

20 Environmental Management Framework

20.1 Introduction

This chapter outlines the Environmental Management Framework (EMF) that would be in place for the detailed design, construction, and operational phases of the Project. The purpose of the EMF is to provide a transparent framework with clear accountabilities for managing environmental effects and impacts associated with construction and operation of the Project. Note that where the conditional tense is used throughout the EES (e.g. the use of the word 'would' rather than 'will'), this is in reference to the possibility that the Project may not be approved and may therefore not proceed. However, if the Project does proceed, the environmental management measures outlined in this section will be implemented.

This EES has assessed the combined level of impact associated with the construction area for both the initial alignment (construction of a two lane, two-way carriageway road including a bridge across each waterway) and the ultimate duplication (construction of a duplicated roadway and bridges, which would be constructed when future traffic demand warrants an increase in road capacity).

The environmental management requirements recommended in this chapter would apply to both the initial and ultimate carriageways. The future upgrade would be managed in accordance with VicRoads' Environmental Risk Management Guidelines (2012).

This EES considered three initial alignment options that resulted in the selection of the Mid-West Option as the preferred alignment. The impacts of the Mid-West Option were assessed by the specialist studies carried out as part of this EES. The environmental management requirements outlined in this chapter apply to the Mid-West Option.

20.2 EES objectives

The EES objective relevant to the EMF is *"To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation and rehabilitation phases of the Project, in order to achieve acceptable environmental outcomes."*

The EMF addresses the following key issues and requirements specified in the EES Scoping Requirements:

Key issues

- *Management of environmental effects during Project construction and operation that is not sufficient to meet statutory requirements and sustain stakeholder confidence.*

Priorities for characterising the existing environment

- *Outline the means by which a register of environmental risks associated with the Project will be developed and maintained during Project implementation (including matters identified in preceding sections in these directions as well as other pertinent risks) (refer section 20.4.1 and Risk Register in EES Technical Appendix P).*

Design and mitigation measures

- *Provide a proposed framework for managing the risks of adverse environmental effects, including:*
 - *Requirements for related environmental management plans (EMPs), in the context of required approvals and consents (refer section 20.4.2)*
 - *The environmental management system (EMS) to be adopted, including organisational responsibilities and accountabilities (refer section 20.3)*
 - *A summary of environmental management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes (refer section 20.5)*
 - *Proposed objectives, indicators and monitoring requirements, including for managing:*
 - *traffic*
 - *surface runoff and water quality*
 - *cultural heritage*
 - *construction noise and dust*
 - *disruption and hazards to existing recreational users (refer section 20.5)*
 - *Outline of any relevant EMPs for construction and operational phases (refer section 20.4.4).*

Assessment of likely effects

- *Evaluate the likely effectiveness of the proposed environmental management framework in controlling adverse effects (refer section 20.4.6).*

Approach to manage performance

- *Procedures for:*
 - *Verifying or monitoring environmental performance and compliance with requirements (refer section 20.4.6)*
 - *Review of the effectiveness of the environmental management framework for continuous improvement (refer section 20.4.6).*

- *Arrangements for management of and access to baseline and monitoring data, to ensure the transparency and accountability of environmental management as well as to contribute to the improvement of environmental knowledge (refer section 20.4.70).*

20.3 Project delivery roles and responsibilities

VicRoads, as the Victorian statutory authority for arterial roads (including highways and freeways), and Roads and Maritime Services of NSW (Roads and Maritime Services), as the NSW statutory authority for arterial roads (including highways and freeways), are co-proponents for the Project and responsible for the overall delivery and operation of the Project. VicRoads and Roads and Maritime Services would appoint one or more construction contractor(s) who would be responsible for construction works for the Project.

VicRoads would be responsible for ongoing management of the Victorian portion of the Project post-construction, while Roads and Maritime Services would be responsible for ongoing management of the NSW portion of the Project post-construction. The key activities would comprise ongoing road maintenance. VicRoads and Roads and Maritime Services may appoint contractors to complete specific maintenance tasks on an as required basis during operation. These contracts would be managed in accordance with the relevant authorities' practices, standards and legislative obligations.

The key roles and responsibilities for the construction and operational phases of the Project in Victoria are listed in Table 20-1.



Table 20-1 Roles and tasks/responsibilities for environmental management

Organisation	Tasks/responsibilities
VicRoads Project Director (Superintendent)	- Check that VicRoads' Project Environment Protection Strategy (PEPS) (refer section 20.4.3) is developed, approved and implemented in accordance with VicRoads requirements - Ensure that the preparation of PEPS incorporates any requirements arising out of the Minister for Planning's Assessment of the EES to the satisfaction of DELWP - Ensure that VicRoads staff are appropriately trained in environmental awareness - Approve standard and specific environmental clauses in contract specification - Endorse or delegate Environmental Incident Reports for investigation, the identification of Preventative Actions and the closure of Incident Reports
VicRoads Manager – Project Delivery	- Ensure that relevant stakeholders are consulted and provide input into the development of the PEPS where appropriate - Ensure that the required actions identified in the PEPS are undertaken - Ensure that the PEPS, including the Table of Commitments, is regularly reviewed and updated as required - Ensure that non-contractual environmental commitments are actioned - Ensure that all necessary permits for the Project are obtained by VicRoads
VicRoads Project Engineers/ Surveillance Officers	- Prepare the PEPS in accordance with VicRoads internal environmental management guidelines - Ensure that the requirements in the PEPS are incorporated into the contract specification for construction - Ensure that the requirements of the PEPS and contract specification are addressed by the construction contractor's EMP(s) - Log environmental incidents in VicRoads incident reporting system - Prepare surveillance plans for construction contract(s) and complete regular assessment/review of the environmental risks and amend the surveillance plan as necessary to reflect the risks - Conduct surveillance of works to check compliance with the contract specification and the contractor's EMP(s) - Engage an independent, suitable qualified and experienced auditor to conduct audits of implementation of the contract specification - Record environmental surveillance in the VicRoads Surveillance and Management System
Construction contractor(s)	- Develop an EMP(s) to the satisfaction of VicRoads Project Director - Effectively implement and manage EMP(s) to the satisfaction of VicRoads Project Director - Monitor and audit the implementation and effectiveness of the EMP(s) and report their effectiveness to VicRoads Project Director - Engage specialist environmental advice where required - Verify that all contractual commitments including requirements as described in the contract specification are honoured - Report environmental incidents to VicRoads Project Director. Notifiable incidents are reported to relevant statutory authorities. Document actions taken to rectify the situation - Inform VicRoads Project Director of any queries from statutory agencies and respond accordingly - Ensure that contractor's staff and subcontractors have been appropriately trained in environmental awareness

20.4 VicRoads Environmental Risk Management Guideline

VicRoads has established an Environmental Risk Management Guideline to define and aid the implementation of its Environmental Management System for construction and maintenance projects. The guideline has been developed to assist VicRoads staff in the management of the potential environmental impacts in relation to the planning, development and delivery of road construction projects. The Project would be delivered in accordance with VicRoads' Environmental Management System and the Environmental Risk Management Guideline. The process for

implementation of VicRoads' Environmental Management System is shown in Figure 20-1. The EES process, including this EMF, form part of the 'Survey and Investigations' and 'Initial Risk Assessment' tasks.

Key elements of the Environmental Management System are described in more detail in the following sections of this chapter.

