

8. Environmental risk analysis

This chapter outlines how environmental issues for the project were identified through an environmental risk analysis process, and documents the findings of that process.

DGRs	Where addressed
Environmental Risk Analysis	
The environmental assessment must include an environmental risk analysis to identify potential environmental impacts associated with the project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures.	Section 8.2
Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the environmental assessment.	Section 8.3 No additional key environmental impacts identified.

8.1 Overview

An analysis was undertaken, which:

- Identified environmental issues, including key issues in the DGRs and any other issues.
- Examined potential impacts and proposed mitigation measures in relation to the identified issues.
- Examined impacts likely to remain after application of mitigation measures.

Based on this analysis, an environmental risk category was assigned to each impact. This enabled the identification of any matters that might be considered as additional key issues and established the basis for an appropriately detailed assessment of those additional key issues to be included in this environmental assessment.

8.2 Risk analysis

The environmental risk categories assigned to each impact are described in Table 8-1. The environmental risk analysis is summarised in Table 8-2. The findings of the analysis are provided in Section 8.3.

Table 8-1 Risk category descriptions

Risk category	Description
A	May have high or moderate impacts. Detailed assessment necessary to determine the level of potential impact and to develop appropriate measures to mitigate and manage the impacts.
B	May have high or moderate impacts. These can be mitigated by the application of standard environmental management measures.
C	Has low impacts. These can be managed by standard environmental management measures.

Impacts that have been assigned a risk category of 'A' are considered in all cases to indicate key issues. The environmental risk analysis has automatically allocated a risk category of 'A' to all key issues identified in the DGRs.

Noise and vibration, and traffic and transport, were identified as key issues in the *Hume Highway Upgrade Woomargama Bypass: Preliminary Environmental Assessment* (RTA 2008a) and the DGRs. However, further detailed assessment of these issues has determined that standard mitigation measures could be implemented to manage their impacts during construction and operation. Were it not for their inclusion as key issues, the risk levels for noise and vibration, and traffic and transport, would be reassessed as 'C'.

8.3 Findings

The environmental risk analysis confirmed that the DGRs included all key issues. No additional key issues were identified.

Table 8-2 Environmental risk analysis — summary

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
Traffic and transport	Yes	Disruption to the existing local traffic network during construction: - Temporary disruptions/delays to local and highway traffic. - Temporary road closures/diversions. - Temporary restrictions to private access roads. - Increased construction traffic on the existing road network.	- Standard traffic management measures would be employed during construction to minimise traffic disruptions on the highway and local connecting roads. These management measures would be developed in accordance with the RTA QA Specifications (RTA 2008d) and the RTA's <i>Traffic Control at Work Sites Manual</i> (RTA 2003a). - Property access would be maintained for the duration of the construction. If required, temporary or alternative access would be provided in consultation with the affected landowner(s).	A (would be C if not a key issue)	Section 9.6
		Permanent adjustment to some private property access roads.	Permanent changes to property access would be developed in consultation with the relevant road authority and affected landowners.		Section 5.3.3
		Changed traffic patterns (local and regional): Potential negative impacts that may occur are likely to be short-term while road users adjust and become familiar with changed traffic patterns.	Changes to the local road network would be clearly signposted.		Section 9.6
		Traffic and transport benefits would be expected in relation to travel efficiency and road safety.	The design of the project would likely improve traffic efficiency and safety for traffic using the project and the existing highway.		Section 9.6
		Cumulative benefits for travel efficiency during operation: Associated benefits with construction and operation of the proposed Holbrook and Tarcutta bypass projects and other Hume Highway duplication projects.	The three bypasses, in conjunction with the duplication projects, would lead to a cumulative reduction in travel time for vehicles on the Hume Highway and an improvement in safety for road users.		Section 9.6

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
Flora and fauna	Yes	Clearing of native vegetation, including endangered ecological communities and loss of habitat for threatened species. This includes Box-Gum Woodland and habitat for a range of threatened woodland species.	- Flora and fauna impacts would be managed following the 'avoid, minimise, mitigate, offset' hierarchy. Management measures for vegetation loss include limiting the extent of clearing, controlling weeds and revegetation. Measures to manage the loss of fauna habitat include providing alternate habitat and developing fauna crossing treatments. A biodiversity offset package would be developed to manage the residual impacts on ecological values. - Assessments indicated that impacts to threatened species and endangered ecological communities would not be significant.	A	Section 9.1
		Construction of the project creating barriers for the movements of threatened species through the landscape.	To facilitate the safe movement of fauna across the highway, natural and artificial crossing treatments would be investigated in consultation with DECCW.		Section 9.1
		Impacts on flora and fauna due to limitations of survey data.	Targeted surveys for threatened flora and fauna species would be carried out in Spring 2009. Should any additional impacts be identified, additional mitigation and management measures would be developed in consultation with DECCW and other relevant agencies.		
		Impacts on threatened aquatic ecological communities: - Both Mountain and Sandy creeks form part of threatened Aquatic Ecological Community in the Natural Drainage System of the Lower Murray River Catchment, which is listed under the <i>Fisheries Management Act 1994</i>. The threatened Southern Pygmy Perch was recorded in Mountain Creek. - New bridge structures over Mountain and Sandy creeks (including temporary crossings during construction) may alter creek bed characteristics and affect sediment loading in the watercourses. Fish	- Waterway crossings (permanent and temporary) would be designed and constructed in accordance with the DPI guidelines '<i>Why do fish need to cross the road? Fish passage requirements for waterway crossings</i>' (Fairfull and Witheridge 2003). - Works within the main watercourse of Mountain Creek would be avoided during the breeding season of the Southern Pygmy Perch (September to January) unless mitigation measures are developed in consultation with the		Section 9.1

