

13. Hazard and risk

13.1 Assessment approach

The hazards and risks to human health, assets and the environment associated with the construction and operation of the proposed upgrade were considered in a hazard and risk assessment completed by the RTA in 2007. The outcomes of this assessment are detailed in the unpublished technical report *Kempsey to Eungai – Upgrading the Pacific Highway Hazards and Risk Report* (NSW Roads and Traffic Authority 2007a).

The potential hazards considered as part of the assessment were those that could arise during construction and operation as a result of incidents, including accidents and natural events such as flooding. The main focus of the assessment was the accidental release of toxic chemical substances associated with the use and transport of dangerous goods. It provided a qualitative assessment of the risk associated with accidents involving dangerous goods and the potential impacts on human health and the environment. The risk associated with accidents or incidents involving dangerous goods relates to the likelihood of an incident occurring and the consequences of such an incident.

This assessment did not address hazard and risk associated with road safety or general public safety with regard to road traffic where there is/has been no release of dangerous goods and none is expected.

13.2 Construction hazards and risks

13.2.1 Environmental and occupational health and safety hazards

Hazards associated with the use and transport of dangerous goods during construction of the proposed upgrade have the potential to affect the site and surrounds. The proposed upgrade is located close to several environmentally sensitive areas, including forests, the Macleay River and wetlands protected under *SEPP14 - Coastal Wetlands*. Environmental impacts resulting from the construction of the proposed upgrade, including habitat disturbance and vegetation loss, soil erosion, sedimentation and disturbance of acid sulfate soils, are discussed in the Chapter 11 – *Biodiversity* and Chapter 12 – *Geology and soils*, respectively.

Occupational health and safety hazards are those that have the potential to affect the health and safety of construction personnel and persons visiting a construction site. Occupational health and safety risks are generally attributable to failure of health and safety procedures.

13.2.2 Hazardous materials transport

Construction activities may result in changes to local traffic conditions, including detours, restricted lane widths and temporary changes to access points that may change the level of risk to local road users.

Transport of hazardous goods, such as fuels and explosives, to and from the main construction compounds during construction poses a potential risk to the environment and people in the event of an accident resulting in the release of hazardous material.

The risk to road users and the general public associated with the transport of hazardous materials during construction would be minimal as the majority of construction of the proposed upgrade would occur away from the existing highway and local roads in largely unpopulated, undeveloped areas.

13.2.3 Hazardous materials handling and storage

During construction, it is anticipated that at least one major construction compound would be required at each end of the proposed upgrade, with minor compounds or depots required adjacent to bridges under construction or in more isolated areas. Additional sites would be required for other ancillary activities, including concrete/asphalt batching plants, crushing operations and stockpile areas. The locations of all construction-related compounds/sites including potential ancillary sites are identified in Figure 7-1.

Some hazardous materials required for construction would be stored at these sites. The storage, handling and use of these materials would be undertaken in accordance with the *Occupational Health and Safety Act 2000* and WorkCover guideline – *Storage and Handling of Dangerous Goods*.

While the exact quantities and materials to be used during construction would be determined by the construction contractor following completion of the detailed design and construction program, it is likely that the hazardous materials detailed in Table 13-1 would be used. Some of these are classified as dangerous goods under the *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code)* (Environment Protection Authority 1998).

Table 13-1 Dangerous goods and hazardous materials likely to be used and stored during construction

Hazardous material	Dangerous goods class	Likely use during construction	Mode of storage on-site (package size)	Estimated maximum quantity	Screening level
Diesel fuel	Not applicable, C1 combustible liquid ¹	Refuelling of construction machinery and vehicles	Tank (bunded)	40,000L	Not applicable ¹
Oils, greases and lubricants	Not applicable, C2 combustible liquid ²	Maintenance and operation of construction machinery and vehicles	Drums (400L)	<5,000L	Not applicable ²
Petrol	3 (PGIII) – Flammable liquids	Refuelling of construction machinery and vehicles	Tank (bunded)	1 m ³	2 m ³
Gases (oxy-Acetylene)	2.1 – Gases: compressed, liquefied or dissolved under pressure	Welding	Cylinder (55kg)	Minor quantities stored for welding	5 m ³
Bitumen	3 (PGIII) – Flammable liquids	Construction material	Stored within batching plant	40 m ³	Variable depending on distance to sensitive receptors

Hazardous material	Dangerous goods class	Likely use during construction	Mode of storage on-site (package size)	Estimated maximum quantity	Screening level
Cement	Not classified	Construction material	Silos	600t	Not applicable ⁴
Paint and epoxies	3(PGIII) – Flammable liquids	Construction material	Containers (20L, banded)	1,000L at various locations	2m ³
Hydrated lime	8(PGIII) – Corrosive substances	Construction material	50t moveable silos	20-50t (at any one location)	50t
Herbicides	Not classified	Weed control (glyphosate based)	Containers (20L banded)	Minor quantities stored for occasional use	Not applicable ⁵