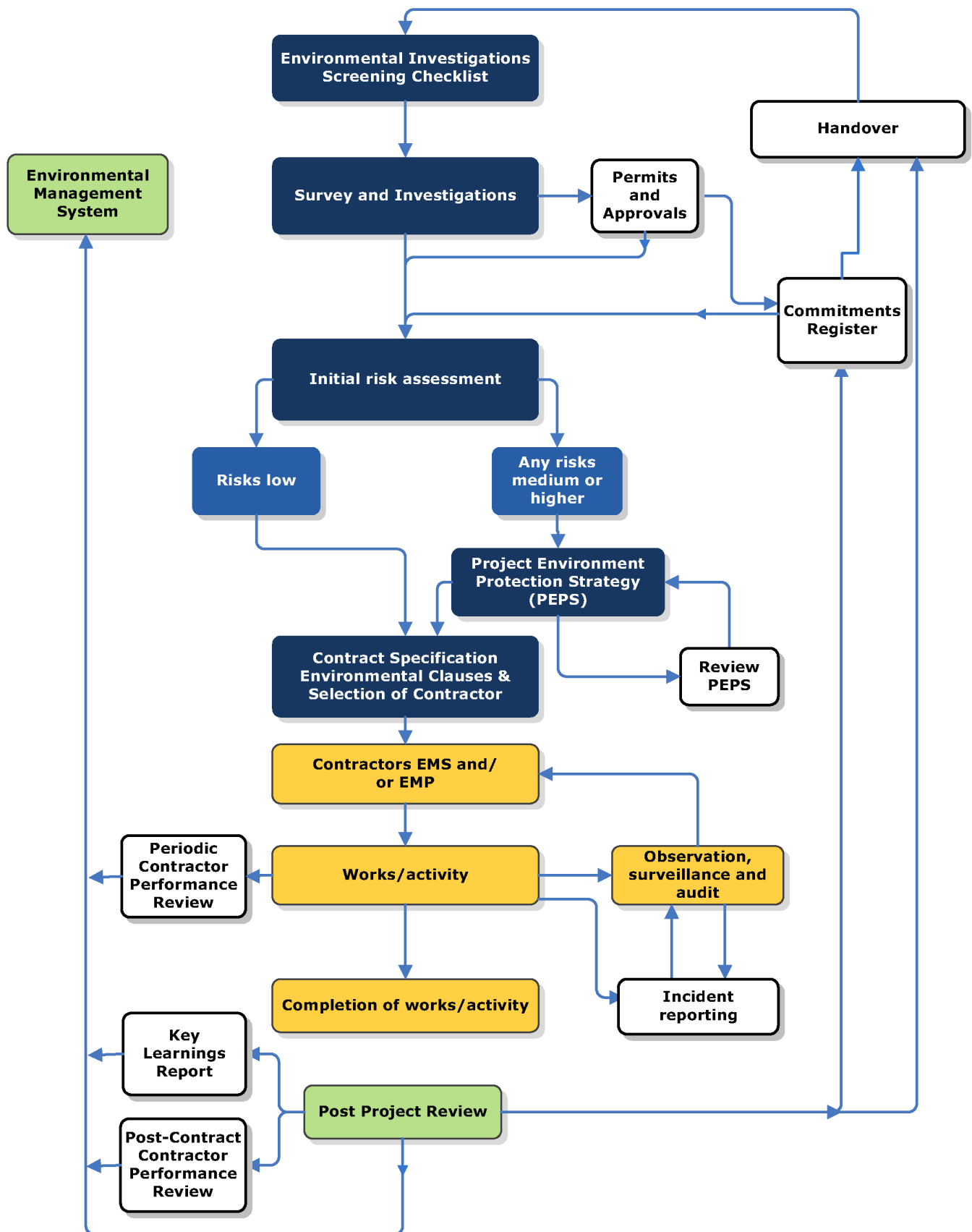


Figure 20-1 VicRoads Environmental Management System

20.4.1 Risk identification and assessment

Environmental Investigations Screening Checklist

As the first step in the planning investigation process, VicRoads completed an Environmental Investigations Screening Checklist to gain an understanding of the environment in which the Project would take place. The checklist assisted VicRoads to determine the environmental surveys and investigations required to identify and better understand potential environmental risks. This information was also used as the basis for the Project business case and the referral under the *Environment Effects Act 1978* (Vic.).

Surveys and investigations

VicRoads engaged a number of external consultants to undertake specialist surveys and investigations and to prepare reports, including those required to support this EES. These specialist studies were required to identify potential environmental impacts and risks, permit and approval requirements and to detail management measures for the Project (including those outlined in this EMF) and are presented in the EES Technical Appendices.

Risk assessment

Environmental sensitivities and potential impacts were identified and assessed through the specialist assessments for the EES. As described in Chapter 5, the risk assessment process for the EES was aimed at identifying significant environmental, social and economic risks and impacts associated with the Project. Management measures have been proposed to address these risks and are presented in this EMF and in the EES chapters. EES Technical Appendix P contains a copy of the Risk Register developed for the EES.

The EES risk assessment would inform the contract Risk Register developed by VicRoads as part of the Project Environmental Protection Strategy for project implementation. The Project Environmental

Protection Strategy would also include any commitments or requirements from the Minister's Assessment. This contract Risk Register would be regularly reviewed and updated during delivery of the Project to reflect the Project status and to inform environmental management requirements.

It should be noted that the impact assessments for social, economy, planning and land use, and landscape and visual impacts were not based on an environmental risk framework. Assessment for these disciplines focused on predicted change rather than the risk of environmental harm. This is because impacts associated with these disciplines are more qualitative and are therefore difficult to accurately measure. Project commitments for these disciplines have been incorporated into the Project Description, which is provided in Chapter 6.

20.4.2 Permits and approvals

VicRoads is responsible for coordinating and obtaining statutory approvals for the Victorian portion of the Project and ensuring the requirements of these approvals are implemented. Roads and Maritime Services is responsible for coordinating and obtaining statutory approvals for the NSW portion of the Project and ensuring the requirements of these approvals are implemented. VicRoads and Roads and Maritime Services would require the construction contractor(s) to comply with the conditions of these approvals and to obtain any additional licences or permits that may be required for construction. VicRoads would review the need for additional permits or approvals and ensure that these were obtained prior to proceeding with the works.

Key regulatory approvals required for the Project are described in detail in Chapter 3. This EES focuses on the approvals to be obtained by VicRoads under Commonwealth and Victorian legislation. Detailed analysis of NSW legislation is outlined in the Review of Environmental Factors prepared for the Project. A summary of the Commonwealth and Victorian approval requirements and the mechanisms for implementing these requirements is presented in Table 20-2.

Table 20-2 Summary of key statutory approvals and consent requirements

Approval	Requirements	Responsibility	Implementation
Approval under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth.) for potential impacts on threatened species and ecological communities	The Matters of National Environmental Significance listed under the Act relevant to this assessment are: Threatened Species and Ecological Communities.	VicRoads	To be confirmed subject to the requirements of an approval decision under the Act.
Planning Scheme Amendment under the <i>Planning and Environment Act 1987</i> (Vic.)	A draft Planning Scheme Amendment has been placed on public exhibition concurrently with this EES.	VicRoads	Conditions outlined in the Incorporated Document forming part of the Planning Scheme Amendment would be incorporated into the VicRoads PEPS and addressed by either VicRoads or through the Construction Environment Management Plan as appropriate.

Approval	Requirements	Responsibility	Implementation
Permits under the <i>Flora and Fauna Guarantee Act 1988</i> (Vic.) and <i>Wildlife Act 1975</i> (Vic.)	A Flora and Fauna Guarantee Act permit would be sought to remove listed flora species. Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation under the Wildlife Act. <i>Note: These requirements are subject to consideration of the Project under the Flora and Fauna Guarantee Act and the Wildlife Act and may be subject to change, consistent with any conditions of a decision under either Act.</i>	VicRoads	Any conditions or requirements of the permits would be incorporated into the VicRoads PEPS and addressed by either VicRoads or through the construction contracts as appropriate.
Licence to construct works on a waterway or to construct a bore under the <i>Water Act 1989</i> (Vic.) Licence to take or use water from a waterway or groundwater under the Water Act	Any works undertaken in and around waterways and their floodplains will need to be undertaken in accordance with the Water Act. North Central Catchment Management Authority (NCCMA), as caretaker for river health under the Water Act is responsible for issuing licences for works on waterways and therefore VicRoads will require a licence (Works on Waterways) from NCCMA prior to undertaking the works.	VicRoads	Any conditions or requirements would be incorporated into the VicRoads PEPS and addressed by either VicRoads or through the construction contracts as appropriate.
Cultural Heritage Management Plan under the <i>Aboriginal Heritage Act 2006</i> (Vic.)	VicRoads is preparing a Cultural Heritage Management Plan (CHMP) for the Project. The CHMP would be finalised in accordance with the requirements of the Aboriginal Heritage Act for evaluation by the Registered Aboriginal Party after the Minister's assessment of the EES has been issued.	VicRoads	Specific commitments made in the CHMP would be incorporated into the PEPS specification and addressed by either VicRoads or through the construction contracts as appropriate.
Offsets for native vegetation losses in accordance with the <i>Permitted clearing of native vegetation, Biodiversity Assessment Guidelines</i> (DEPI, 2013c)	VicRoads would prepare an Offset Management Strategy to satisfy requirements under the Permitted clearing of native vegetation, Biodiversity Assessment Guidelines.	VicRoads	Conditions and requirements from the Offset Management Strategy would be incorporated into the VicRoads PEPS and addressed by VicRoads.
Consent under the <i>Road Management Act 2004</i> (Vic.)	Consents to undertake roadworks would be sought from the issuing authorities, VicRoads (arterial roads and freeways) and the Shire of Campaspe (municipal roads).	VicRoads	Any conditions or requirements would be incorporated into the VicRoads PEPS and addressed by either VicRoads or through the construction contracts as appropriate.