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
		assemblages may be affected by the watercourse crossings, including impacts on threatened species (Southern Pygmy Perch).	Department of Industry and Investment.		
		Cumulative biodiversity impacts associated with the construction of the proposed Holbrook and Tarcutta bypass projects and other Hume Highway duplication projects: Biodiversity impacts of the project are likely to be more significant as a result of biodiversity impacts from other projects. Cumulative impacts would include a greater extent of clearing of native vegetation and habitats, including endangered ecological communities, and further fragmentation of habitats.	A biodiversity offset package would be implemented to address residual and cumulative impacts.		
Aboriginal heritage	Yes	Direct impacts on Aboriginal archaeological and cultural objects, sites, and natural and landscape values.	- Any Aboriginal heritage items would be managed in accordance with the Aboriginal Cultural Heritage Assessment Report (CHAR), developed in consultation with Aboriginal stakeholders and DECCW. - All excluded archaeological and cultural sites in the construction site boundary would be fenced and identified as 'environmentally sensitive areas' prior to construction. - Archaeological salvage excavation of archaeological sites would be undertaken to mitigate impacts on significant archaeological sites, where required, prior to commencement of construction in the area to be salvaged. - Salvage through collection of artefacts would be undertaken, where required, prior to construction.	A	Section 9.2

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
Noise and vibration	Yes	Noise and vibration impacts on sensitive receivers during construction: - Noise impacts - Vibration impacts could occur during some construction activities (eg piling, blasting).	- A construction noise and vibration management plan would be developed and implemented through the construction environmental management plan (CEMP). The plan would include: - A notification and negotiation procedure where noise impacts from evening and night-time construction activities are above criteria. This would involve consultation with sensitive receivers to develop appropriate management measures. - A specific notification procedure for blasting activities. - Procedures for dealing with and responding to complaints. - Procedures for noise monitoring and auditing to verify compliance with the predicted noise impacts.	A (would be C if not a key issue)	Section 9.4
		Noise impacts on sensitive receivers during operation: - Noise reduction at some sensitive receivers. - Noise increases at some sensitive receivers.	Operational noise would be managed to meet the noise criteria applicable to the project. Where criteria cannot be met, reasonable and feasible measures would be developed in consultation with affected landowners.		Section 9.4
Surface water and groundwater	Yes	Impacts on water sources and users through water demand for construction: Approximately 400 megalitres of water would be required over the two year construction period. Accessing this volume from surface and ground water sources may not be viable and may affect availability for other users.	- Water for construction would be sourced from: - Industrial recycled waste water. - Sediment basins (where feasible). - Existing farm dams (in consultation with landowner). - Woomargama village groundwater bore. - The Hume Weir.	A	Section 9.3

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
		Flooding impacts due to altered flooding behaviour of Mountain and Sandy creeks.	- The project has been designed to minimise change in afflux. - Bridge and drainage structures would be designed to minimise possible rises in flood levels, and preserve hydraulic connectivity of flow paths.		Section 5.3.4 Section 9.3
		Impacts on groundwater system.	Undertake groundwater monitoring during construction if geotechnical investigations determine likely impacts on the aquifer from deep cuttings. If required, implement mitigation measures where levels indicate that the project is potentially having an adverse impact.		Section 9.3
		Impacts on waterways and water quality due to: - Erosion and sedimentation. - Fuel spills and leaks. - Inappropriate classification, storage and disposal of liquid and non-liquid wastes.	- Standard best practice environmental management measures would be implemented during construction in accordance with <i>Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Ed.</i>, (Landcom 2006) and <i>Managing Urban Stormwater: Soils and Construction, Volume 2D, Main Road Construction</i> (DECC 2008). - Operational water quality treatment measures would incorporate structural and non-structural measures to control road run-off pollutants entering Mountain and Sandy creeks.		Section 5.3.4 Section 9.2 Section 10.2
Social and economic	Yes	- Loss of business from reduction in passing trade: - Economic impacts - Loss of local services.	- Continued consultation would be undertaken with Greater Hume Shire Council through detailed design and construction to assist in developing strategies to encourage the continued viability of Woomargama and the further development of the <i>Woomargama Vision 2018</i> (Greater Hume Shire Council 2008). - The project would be designed to maintain access into and out of the village.	A	Section 9.5