Notes

These quantities would be subject to refinement during detailed design

1. Diesel fuel is classified as a Class C1 combustible liquid and accordingly, for storage of diesel, the ADG Code classification is not applicable.
2. Lubricating oil is classified as a Class C2 combustible liquid and accordingly, for storage, the ADG Code classification is not applicable. Consequently, no screening level limit applies.
3. Batching plant to be positioned at least 15 metres from sensitive receptors to ensure activity is not potentially hazardous according to SEPP33.
4. Cement is not classified as a dangerous good under the ADG Code.
5. Glyphosate based herbicides are not classified as a dangerous good under the ADG Code.

The above assessment demonstrates that the quantities of hazardous materials that would be stored at the construction compounds for use during construction of the proposed upgrade are below the screening thresholds nominated in SEPP33. Consequently, the proposed construction is considered unlikely to be potentially hazardous and/or offensive and there are no significant off-site risks. A preliminary hazard analysis is not, therefore, required for the proposed upgrade.

Potential risks associated with the use, storage and transport of hazardous materials during construction would be further mitigated by placing restrictions on storage of hazardous materials and siting construction sites in accordance with site compound location criteria (no compounds within 100 metres of residential areas and no batching plants within 250 metres of residential areas).

The storage of hazardous materials on the floodplain poses a risk in terms of potential contamination of waterways and farmland. However, this risk can be limited by placing restrictions on storage of hazardous materials and siting construction sites. These measures are outlined in Section 13.4.

13.3 Operational hazards and risks

Hazards and risk associated with the operation of the proposed upgrade can be categorised as:

- *Health and safety hazards* – where accidents involving vehicles transporting dangerous goods result in spill of dangerous goods and potential harm to road users, the general public, local residents and/or land users.

- *Environmental hazards* – where contaminants generated during normal road operation or from spills of dangerous goods or other potential pollutants (as a result of accidents or other incidents) are carried from the road surface by run-off, resulting in potential harm to the receiving environment.

13.3.1 Health and safety hazards

Dangerous goods transport

The Pacific Highway serves as the through highway route for north–south regional and interstate traffic. As such, the Pacific Highway carries large volumes of commercial and freight traffic, including vehicles carrying dangerous goods.

In 1992, the Department of Environment and Conservation (formerly Environment Protection Authority) conducted a survey on dangerous goods transport in NSW (Environment Protection Authority 1996). The surveys found that 1.15% of all heavy vehicles carry dangerous goods and that the majority of the vehicles carrying dangerous goods are transporting petrol.

The average number of dangerous goods vehicle movements on the Pacific Highway between Kempsey and Eungai is estimated to be less than 0.2% of daily traffic, based on current heavy vehicle traffic.

The potential for an incident involving a vehicle transporting dangerous goods resulting in impacts on health and safety to occur on the proposed upgrade has been assessed as low due to:

- The low proportion of dangerous goods vehicles (approximately 0.2% of all traffic).
- High road design standards, which would reduce the number of accidents.
- Stringent legislative controls on the transport of dangerous goods.

Accident rates

Historical accident rates for the existing Pacific Highway were obtained from data provided by the RTA. Four hundred and fourteen (414) accidents were recorded on the Pacific Highway between Maria River and the Eungai rail overbridge (approximately 42 kilometres in length) from 1 January 1996 to 31 December 2005. This equates to an average accident rate of 21 accidents per 100 million vehicle kilometres travelled (NSW Roads and Traffic Authority 2006b).

Heavy vehicles were involved in 27% of these accidents. This is higher than the actual proportion of trucks in the traffic stream, which ranges from 12% at Macleay River bridge to 24% at Eungai Rail. This suggests that trucks are more often involved in accidents on the existing highway compared to other vehicles, relative to their proportion of total traffic. However, as only 0.2% of trucks carry dangerous goods, the likelihood of an accident involving a truck containing dangerous goods is very low.

As the number of vehicles travelling on the Pacific Highway increases over time, the current accident rate on the existing Pacific Highway between Kempsey and Eungai would be likely to increase without the proposed upgrade.

Incidents involving dangerous goods

The hazard and risk assessment considered the likelihood of an accident involving loss of containment of dangerous goods occurring with the proposed upgrade, relative to the existing situation. The consequence of such an event has also been assessed, and would depend on the nature of the dangerous goods carried and, as such, would be highly variable.