20.4.3 Project Environment Protection Strategy (PEPS)

VicRoads would develop a PEPS that details the environmental management arrangements for the design, construction and operation of the Project. The PEPS is a VicRoads document and would be used by VicRoads to guide environmental management for the Project and to track implementation of overall environmental commitments and approval conditions.

The PEPS would include the contract Risk Register and commitments register as well as contain the environmental management measures and objectives described in this EES. The PEPS would be updated to reflect permit and approval conditions and any other measures or commitments identified through the Minister's Assessment and conditions of subsequent approvals, and consultation.

During Project delivery the PEPS and Project Risk Register would be reviewed and updated in response to contractor performance reviews, changes in activities and work practices, legislation, aspects and impacts, or as a result of internal or external audit findings, incidents or complaints.

20.4.4 Construction environmental management

Contract specification environmental clauses

VicRoads would prepare a construction contract specification(s) for the Project to articulate the requirements for the Project. VicRoads has standard contract specifications that contain environmental protection measures developed to address environmental management principles and legislative requirements. The VicRoads standard environmental protection measures that would be applied to this Project are included in EES Technical Appendix O. The specification clauses would be further developed to address specific risks and management measures identified for the Project in this EES where these are not adequately addressed by the specification. This would cover any requirements around construction activities in flood-prone land as identified in Chapter 6.

Contractor Environmental Management Plan

The construction contractor(s) would be required as a condition of contract to prepare a Project-specific EMP for construction. The EMP would be required to address the range of environmental risks and impacts and proposed management measures identified in the EES and would require the approval of the Minister for Planning. The EMP would incorporate the following:

1. A statement of scope and purpose and the environmental objectives.
2. A schedule of environmental elements that are expected to be affected by the works under the contract including an outline of proposed mitigation treatments and proposed timeframes.
3. The identification of work activities and an assessment of their potential impacts and associated risks to onsite and offsite environmental receptors (e.g. community, including tourism events, land uses, waterways, floodways, flora and fauna, cultural heritage, etc.) including times when the contractor(s) is not on site, including but not limited to matters covered in this specification.
4. Processes and responsibilities for:
 - The preparation and implementation of the EMP
 - Reporting and investigation of environmental incidents or complaints relating to any environmental issue under the contract

- Implementing an adaptive approach for the review and update of the EMP in conjunction with the assessment of the adequacy of the onsite implementation of controls and procedures as works progress and/or following non-conformances, complaints, or previously unidentified issues
- After hours response including arrangements for containing environmental damage and attendance on site in the event of an emergency.

5. Legal and other requirements – details of approvals, licences and permits necessary and their associated conditions.
6. Competence, training and awareness – an induction and training plan so that all site personnel (including subcontractors) understand the EMP and are aware how the EMP is to be implemented in relation to the works, including any possible emergency response procedures.
7. Operational control – the EMP shall document environmental procedures to avoid or mitigate identified environmental impacts. The procedures shall address the environmental protection requirements, including standard contract requirements, and any Project-specific environmental requirements. These procedures shall include inspection and monitoring.
8. Scaled drawings that clearly show the location and extent of environmental controls, modifications to existing control devices and monitoring locations.
9. Emergency preparedness and response – an emergency response procedure shall include processes for managing any environmental emergency on site, such as contacting relevant stakeholders and clean-up of the site.
10. Nonconformity, environmental incidents and corrective and preventative action procedures.
11. Audit – a documented process for audit of the EMP against the contract requirements, including the effectiveness of onsite environmental protection measures.

EMP revisions

Revisions to the construction contractor(s) environmental documentation may be required as a result of reviews, changes in activities and work practices, legislation, aspects and impacts, or as a result of internal or external audit findings, incidents or complaints. The construction contractor(s) would be required to submit all major revisions to environmental documentation to VicRoads for review. Major revisions are defined as changes that affect work practices, roles and responsibilities, environmental risks and overall Project delivery. Minor revisions are defined as addressing typographical errors, formatting and other administrative changes.

20.4.5 Operational phase

As stated in section 20.3, VicRoads would be responsible for the ongoing management of the Victorian component of the Project, while Roads and Maritime Services would be responsible for the NSW portion of the Project. The maintenance of the Murray River bridge structure would be undertaken by Roads and Maritime Services and would be jointly funded by VicRoads under an existing bilateral agreement with Roads and Maritime Services.

The environmental management process for maintenance contracts is similar to that employed for construction, as outlined in sections 20.4.4 and 20.4.6.

To manage its obligations as the responsible road authority under the Road Management Act, VicRoads currently has in place area-wide contract arrangements for the maintenance of the arterial road network. These contracts include the routine maintenance of pavement, shoulders, roadside areas, drainage systems, road furniture and structures on the arterial network and require the contractor to have an EMP in place.

The VicRoads standard maintenance contract has standard contract management clauses that address environmental management principles and legislative requirements associated with the ongoing operation of the road network. A PEPS and risk assessment are developed by VicRoads to address maintenance activities for the specific area-wide maintenance contracts. The PEPS addresses any additional matters that need to be included in the maintenance contract specification and the maintenance contractor's EMP. As per the process for construction, the maintenance contractor's EMP would be subject to regular monitoring, revision, audit, reporting and review.

Following the completion of the construction contract for the Project, a handover report would be prepared, including details of specific maintenance requirements or commitments arising out of the Project construction. Accordingly, the Risk Register for the relevant area-wide maintenance contract would be reviewed and updated along with the PEPS and the maintenance contractor's EMP to incorporate specific management measures relating to the Project.

20.4.6 Observation, surveillance and audit

Contractor monitoring

The construction contractor(s) would be required to undertake monitoring and audits of construction activities, including works undertaken by subcontractors employed on their behalf. The contractor(s)' monitoring requirements would be detailed in its EMP and would as a minimum include or address the requirements of the contract specification and commitments made as part of this EES.

VicRoads surveillance

In addition to the contractor auditing and monitoring of the works, VicRoads would also conduct its own surveillance and auditing to assess the contractor(s)' compliance with the EMP and the requirements of the contract specifications through:

- Observation of Project activities on a day-to-day basis
- Periodic risk-based surveillance of the effectiveness of environmental controls and processes implemented on site
- Audit of the implementation and effectiveness of the EMS and/or EMP and the effectiveness of the controls and processes implemented on site.

VicRoads' surveillance plans and audit schedules would be reviewed on a regular basis and revised as necessary to assess if activities are being appropriately managed by the contractor to address the environmental risks.

External audit

The construction contractor(s) would be required to engage an independent, suitably qualified and experienced auditor to conduct an audit prior to commencement of construction works to confirm the contractor(s)' EMP conforms to the contract specification and that proposed controls and procedures are consistent with best practice environmental guidelines.

VicRoads would engage suitably qualified and experienced environmental auditors to undertake compliance audits on a quarterly basis during construction. The compliance audits would assess the contractor's performance against the requirements of the contract specification, legislative requirements and the contractor(s)' EMP. The contractor(s) would be required to address any identified non-compliance.

