of people have been affected. However, there have been incidents elsewhere, which demonstrate that serious accidents with multiple fatalities can and do occur, even on highways constructed to a high standard.

14.4.1 Dangerous goods vehicle movements

The most common types of dangerous goods transported by road include flammable and combustible liquids (e.g. petrol and diesel fuels), liquefied petroleum gases (LPG), chlorine and poisons. Previous studies have estimated the relative proportions of dangerous goods carried by all heavy vehicles in New South Wales to be as shown in Table 14-3.

Heavy vehicles have been shown to constitute an average of 17% of vehicles using the Pacific Highway between Moorland and Herons Creek (see Section 4.4.1). Therefore the average number of dangerous goods vehicle movements is assumed to be less than 0.2% of all future traffic.

Table 14-3 Dangerous goods vehicle type as percentage of all heavy vehicles in NSW

Vehicle type	Percentage of total heavy vehicles
Petrol	0.75%
LPG	0.10%
Chlorine	0.10%
Poisons	0.10%
Other Dangerous Goods (including ammonium nitrate)	0.10%
Total	1.15%

Source: Connell Wagner 1998

14.4.2 Improving accident rates

As discussed in Section 4.5, the accident rate over the Proposal length of the Pacific Highway during the period 1998-2003 was 18 accidents per 100 MVK. Whilst this was well below the State-wide average for rural two-lane undivided roads of 32.2 accidents per 100 MVK (see Table 4-5), the fatality rate during the period was 8.6% of reported accidents. This is significantly above the State-wide average of 1.0% (RTA 1999c, 2001a). Of the six fatal crashes that occurred, four were head-on.

The vehicle accident reduction objective for the Proposal is:

Develop a dual carriageway road with potential to reduce crash rates to 15 crashes per 100 MVK over the Proposal length.

Whilst this objective does not specifically address fatal accidents, the safety features incorporated into the Proposal design, which include the following, will significantly reduce the potential for fatal crashes, particularly head-on:

- relocation of the highway from the centre of populated areas in Johns River and Kew
- divided carriageways separated by a wide median or safety barriers
- grade separation of major intersections
- vertical and horizontal road geometry planned to current design standards.

The combined effect of the above measures would be expected to see the crash rate fall to or below the objective target of 15 crashes per 100 MVK.

Therefore, the Proposal would be expected to reduce the risk of an accident occurring. Given the low percentage of dangerous goods vehicles (<0.2% of all traffic) and the relocation of the highway from the more developed areas, the risk associated with a dangerous goods incident is likely to be significantly reduced for people living in the areas of Johns River and Kew.

14.4.3 Mitigation measures

Measures to mitigate the spillages of dangerous goods and associated incidents (including contaminants carried by surface run-off) have been incorporated into the concept design of the Proposal. These measures are predominantly associated with containing any spillage and minimising the risk of contamination spreading, until emergency response and clean-up procedures can be implemented.

Twenty-three permanent water quality ponds have been included in the concept design, which have been designed to retain chemicals such as hydrocarbons that are non-soluble and less dense than water. These water quality ponds have a capacity to contain emergency spillage of up to a volume of 20 m³, which is the volume of a typical road tanker (see Section 9.2.2.1).

The NSW Fire Service has overall responsibility for site coordination where fire or chemical incidents occur. The Service's functions include containment and suppression of any chemical fire, spillage or other hazardous incident.

14.5 Implications for ESD

14.5.1 Precautionary principle

The Proposal would avoid serious or irreversible damage to the environment through separation of north and southbound carriageways and removal of through traffic from residential areas (including a major signalised intersection), thereby substantially reducing the risk of a hazardous goods incident.

14.5.2 Intergenerational equity

The health, diversity and productivity of the environment would be maintained or enhanced for the benefit of future generations through both the safety measures which would be implemented to minimise the risk of damage to the environment during construction and the overall safety benefits inherent in the Proposal design.

14.5.3 Conservation of biological diversity

The Proposal design has incorporated a number of measures to reduce hazards and associated risks, consequently reducing impacts on biological resources and ecological diversity.

14.5.4 Improved valuation and pricing of environmental resources

The potential costs of damage to environmental resources have been recognised in the design of environmental protection measures for the Proposal.