What dangerous goods are transported?

- Flammable and combustible liquids including diesel fuel and petrol.
- Liquefied petroleum gas (LPG).
- Liquefied gases such as chlorine and ammonia.
- Corrosive materials.
- Poisons.
- Pesticides and fertilisers.



A loss of containment of a dangerous substance would generally present a risk to the public over a limited area only, although some dangerous goods have the potential to cause a significant impact across a wider area. The nature of the dangerous goods transported would be unlikely to change as a result of the proposed upgrade. Therefore, through road improvements, it is only the likelihood of loss of containment, and potential impacts on the surrounding environment and public health that may change.

The proposed upgrade would reduce the hazard and risk associated with the transport of dangerous goods. Specifically, the proposed upgrade would bypass the town centres of Kempsey and Frederickton, reducing the potential for public exposure should a loss of containment occur. Further, the improved alignment of the proposed upgrade and the physical separation of opposing traffic streams would be expected to reduce the overall incidence of accidents.

Given the relatively low percentage of vehicles carrying dangerous goods, the relocation of the highway away from population centres, the high proportion of unpopulated or rural land that the proposed upgrade would pass through, and the expected reduction in accident frequency, the overall public hazard associated with a dangerous goods-related accident is likely to be reduced. This would particularly be the case for the residents of the Kempsey and Frederickton town centres.

13.3.2 Environmental hazards

The two main sources of potential environmental risk associated with the normal operation of the Pacific Highway are:

- Contaminants generated from diffuse discharges resulting from normal operation of the road carried by surface run-off.
- Loss of containment of dangerous goods and other potential pollutants due to accidents or other incidents.

The sources of the contaminants associated with diffuse discharges may include:

- Combustion products from vehicle engines.
- Wear products from brakes, tyres and other mechanical parts.
- Minor discharges from vehicle engines, including hydraulic fluids, lubricants and other similar materials.
- Minor discharges from leaking or damaged loads.
- Litter and other waste.

These contaminants are generally mobilised through surface run-off during rainfall events. The potential water quality impacts associated with surface run-off from highway surfaces are discussed in Chapter 21 – *Other environmental issues*.

The principal environmental hazard associated with operation of the proposed upgrade is loss of containment of dangerous goods during their transport.

The potential for a hazardous event (e.g. a spill) that would result in impacts on the environment to occur on the proposed upgrade has been assessed as low due to:

- The low proportion of dangerous goods vehicles (approximately 0.2% of all traffic).
- High road design standards, including physical separation of opposing traffic streams, which would reduce the number of accidents.
- Stringent legislative controls on the transport of dangerous goods.



The aquatic ecology of waterways along the proposed upgrade is sensitive to changes to water quality, particularly from contamination.

Whilst the likelihood of a spill of hazardous goods is low, the proposed upgrade passes through areas that are environmentally sensitive. Should an incident occur in or near one of these areas, there is potential for environmental damage to occur.

13.4 Management of impacts

13.4.1 Construction hazards and risks

On-site occupational health and safety

Occupational health and safety hazards would be managed through the implementation of an Occupational Health and Safety Plan and the Soil and Water Management Plan, which would be developed by the contractor prior to commencement of construction.

The application of normal good practice in dangerous and hazardous goods handling would be expected to provide appropriate practical responses to potential impacts on occupational health and safety.

The construction contractor would comply with the *Occupational Health and Safety Act 2000*, which invokes a requirement to comply with Australian Standard AS4940:2004 – *The storage and handling of flammable and combustible materials*, which specifies requirements for the storage and handling of these materials.

Conventional construction hazard and risk management measures relating to occupational health and safety are included in the draft Statement of Commitments for the proposed upgrade in Appendix D and are outlined in the summary of management measures below.

Contaminated run-off and spills

The identified environmental hazards associated with the construction of the proposed upgrade would be mitigated through appropriate design and establishment of the proposed upgrade and ancillary infrastructure. Potential discharges to the environment at these sites would be managed through the installation of bunds to retain chemicals and capture potential spills.

Where organic-certified farms are in close proximity to the proposed upgrade, mitigation measures to prevent contaminated run-off entering the certified area would be developed prior to the construction of the proposed upgrade in consultation with landholders.

The location of construction sites containing hazardous materials would be determined based on specific environmental criteria (refer Section 7.5). To reduce the risk of contamination as a result of a flood event, no storage of hazardous materials would occur on the floodplain below the 20 year ARI flood level. The use of hazardous materials during construction on the floodplain would be limited by a daily or weekly threshold to ensure that only the minimum required materials are kept on the floodplain at any one time. Further and generally, cabins, containers, workshops, plant, materials stores and storage tanks would not be sited on the floodplain of watercourses. Where this would be unavoidable, for bridgeworks for example, appropriate mitigation measures would be resolved in consultation with Department of Planning.