Reporting

The contractor(s) would be required to report all environmental incidents and non-conformances with the EMP or approvals to VicRoads. VicRoads would report on notifiable environmental incidents and non-conformances with approval or permit conditions to the relevant agencies.

A monthly report would be provided to VicRoads by the construction contractor(s) outlining the performance and effectiveness of the CEMP as well as other items specifically required by VicRoads. This report would include external and internal audit findings, monitoring results and incidents and non-compliances.

Contractor performance reviews

Contractor performance reviews would be periodically completed throughout the delivery, and at the completion, of the Project in accordance with VicRoads Procurement procedures. The reviews would assess the performance of the Project for both the administration and implementation of its EMP(s) for compliance with VicRoads specification. A contractor's pre-qualification status may be reviewed if performance is demonstrably below the requirements and if appropriate corrective actions are not implemented.

Post Project review

VicRoads would carry out a post Project review following practical completion of the contract. This would be attended by both VicRoads and the contractor(s) and a 'Project Key Learnings Report' would be prepared summarising the performance on the Project as well as actions to be taken to advise others of the learnings. Learnings from the review may be used to update and improve the EMS as well as EMFs for future projects (refer to Figure 20-1).

20.4.7 Monitoring

A summary of the results of environmental monitoring and studies conducted subsequent to the EES would be communicated through forums including a Project website and community information bulletins.

Environmental monitoring would include:

- Monitoring of erosion and scour and the effectiveness of erosion and sediment controls per section 20.5.3, 20.5.7 and 20.5.8.
- Monitoring of chemical and fuel handling and storage per section 20.5.3, 20.5.7 and 20.5.8
- Groundwater monitoring as per section 20.5.7
- Surface water quality monitoring as per section 20.5.7

- Monitoring for flora and fauna as per sections 20.5.2 and 20.5.3
- Air quality monitoring as per section 20.5.9
- Construction noise monitoring as per section 20.5.10
- Monitoring of how community complaints are addressed.

Management and access to baseline and monitoring data

Results of monitoring and studies relevant to the design and construction phase of the Project would be forwarded to relevant government agencies to contribute to the improvement of environmental knowledge.

20.5 Environmental management measures and monitoring requirements

The following section outlines the environmental management measures and monitoring requirements that would be implemented for the Project. The Project would be implemented in accordance with the project commitments in Chapter 6 and would adopt the standard environmental protection measures contained within VicRoads' contract specifications. Where Roads and Maritime Services guidelines are more stringent, or contain additional relevant requirements, these would also be adopted.

An overview of the relevant clauses from the VicRoads and Roads and Maritime Services standard contract specifications are provided below in Table 20-3 and a full version is contained in EES Technical Appendix O. Where the risk assessment has identified a need for additional Project-specific environmental management measures, these are also listed in the tables below, together with the relevant risk.

Table 20-3 VicRoads and Roads and Maritime Services standard environmental protection measures

Section	Description	Summary of requirements	Relevant specialist studies
VicRoads Standard Section 177 Environmental Management			
Part B	Water	Requirements for water quality monitoring and dewatering.	Aquatic flora and fauna Hydrology Soils and geology
Part C	Air Quality	Requirements for the control of emissions to air so as not to create objectionable conditions for the public.	Air
Part D	Erosion and Sediment Control	Requirements for erosion and sediment controls, works in/near waterways, spill/sedimentation basins, stockpiles and monitoring.	Aquatic flora and fauna Hydrology Soils and geology
Part E	Contaminated Soils and Materials	Requirements for control and disposal of potential contaminated materials	Soils and geology

Section	Description	Summary of requirements	Relevant specialist studies
Part F	Waste and Resource Use	Requirement for the disposal of noxious or environmental weeds to prevent regeneration.	Aquatic flora and fauna
Part G	Fuels and Chemicals	Requirements for management of chemicals and fuels.	Aquatic flora and fauna
Part H	Noise	Requirements to minimise noisy work practices.	Biodiversity and habitat Aquatic flora and fauna Noise
Part I	Flora and Fauna	Requirements for protection of flora and fauna sites, removal of flora and fauna, discovery of significant flora or fauna, damage to protected vegetation, monitoring, and management of weeds, pests and disease.	Biodiversity and habitat Aquatic flora and fauna
Part J	Cultural Heritage	Requirements for compliance with Cultural Heritage Management Plan, obtaining approval for impacts on cultural heritage sites and areas of significance, establishment of no-go zones and contingency procedures.	Aboriginal cultural heritage Historic heritage

VicRoads Standard Section 1160 Traffic Management

1160 and 1180	Clauses of the VicRoads DC1 contract specifications	Standard protection measures to minimise transport impacts	Traffic and transport
3010	Road Geometry	This section relates to the requirements for the geometric design of roads and bridges, to safely achieve specified traffic volumes travelling at the minimum operating/design speeds.	Aquatic flora and fauna
3030	Drainage	The waterway at bridge and culvert structures shall be sufficient to prevent scour and to limit afflux. Existing drainage catchments and flow patterns shall be maintained where practicable. Drainage systems shall be designed with sufficient capacity. Ground surfaces are to be protected from scour. Stormwater shall discharge at the base of batters. Runoff from all pavement areas will be collected and treated to quality suitable for discharge to the environment.	Aquatic flora and fauna
3060	Landscape and Architectural Elements	Waterway treatments shall minimise impact to waterways, and provide free passage for fish.	Aquatic flora and fauna
3080	Traffic Control and Management Devices	Traffic incident device and signage to manage safety of hazardous load transport.	Aquatic flora and fauna
3090	Traffic Barriers	Traffic barrier systems shall provide sufficient protection for hazardous load transport.	Aquatic flora and fauna

NSW Roads and Maritime Services (Transport) Environmental Assessment Procedure for routine and minor works: Standard safeguards list

G	General	An EMP is prepared and implemented prior to works. Access to waterways is to be via existing boat ramp with no disturbance to the bank or surrounding vegetation	Aquatic flora and fauna
E	Erosion	Erosion and sediment control measures are to be implemented and maintained.	Aquatic flora and fauna
W	Water Quality	No release of dirty water in waterways. Monitoring to be undertaken. Measures to prevent pollution from entering stormwater incorporated in drainage system.	Aquatic flora and fauna
N	Noise and Vibration	Works to be carried out to minimise noise impacts.	Aquatic flora and fauna
B	Biodiversity	There is to be no disturbance or damage to threatened species or critical habitat. Pathogens, weeds and pests are to be managed. Fauna handling must be carried out according to guidelines. Works are not to create an ongoing barrier to the movement of wildlife.	Aquatic flora and fauna

Section	Description	Summary of requirements	Relevant specialist studies
NSW Roads & Traffic Authority (RTA) Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects			
1	Pre-clearing process	Procedure for unexpected threatened species finds.	Aquatic flora and fauna
2	Exclusion Zones	Management requirements for establishing no-go zones relevant to aquatic habitats.	Aquatic flora and fauna
3	Re-establishment of native vegetation	Revegetation requirements for erosion and soil control.	Aquatic flora and fauna
6	Weed management	Prevent or minimise the spread of noxious aquatic weed species on all Roads and Maritime Services project sites and during maintenance works.	Aquatic flora and fauna
7	Pathogen management	Prevent the introduction and/or spread of disease causing agents such as bacteria or fungi.	Aquatic flora and fauna
9	Fauna handling	Use of experienced aquatic ecologists for salvage and translocation of aquatic fauna to minimise impacts fauna and prevent injury to people handling fauna.	Aquatic flora and fauna
10	Aquatic habitats and riparian zones	Establish exclusion zones within aquatic habitats and riparian zones. Access to waterway undertaken to minimise impacts and risk of pollution or erosion. Clearing of riparian vegetation undertaken to minimise impacts to aquatic habitats. Snags relocated to maintain aquatic habitat. Site rehabilitation to protect banks and aquatic habitats. Ensure movement of fish up and downstream is maintained at all times during works in a waterway.	Aquatic flora and fauna