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
			▪ Appropriate signposting would be provided.		
		Short-term benefits to local economy during construction.	▪ Construction materials and other products would be sourced locally as far as possible.		Section 9.5
		Changes to amenity: ▪ Increased amenity in the village.	▪ Reduction in traffic noise for residents within Woomargama village.		Section 9.5
		Direct property impacts, including property acquisition, land use viability, infrastructure and severance.	▪ Consultation would be undertaken with all affected landowners throughout detailed design and construction to develop and implement measures to mitigate impacts on land use viability, infrastructure and severance. ▪ All property acquisitions would be undertaken in accordance with the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> and the RTA's (1999) <i>Land Acquisition Policy</i>.		Section 9.5
Non-Aboriginal heritage	No	Impacts on non-Aboriginal heritage items and cultural values: ▪ The project would directly impact Mount Raven Cottage footings site. ▪ Potential for discovery of unidentified items. ▪ The cultural landscape and setting of the Mount Raven Woolshed and Mount Raven Woolshed Cottages.	▪ A supplementary archaeological survey of the assessment area would be undertaken in advance of the commencement of construction works. Should any further items be identified, mitigation and management measures would be developed in consultation with Heritage Branch. ▪ Heritage impacts would be managed through the CEMP. ▪ Any landscaping and urban design would take into consideration the heritage values of Mount Raven Woolshed Complex and the Mount Raven Woolshed Cottages in consultation with the relevant landowner(s) and a suitable qualified heritage specialist.	B	Section 10.1
Soils and water quality	No	Erosion and sedimentation during construction and operation.	▪ Standard best practice environmental management measures would be implemented during construction in accordance with <i>Managing Urban Stormwater: Soils and</i>	B	Section 10.2

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
			<i>Construction, Volume 1, 4th Ed.</i>, (Landcom 2006) and <i>Managing Urban Stormwater: Soils and Construction, Volume 2D, Main Road Construction</i> (DECC 2008). - A soil conservation specialist would be appointed to the project during design and construction to advise on the appropriate treatments to minimise erosion and sedimentation. (Refer to 'Surface water and groundwater' issue for further discussion of mitigation of impacts on water quality.)		
Visual amenity and landscape	No	The visual amenity of Woomargama village may be improved by the reduction of through-traffic. The clearance of native vegetation, extensive earthworks and construction of a new highway may reduce the visual amenity of the area.	The objectives identified in the urban design and landscape strategy would be incorporated into the road design.	B	Section 10.3
Air quality	No	Air quality impacts on road users and sensitive receivers during construction. Potential for short-term decreases in local air quality during construction associated with dust-generating activities and emissions from heavy construction machinery.	Standard dust and emission control measures would be implemented to manage construction air quality impacts.	C	Section 10.4
Hazards and risk	No	Hazards to the environment, workers and the public during construction associated with transport, handling and storage of hazardous materials.	- Potential environmental hazards and risks associated with construction activities would be identified prior to construction, with standard management measures and contingency plans implemented throughout the construction period. - Occupational health and safety hazards would be managed by preparation and implementation of a site-specific safety management plan and safe work method statements.	C	Section 10.5

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
		Risks to the environment, and human health and safety associated with the transport of hazardous goods on the bypass.	Spill containment measures/facilities for incidents near sensitive environments would be incorporated into the design of the project.		Section 10.5
Contaminated land	No	Contaminated land within the construction site boundary: - A stockpile located at the north-eastern end of the project known to contain road base and bitumen fragments would be directly impacted by construction works. - Potential contamination risk associated with removal of footings on property in the middle section of the project.	- All potentially contaminated waste (including known road base stockpile) will be classified according to the <i>Waste Classification Guidelines: Parts 1 and 2</i> (DECC 2008a), and disposed of to a suitably-licensed disposal facility or reused in the construction works as appropriate. - Standard contingency measures (including for unknown contaminants, asbestos containing materials and site operations during construction) would be implemented to allow for further investigation and treatment/disposal as appropriate.	C	Section 10.6
Sustainable management (greenhouse gases, waste, energy)	No	Consumption of energy and generation of greenhouse gases and waste during construction of the project: - Greenhouse gases would be emitted from construction plant, equipment and vehicles. - Greenhouse gas emissions would be embodied in materials consumed during construction or impacted by the project, such as vegetation removal and soil disturbance. - Energy-consuming activities over the two year construction period would be extensive. Energy used would be in the form of fuel and electricity. - Waste generated during construction.	- Energy efficient work practices would be implemented, including consideration of: - Energy efficient design of site buildings. - Design of site compounds and the batch plant to minimise unnecessary vehicle movement. - Regular servicing of site plant and equipment. - Training of construction personnel in energy efficient plant operation. - The use of accredited GreenPower. - Use of locally sourced materials where available and of suitable quality. - Use of recycled materials, such as replacement of cement with fly ash, recycled aggregate and recycled content in steel, where possible. - Waste management would be undertaken in accordance with the waste hierarchy (avoid,	C	Section 10.7

Issue	DGRs — key issue?	Potential impacts	Analysis — proposed mitigation measures and residual impacts after their application	Risk category following analysis	Environmental assessment reference
			minimise, reuse/recycle, dispose) principles of the <i>Waste Avoidance and Resource Recovery Act 2001</i> . A waste management system would be prepared for implementation and a waste register would be maintained throughout construction.		