Standard hazard and risk management measures relating to spill containment during construction are included in the draft Statement of Commitments for the proposed upgrade in Appendix D and are outlined in the summary of management measures below.

Traffic accidents

The construction contractor would manage risks associated with the transport of hazardous materials during construction as part of the Traffic Management Plan for the project. The implementation of the Traffic Management Plan would assist in reducing the risks of accidents involving vehicles carrying dangerous goods or hazardous materials.

Standard construction hazard and risk management measures relating to hazardous goods transport are included in the draft Statement of Commitments for the proposed upgrade in Appendix D and are outlined in the summary of management measures below.

13.4.2 Operational hazards and risks

Contaminated run-off and spills

Operational water quality control basins would be installed in strategic locations to reduce impacts associated with pollutants from the surface of the proposed upgrade discharging to sensitive environments.

The operational water quality control basins would be designed to contain spills of chemicals/dangerous goods in areas assessed as environmentally sensitive. The basins would be designed to contain major spills of up to 1.2 tanker volumes or 50 cubic metres of material.

Where organic-certified farms are in close proximity to the proposed upgrade, mitigation measures to prevent contaminated run-off entering the certified area would be developed during detailed design in consultation with landholders.

Standard construction hazard and risk management measures relating to spill containment during operation are included in the draft Statement of Commitments for the proposed upgrade in Appendix D and are outlined in the summary of management measures below.

13.4.3 Emergency services

The RTA has a well-developed framework for managing risk associated with highway incidents. The RTA holds Memoranda of Understanding with the NSW Fire Brigade and the NSW Police Service in relation to emergency response. In the event of a dangerous goods incident or fire, the emergency services would respond, with the NSW Fire Brigade responsible for control and containment of the hazardous materials. The RTA would be responsible for traffic management around the incident. In addition, the RTA Traffic Operations Manager for the Northern Region is responsible for incident management in the northern region and is currently developing an Incident Management Plan for the Pacific Highway Northern Region. This Plan would identify and define protocols, roles and responsibilities in the event of an incident. The application of these management measures combined with the Kempsey Shire Local Disaster Plan and district disaster management plans would further reduce potential risks to the general public, road users and environmentally sensitive areas.

13.4.4 Summary of management measures

Standard and project-specific mitigation measures for management of hazard and risk arising from the construction and operation of the proposed upgrade are included in the draft Statement of Commitments for the proposed upgrade in Appendix D and are summarised below.

Environmental hazards

- Hazards and Risk Management Sub Plans will be prepared and implemented as part of the Construction and Operation EMPs. These Sub Plans will include:
 - Details of the hazards and risks associated with the activity.
 - Mitigation measures including contingency plans.
- Areas for storage of oils and other hazardous liquids used during construction would be bunded and secure, and any spillage would be collected and disposed of off-site at a licensed facility.
- Activities with the potential for spillage, such as refuelling, maintenance of equipment, mixing of cutting oil and bitumen, will be conducted in bunded areas to prevent discharge into watercourses.
- Potentially hazardous and contaminating activities (such as washing construction plant, concrete mixers, bitumen surfacing equipment and handling hazardous chemicals) will be conducted in bunded areas away from watercourses.
- Any construction materials and fuels stored or used on-site will be managed to minimise the risk of water contamination.
- A maintenance and inspection program will be implemented for construction controls.

Occupational, health and safety

- A Site-Specific Safety Management Plan and Safe Work Method Statements will be prepared and implemented to apply to all construction personnel and site visitors. The Plan will identify hazards associated with work on the site and the hazard control measures or controls to be implemented to ensure that people are adequately protected from risk of injury or illness, including:
 - Procedures to comply with all legislative and industry standard requirements for the safe handling and storage of hazardous substances and dangerous goods.
 - Procedures for manual handling of heavy loads.
- The Plan will address the following six components:
 - Risk management: identification of the hazards and assessment of the risks associated with the work and documentation of the risk control measures to be taken.
 - Statement of responsibilities: nominating individuals responsible for occupational health and safety aspects of the work, and who will be available to deal with illness/injury and occupational health and safety incidents.
 - Occupational health and safety training: a statement identifying training needs of personnel on the work site, including site induction.
 - Incident management: identifying the processes and personnel to prevent, prepare for, respond to and recover from incidents.
 - Site safety rules: these should be displayed in prominent areas around the site.
 - Safe work method statements: for all activities with health or safety risks, including working at height, with or near hazardous substances, in tunnels or confined spaces, with cranes, with compressed air, in deep excavations.