20.5.1 Traffic and transport

Table 20-4 Traffic and transport objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To improve accessibility and connectivity for the people of Echuca-Moama and the wider region by providing for existing and future traffic safety and capacity needs.</i>	- Improve accessibility and road safety - Reduce transport delays and costs - Improve road network connectivity and efficiency - Minimise the impact on local landowners and the community during construction	- Community complaints relating to traffic management during construction - Road safety audit findings - Reduced crash statistics - Reduced travel times

Table 20-5 Traffic and transport Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
TT2	Reduced road safety during operation	Items identified in Road Safety Audit are addressed prior to signoff of detailed design.	VicRoads
TT3	Reduced road safety during construction	Construction traffic routes to be designated and managed as part of the Traffic Management Plan in accordance with the relevant standards. Communication strategy to be implemented to inform stakeholders of Project traffic. Avoid construction during major event periods and locations.	Contractor

20.5.2 Biodiversity and habitat

Table 20-6 Biodiversity and habitat objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.</i>	- Minimise loss of native vegetation and habitat - Avoid and minimise impacts on significant species and communities - Prevent introduction and spread of pest plants, weeds and disease	- No-go zones established to protect native vegetation and habitat that is to be retained - Project activities conducted in accordance with specific measures and species management plans for EPBC and FFG listed threatened species and communities - Development and implementation of an Offset Management Strategy that satisfies requirements under the <i>Permitted clearing of native vegetation, Biodiversity Assessment Guidelines</i> - Development and implementation of a weed management and control program - Development and implementation of hygiene practices to alleviate pathogen/disease risk

Table 20-7 Biodiversity and habitat Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
FF1	Construction encounters confirmed habitat for EPBC listed fauna species (Rainbow Bee-eater)	Refine the alignment through detailed design and/or construction planning to minimise removal of known fauna habitat.	Contractor
FF2	Construction encounters confirmed habitat for EPBC listed fauna species (Rainbow Bee-eater)	Risk would be managed by implementing VicRoads standard environmental protection measures as outlined in Chapter 20 and described in detail in EES Technical Appendix O – Section 177 Environmental Management. No Project-specific environmental management measures were identified.	Contractor
FF3	Construction encounters confirmed habitat for FFG listed fauna species (Masked Owl, Squirrel Glider and Yellow-bellied Sheath-tailed Bat) or impact outside of nominated construction footprint	As per risk FF1.	Contractor
FF4	Construction encounters confirmed habitat for FFG listed fauna species (Masked Owl, Squirrel Glider and Yellow-bellied Sheath-tailed Bat) or impact outside of nominated construction footprint	Include a requirement in the EMP to undertake salvage and translocation of tree dwelling fauna species.	Contractor
FF5	Construction encounters Scattered LOTs	As per risk FF1, to minimise removal of scattered trees.	Contractor
FF7	Construction encounters habitat for DELWP Advisory listed flora and fauna species	As per risk FF1. Include a requirement in the EMP to undertake salvage and translocation of Dianella and other similar flora species.	Contractor

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
FF8	Construction results in weeds and/or pathogens being spread	Risk would be managed by implementing VicRoads standard environmental protection measures as outlined in Chapter 20 and described in detail in EES Technical Appendix O – Section 177 Environmental Management. No Project-specific environmental management measures were identified.	Contractor
FF9	Loss of habitat due to machinery sparking fire during construction	Construction not to occur on total fire ban days and diesel vehicles to be used. Keep vehicles to well-designed haul roads and limit vehicle speeds.	Contractor
FF10	Light, noise, vibration disturbance to native fauna during construction and operation	As per risk FF4. Erect signage to alert drivers of risks of traffic to wildlife and fencing, where appropriate, to exclude animals.	Contractor
FF11	Construction removes remnant native vegetation and habitat	Engage a suitably qualified and skilled ecologist to prepare a management plan, or update any existing management plan, for the Victoria Park Reserve, ensuring that any predicted future threats arising from edge effects, reduced area, etc. are managed. The management plan should be prepared in consultation with, and made freely available to, the relevant managing authority. In order to minimise Squirrel Glider road mortality and facilitate ease of movement across the preferred alignment, it is recommended that an appropriate number of crossing zones. Crossings should be approximately 100m long and incorporate the following features: ■ Suitable Squirrel Glider vegetation to be retained as close to the road as practical ■ Artificial land/launch poles to be strategically placed to facilitate glider road crossing ■ Aerial rope bridges to be constructed over the road to facilitate glider road crossing. Crossing zones should be designed in consultation with the Centre for Urban Ecology and Campaspe Shire Council (the relevant managing authority). A preliminary crossing strategy has been developed in consultation with Roads and Maritime Services New South Wales (Brett Lane & Associates, 2015b). The location of crossing zones in Victoria should be determined in accordance with the Project-wide strategy.	Contractor
FF12	Shading	Engage a suitably qualified and skilled ecologist to prepare a management plan, or update any existing management plan, for the Victoria Park Reserve. The management plan should be prepared in consultation with, and made freely available to, the relevant managing authority.	Contractor
FF13	Operational collision with wildlife, particularly at dawn, dusk and night	Erect signage to alert drivers of risks of traffic to wildlife and fencing, where appropriate, to exclude animals.	Contractor
FF14	Construction encounters habitat for DELWP Advisory listed flora and fauna species	As per risk FF4.	Contractor

20.5.3 Aquatic flora and fauna

Table 20-8 Aquatic flora and fauna objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.</i>	- Minimise loss of riparian vegetation and habitat - Avoid and minimise impacts on significant aquatic species - Prevent introduction and spread of pest plants, weeds and disease	- No-go zones established to protect riparian vegetation and habitat that is to be retained - Project activities conducted in accordance with specific measures and species management plans for EPBC and FFG listed threatened species and communities - Development and implementation of a weed management and control program - Development and implementation of hygiene practices to alleviate pathogen/disease risk
<i>To maintain floodplain functions... of proximate section of the lower Campaspe and Murray Rivers.</i>	- Comply with the State Environment Protection Policy (Waters of Victoria) - Protect river health and waterway quality - Minimise impacts on waterways and floodplain hydraulics	- No deterioration in water quality between the upstream and downstream limits of the work site during the construction period (where upstream results become background limits) - All waterway crossings provide for fauna passage - Spill basins design to cater for the 1 in 100 year ARI rainfall event

Table 20-9 Aquatic flora and fauna Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
All identified risks would be managed by implementing VicRoads and Roads and Maritime Services standard environmental protection measures as outlined in this chapter and in EES Technical Appendix O – Section 177 Environmental Management. No Project-specific environmental management measures were identified.			

20.5.4 Aboriginal cultural heritage

Table 20-10 Aboriginal cultural heritage objectives and indicators

EES Evaluation Objective	Performance objective	Indicator
<i>To avoid or minimise adverse effects on Aboriginal...cultural heritage values.</i>	- Minimise impacts on Aboriginal cultural heritage - Comply with the <i>Aboriginal Heritage Act 2006</i>	Project activities conducted in accordance with approved Cultural Heritage Management Plan

Table 20-11 Aboriginal cultural heritage Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
CH1	Project impacts on registered Aboriginal scarred tree VAHR 7825-0386.	Scarred tree to be removed and re-instated at a location to be agreed with the Yorta Yorta Nation Aboriginal Corporation (YYNAC) and any other relevant management authorities. The tree removal must be monitored and assisted by representatives from the YYNAC, in consultation with a qualified arborist.	VicRoads

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
CH2	Project impacts on registered Aboriginal scarred trees VAHR 7825-0371, VAHR 7825-0482, VAHR 7825-0396 or VAHR 7825-0398.	Scarred trees VAHR 7825-0371, VAHR 7825-0482, VAHR 7825-0396, VAHR 7825-0398 must be retained in their current locations. The way in which the trees are conserved must ensure the long-term health of the trees.	VicRoads
CH3	Project impacts on registered Aboriginal scarred tree VAHR 7825-0372. Tree impacted by lopping of tree branches at ultimate duplication.	Lopping of the tree branches must be carried out by a qualified arborist with the assistance of representatives from the YYNAC. The lopping of branches must be carried out in such a way as to not endanger the long-term health of the tree.	VicRoads
CH4	Project impacts on registered Aboriginal scarred tree 7825-0399 VAHR at ultimate duplication.	This tree would not be impacted by the initial alignment and may safely be retained in the road reserve in the short term. A barrier or fence must be erected around the tree. The condition of the tree is to be monitored regularly (at least once per year) to assess the likelihood of the tree collapsing. If it appears likely that the tree may collapse, VicRoads must contact the YYNAC to discuss treatment of the tree. If the tree is moved prior to construction of the ultimate duplication, the removal of the tree must be carried out by a qualified arborist in consultation with, and the assistance of, representatives from the YYNAC. After the tree is removed, it must be transported to a location agreed to by YYNAC to undergo conservation treatment. The conservation work and the re-erection of the tree must be carried out or supervised by a qualified arborist in association with YYNAC representatives.	VicRoads
CH5	Construction encounters previously unregistered ancestral remains.	Additional negotiation with, and approval by, the YYNAC to be carried out regarding the protocol for the protection of ancestral remains. All work must cease in the area where the remains are found and statutory procedures for reporting the discovery that are contained in the contingency recommendations for the CHMP must be followed. Monitoring of excavation works for temporary sedimentation basins and permanent spill basins would be required by the CHMP.	VicRoads
CH6	Construction encounters previously unidentified Aboriginal cultural heritage place.	All work must cease in the area where the place is found and statutory procedures for reporting the discovery that are contained in the contingency recommendations for the CHMP must be followed. Additional negotiation and approval from YYNAC regarding protocol for protection of the Aboriginal cultural heritage place.	VicRoads
CH7	Construction encounters Aboriginal cultural heritage place in a sensitive location, such as the sand hill or banks of the Murray or Campaspe rivers.	All work must cease in the area where the place is found and statutory procedures for reporting the discovery that are contained in the contingency recommendations for the CHMP must be followed. Additional negotiation and approval from YYNAC regarding protocol for protection of the Aboriginal cultural heritage place.	VicRoads
CH8	Fill for the road construction is obtained from a source where excavation impacts on Aboriginal cultural heritage places.	Fill for the road works must be sourced from a licenced existing quarry. Any other fill sources are subject to the provisions in the CHMP.	VicRoads

20.5.5 Historic heritage

Table 20-12 Historic heritage objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To avoid or minimise adverse effects on historic cultural heritage values.</i>	Minimise impacts on historic heritage	Project activities conducted in accordance with any approvals issued under the <i>Planning and Environment Act 1987</i> and <i>Heritage Act 1995</i> .

Table 20-13 Historic heritage Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
HH1	Construction encounters previously unregistered and unassessed historical heritage site.	Avoidance or alternatively reporting and approval would be obtained from relevant authorities (Heritage Victoria) prior to damaging, disturbing or otherwise impacting cultural heritage sites. Conduct salvage works on the site in accordance with Heritage Victoria conditions.	VicRoads/Contractor
HH2	Construction encounters Murray Pine tree stand (HO79) north of the former Echuca Secondary College site.	Planning approval to impact on area of Heritage Overlay crossed by the preferred alignment to be obtained from the relevant authority prior to works commencing. Works to be conducted in accordance with conditions in any required planning approval. This applies only if Planning Scheme Amendment C101 is approved.	Contractor
HH3	Alignment encounters heritage listed area of the Old Echuca township and Victoria Park (HO1).	Planning approval to impact on area of Heritage Overlay crossed by the preferred alignment to be obtained from the relevant authority prior to works commencing. Works to be conducted in accordance with conditions in any required planning approval. Adopt sympathetic materials/colours for the bridge and/or complementary landscaping.	VicRoads/Contractor
HH4	Alignment encounters St Leonards Homestead (HO41).	As per HH2 above Obtain a Consent to Disturb approval for impacts on any archaeological features from Heritage Victoria pursuant to the Heritage Act. Ensure design of the Project does not impact on the property and heritage features within the boundary of HO41.	VicRoads
HH5	Alignment encounters Dwelling, 279-281Campaspe Esplanade (HO68).	Works to be conducted in accordance with conditions in planning approval.	Contractor

20.5.6 Social

Table 20-14 Objectives and indicators for minimisation of hazards to recreational activity

EES Evaluation Objective	Performance Objective	Indicator
<i>To minimise adverse social and land use effects, including impacts on existing uses of the Crown land.</i>	- Minimise disruption and hazards to recreational users of Victoria Park and the Murray River during construction - Minimise disruption and hazards to recreational users of Victoria Park and the Murray River during operation	- Frequency of closure of passive and active recreation routes within Victoria Park - Frequency of community complaints relating to interruption to recreational activities within Victoria Park and on the Murray River



20.5.7 Catchment values

Table 20-15 Catchment values objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>Maintain floodplain functions, hydrology, values of surface water, groundwater... of proximate sections of the lower Campaspe and Murray Rivers.</i>	- Comply with the State Environment Protection Policy (Waters of Victoria) and State Environment Protection Policy (Groundwaters of Victoria). - Protect river health and waterway quality. - Minimise impacts on waterways and floodplain hydraulics. - Minimise impacts on beneficial uses of groundwater.	- No deterioration in water quality between the upstream and downstream limits of the work site during the construction period (where upstream results become background limits). - All waterway crossings provide for fauna passage. - Project activities conducted in accordance with a groundwater management plan and monitoring program.

Table 20-16 Catchment values Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
SW5	Pollutants in stormwater runoff during operation affect the water quality in the local waterways.	Incorporate spill basins into design as required to capture pollutants.	VicRoads

20.5.8 Soils and geology

Table 20-17 Soils and geology objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To maintain... geomorphic stability of proximate sections of the lower Campaspe and Murray Rivers.</i>	- Comply with the State Environment Protection Policy (Prevention and Management of Contamination of Land). - Minimise impacts on soil stability, erosion, and exposure and disposal of waste or hazardous soils.	- All contaminated materials are identified, stored, treated in accordance with State Environment Protection Policy (Prevention and Management of Contamination of Land) and disposed of at EPA licensed facilities. - Erosion and sediment controls installed and maintained in accordance with EPA Best Practice Environmental Management - Environmental Guidelines for Major Construction Sites (1996) and EPA Construction Techniques for Sediment Pollution Control (1991).

Table 20-18 Soils and geology Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
SG1	Waste or contaminated material uncovered during works	Phase 2 environmental site assessment to be carried out to delineate contamination if contamination is encountered. Design to minimise excavation/ground disturbance within the alignment on any defined contaminated sites.	VicRoads and contractor

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
SG2	Soil settlement due to poor/soft ground conditions	Ground stabilisation and/or improvement techniques to be employed if required prior to construction. Contractor(s) to adopt best practice techniques for batter construction.	VicRoads and contractor
SG4	Potential for erosion/sediment generation post construction	Additional erosion management measures if pre-existing measures implemented are identified as being inadequate. Measures may include re-mulching, inserted erosion control mats or seeding with grass (hydroseeding). Undertake surveillance to monitor.	VicRoads
SG5	Potential for uncontained spills or leaks during construction or operation	EMP to include: Appropriate procedures for containing spills and leaks Appropriate methods for cleaning up spills and leaks where safe to do so.	VicRoads and Contractor

20.5.9 Air

Table 20-19 Air objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To minimise adverse...air quality and other amenity effects to the extent practicable.</i>	- Minimise air quality impacts on sensitive receivers - Comply with State environment protection policy Air Quality Management (SEPP AQM)	- Dust monitoring results comply with the requirements of VicRoads Standard Section 177 Environmental Management Part C1 - Community complaints relating to air quality are responded to and addressed where required

Table 20-20 Air Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
All identified risks would be managed by implementing VicRoads and Roads and Maritime Services standard environmental protection measures as listed in Chapter 18 and detailed in EES Technical Appendix O. No Project-specific environmental management measures were identified.			

20.5.10 Noise

Table 20-21 Noise objectives and indicators

EES Evaluation Objective	Performance Objective	Indicator
<i>To minimise adverse noise...and other amenity effects to the extent practicable.</i>	- Minimise noise and vibration impacts on sensitive receivers - Comply with EPA Victoria’s Noise Control Guidelines (2008) (EPA Victoria Publication 1254)	- Noise monitoring results comply with EPA Victoria’s Noise Control Guidelines (2008) (EPA Victoria Publication 1254) - Community complaints relating to noise and vibration are responded to and addressed where required

Table 20-22 Noise Project-specific environmental management measures

Risk No.	Risk description	Project-specific environmental management measures	Responsibility
N1	Construction of the Project may result in vibration levels beyond human comfort and building damage thresholds limits, particularly where activities (e. g. pile driving for bridge piers at locations near the Campaspe River) occur closer than 50-100m from buildings (most other activities would generally be acceptable if greater than 15-30m from buildings).	Prior to works the contractor(s) should carry out an assessment of potential vibration impacts to buildings within 100m of the works and where necessary implement strategies to ensure compliance with building damage vibration thresholds, such as modification of construction method/equipment or implementation of temporary structural support for sensitive receptors. Further consideration should be given to conducting Building Condition Inspections of structures within 200m of pile driving activities.	Contractor
N2	Construction of the Project may result in temporarily increased ambient noise levels beyond those that may cause hearing damage at residential properties, recreational and non-recreational areas along the preferred alignment, particularly where activities occur closer than 25m from sensitive receptors.	Prior to works the contractor(s) should carry out an assessment of noise impacts to potentially occupied buildings and land with respect to hearing damage thresholds. Where necessary, the contractor(s) should implement strategies to ensure compliance, such as modification of construction method/equipment or temporary evacuation of sensitive receptors.	Contractor



21 Conclusion

21.1 Responding to the Scoping Requirements

The Scoping Requirements provide a set of draft Evaluation Objectives to structure and focus the assessment of impacts that may result from the Project.

The Project was assessed against these draft Evaluation Objectives, which reflect relevant legislation, state and local government policies, and key environmental, economic, and social risks associated with the Project.

The EES has determined that the Echuca-Moama Bridge Project would meet the draft Evaluation Objectives as outlined below.

21.1.1 Road safety and capacity

"To improve accessibility and connectivity for the people of Echuca-Moama and the wider region by providing for existing and future traffic capacity and safety needs."

The Project would provide benefits to road users including:

- A 40% reduction in traffic volumes on the existing bridge by 2044
- 42% of through traffic would be removed from the area of High Street near the historic port area by 2044
- Truck volumes are expected to decrease by a similar proportion in and around the town centres
- No adverse impacts have been identified for public transport, walking or cycling
- Additional off road shared path facilities along the entire alignment
- Provision of sealed shoulders for on road cyclists
- Improved river crossing access for heavy and oversize vehicles, currently restricted from using the existing bridge
- Provision of a higher mass limit compliant crossing.

The majority of adverse impacts would be expected to occur during the construction of the Project, including potential impacts on road safety associated with heavy vehicle movements.

It is expected that the existing VicRoads and Roads and Maritime Services standard environmental protection measures together with further Project-specific environmental management measures would be sufficient to manage impacts. These additional management measures would include communication and traffic management plans.

The Project is expected to improve accessibility and connectivity for the people of Echuca-Moama through provision of another river crossing. It would also provide wider regional benefits by providing a direct route for trucks and heavy vehicles through Echuca-Moama which would meet current and future capacity and safety requirements.

21.1.2 Biodiversity

"To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy."

The key potential impacts of the Project on biodiversity and habitat would arise from:

- The removal of remnant native vegetation and hollow bearing trees
- The impact to significant fauna species
- The impact to wildlife corridors that facilitate fauna movements.

There are other potential impacts of the Project on biodiversity and habitat, although these are all readily managed through VicRoads standard environmental protection measures.

The key impacts arising from the Project would be to threatened fauna species through removal of habitat, and particularly hollow bearing trees. There would be minimal impact to threatened flora species and the extent of native vegetation removed could be readily offset.

Overall the impacts to fauna are considered to be confined to an area within and immediately adjacent to the study area, which represents a comparatively small proportion of the available habitat for native fauna on the floodplains of the Murray and Campaspe rivers in and around Echuca. Therefore, significant consequences to fauna populations at more than a local scale are not anticipated. A key management measure would be to limit the removal of hollow bearing trees, where possible. Where this was not possible, species salvage and translocation management measures would be used to reduce the potential impact on species dependent on hollow bearing trees.

The Project would not contribute significantly at a regional scale to the fragmentation of existing wildlife corridors as this habitat is already fragmented due to historical and existing land uses. However, the Project would lead to fragmentation at a local scale specifically affecting Victoria Park. It is likely that many of the remaining fauna species in the existing habitat have already adapted to a degree of habitat fragmentation.

The EES has assessed aspects relevant to this draft Evaluation Objective and concludes that whilst the Project would result in localised impacts, with mitigation measures implemented, the Project would not significantly impact on biodiversity values for the region.

21.1.3 Cultural heritage

"To avoid or minimise adverse effects on Aboriginal and historic cultural heritage values."

The Echuca region has been occupied by people for at least 30,000 years. There are 87 registered Aboriginal cultural heritage places located within the geographic region, including six scarred trees identified within and one just outside of the proposed Right-of-Way. Assessment of these trees using the Australian International Council on Monuments and Sites' (ICOMOS) Burra Charter Criteria determined they are of considerable aesthetic, historical, scientific and social value both to the contemporary Yorta Yorta people, other Aboriginal communities and the wider Australian community.

Works within the construction area of the preferred alignment have the potential to directly impact on these scarred trees. The trees would be retained and protected or relocated prior to any earthworks within the construction area.

A single stone artefact located just north of the Campaspe River would most likely be disturbed during construction, but this is not considered to be significant given it is within highly disturbed soil. Bridge piers would be located in order to minimise the potential for any impacts to another nearby buried deposit of stone artefacts.

The sand hill near the former Echuca Secondary College site, the banks of the Murray and Campaspe rivers and permanent spill and temporary sedimentation basin excavation areas have all been identified as sensitive areas that may contain sub-surface Aboriginal cultural heritage places, including Aboriginal ancestral remains. Construction works at these locations would be undertaken in accordance with an approved CHMP. Additional approval of protocols for the protection of ancestral remains and other unidentified Aboriginal cultural heritage places would also be sought from the YYNAC.

No excavation other than minimal topsoil removal would occur at the sand hill location and a rigid road pavement would be used to minimise the potential for compression of the underlying sand deposits. Consultation would be undertaken with the YYNAC to determine the most appropriate arrangement for a new emergency access on or near the high point of the sand hill, and its use would be restricted to emergency services. Pavement material would be placed on top of the existing ground to enable access for emergency vehicles whilst minimising disturbance to the natural surface.

If unregistered Aboriginal ancestral remains or previously unidentified Aboriginal cultural heritage places are encountered during construction, the contingency arrangements in the approved CHMP will provide best practice outcomes in collaboration with the YYNAC.

There are no previously registered historical heritage sites, heritage places or historic archaeological sites within the proposed Right-of-Way of the preferred alignment.

Construction activities would be managed to contain works within the Right-of-Way and avoid any impacts to historic heritage sites identified in the surrounding area.

The EES has assessed aspects relevant to this draft Evaluation Objective and concludes that with mitigation, the Project would not significantly impact on Aboriginal or historical cultural heritage values.

21.1.4 Social and land use

"To minimise adverse social and land use effects, including impacts on existing uses of the Crown land."

The social and economic roles of the two towns are closely intertwined. Both towns function, and are locally recognised, as a single community. They rely heavily on each other for services and facilities, with extensive collaboration and little need for duplication of services. The majority of employment, education, emergency and social services are provided in Echuca.

The Project would provide a number of positive social benefits. The preferred alignment would relieve traffic congestion on the existing bridge and improve travel times for motorists. This would increase accessibility to local facilities and services for residents of Echuca and Moama, enhancing social cohesion.

The Project would also relieve traffic congestion within the town centres of Echuca and Moama thereby improving the safety and amenity of these centres.

Stakeholders consulted as part of the Social Impact Assessment, including representatives of Campaspe Shire Council and Murray Shire Council, felt the attractiveness of Echuca and Moama were currently negatively impacted by traffic.

The Project would significantly reduce the risks associated with disrupted access across the river, particularly in relation to traffic incidents occurring on the existing bridge.

Given the interdependence of Echuca and Moama, including the reliance of residents on essential services located only in Echuca and/or Moama, the additional security provided by a second river crossing is highly valued.

The Project would improve pedestrian and cyclist connectivity to key destinations including Victoria Park and the Moama Recreation Reserve.

Potential adverse impacts associated with the Project are related to loss of amenity due to noise, in relation to both existing residential environments and recreational and tourism facilities. These impacts would be mitigated, as discussed in section 21.1.7.

From a land use planning perspective, the Project would not result in any significant inconsistency with planning policy, and would not result in broad change of land use within the study area.

The greatest land use impacts resulting from acquisition would be to Victoria Park and the former Echuca Secondary College site, which are both on Crown land. These impacts would be due to changes to access and amenity and the loss of six tennis courts at the Echuca Lawn Tennis Club. The existing draft Victoria Park Master Plan anticipates the road in this location.

The EES has assessed aspects relevant to this draft Evaluation Objective and concludes that Project commitments would reduce the potential social and land use impacts to an acceptable level.

21.1.5 Landscape and visual amenity

"To minimise adverse landscape and visual amenity effects on values of the area, including the Murray and Campaspe rivers and floodplains."

Overall, the introduction of a new twin bridge structure across the Murray River would have a very high impact on its scenic, recreational, cultural and natural heritage values.

The highest impacts would be during construction although impacts would continue throughout the operational phase given the close proximity of the bridge to house boat moorings and its visibility to passing paddle-steamers.

However, if the bridge clear span was designed to be an elegant structure that contributed to the landscape, these impacts would be reduced to a moderate to high level.

Within Victoria Park, the introduction of road and bridge infrastructure was assessed as resulting in a moderate to high impact on the visual amenity and key views of the river floodplains. However, the new road and bridge would provide motorists and shared pathway users with a new elevated view of the floodplains.

These impacts could only be partially mitigated by reinstating the shared pathway and access road connections and planting vegetation between the road and the affected areas of Victoria Park.

In contrast, one of the Project's major benefits would be its contribution to the area's bicycle and walking networks through the provision of on-road bicycle lanes in both directions and an off-road shared pathway following the length of the preferred alignment.

The application of VicRoads' standard environmental protection measures and additional Project-specific management measures would not mitigate the impacts of the Project entirely, but would reduce these impacts to a moderate level. This is also reflected in the outcomes of the Social Impact Assessment, particularly in relation to recreational values.

21.1.6 Catchment values

"To maintain floodplain functions, hydrology, values of surface water, groundwater and geomorphic stability of proximate sections of the lower Campaspe and Murray rivers."

Existing flood conditions for the study area were determined based on a previous study (SKM, 1997) that developed a flood frequency model extrapolated from over 100 years of flood data. These existing conditions were used to build a model to assess the impact of the Project on hydraulic conditions in the study area.

The Project is expected to have limited impacts on flood levels across a range of ARIs. These adverse impacts are expected to occur in the vicinity of Warren Street, where the current road formation acts as a hydraulic barrier within the catchment.

Across the 20, 50 and 100 year ARI events, the increase in water depth is only in the range of 3-5cm, for water depths that are already around 1m in depth (and therefore already severely impacting properties in the floodplain). Therefore, floodplain function is predicted to be maintained after the construction of the Project.

The geomorphology of the study area is dominated by the floodplains of the Campaspe and Murray rivers. Geomorphic conditions are expected to be unchanged by the Project with only localised effects on soil erosion associated with the construction of the bridge piers immediately adjacent to river channels. Given the high sediment loads carried by both the Murray and Campaspe rivers across a range of flows, the potential impacts of the Project on water quality are expected to be negligible.

There is no evidence from historical land use records to indicate the presence of any contaminated land. Phase 1 environmental site assessments (ESAs) would be undertaken as part of detailed design to locate and define any existing land contamination. If any contamination was identified, Phase 2 ESAs would be undertaken to locate and classify the contamination. With the information obtained from these ESAs it would be possible to alter the Project's design and minimise the ground disturbance at contaminated sites.

The EES has assessed aspects relevant to this draft Evaluation Objective and concludes that with mitigation measures, the Project would not significantly impact on the catchment values of the lower Campaspe and Murray rivers.

21.1.7 Amenity

"To minimise adverse noise, air quality and other amenity effects to the extent practicable."

Temporary air quality impacts would be expected during the construction phase of the Project. Construction phase emissions could include windblown dust from exposed surfaces and mechanically generated dust from the operation of plant, equipment and vehicles travelling on unpaved roads. Additionally, exhaust emissions would be discharged from vehicles and plant operating during construction.

Potential impacts from construction of the Project would be minimised through the implementation of VicRoads' standard environmental protection measures, which are routinely and successfully employed on other VicRoads' construction projects.

The operational impacts of the Project on air quality were assessed using VicRoads' AQST and the likely worst-case concentrations of traffic exhaust emissions were considered. The results of the AQST modelling predicted concentrations of nitrogen dioxide and particulate matter less than 10 microns at sensitive receptors which would be substantially less than State Environment Protection Policy (SEPP) (Air Quality Management (AQM)) intervention levels and this was despite the worst-case scenario adopted and the conservatism inherent in the AQST.

The Noise Impact Assessment found that construction of the Project would have the potential to cause noise impacts at the nearest affected sensitive receptors, particularly during corridor clearing and site establishment when heavier machinery is likely to be used.

However, a combination of controls, including restrictions on working hours and implementation of VicRoads' standard environmental protection measures, would reduce noise during construction as far as practicable. It is considered the impacts of noise from construction of the Project would be minor to moderate.

It is also likely that construction of the Project would cause some vibration impacts. However, with the implementation of VicRoads' standard environmental protection measures and Project-specific environmental management measures, it is considered the impacts of vibration during construction would be moderate.

It was found that future operational noise levels for the Project would comply with VicRoads' Traffic Noise Reduction Policy (2005) if mitigation measures, such as low noise asphalt road pavement and noise barriers, were used to limit noise impacts on residential properties in Crofton Street and the Echuca Holiday Park.

Other potential impacts to amenity are covered above in sections 21.1.1, 21.1.4 and 21.1.5.

21.1.8 Economy

"To provide road infrastructure that fosters a viable level of economic performance for the local and regional economy of Echuca-Moama."

The Project would support anticipated urban growth and economic development in Echuca-Moama and the surrounding region.

One of the positive impacts of the Project is the anticipated generation of employment. The assessment identifies the potential for 4,240 full-time equivalent (FTE) direct and indirect jobs and a wage spend of approximately \$18 million over the three-year construction period. In any given year over the construction period, it is estimated that up to 540 direct FTE jobs would be created, and up to

870 indirect FTE jobs would be supported by the Project. Much of this labour would be sourced locally or regionally.

Further employment opportunities would be created if the ultimate duplication is constructed at a later stage when traffic volumes required further capacity.

During the operational phase, the Project would be expected to provide efficiency benefits for local industry and agricultural operators, and for local tourism operators who would benefit from increased accessibility during major events.

The additional crossing of the Murray River would also provide regional benefits as the new bridge would be able to accommodate larger and heavier vehicles, and reduce the requirement to travel to alternative river crossing points almost 100km away. This would benefit industry and agricultural operators in the region.

Local retail and commercial businesses in the Echuca central business district are likely to experience both amenity and efficiency benefits associated with the removal of heavy vehicle movements from the existing bridge and Echuca town centre, and the increased opportunities for better connected, attractive and well-functioning business areas.

Some specific business and tourism operations may be affected by short-term, construction-related impacts, particularly in terms of noise effects and conflicts with construction traffic. These impacts could persist during the operational phase depending on proximity to the preferred alignment. In particular, traffic noise during operation could result in economic loss for the Echuca Holiday Park if some visitors are deterred from using the facility in favour of other accommodation options which provide a higher level of amenity. The proposed installation of a noise wall adjacent to the Echuca Holiday Park would reduce, but would not eliminate, these potential traffic noise impacts.

21.1.9 Environmental Management Framework

"To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation and rehabilitation phases of the Project, in order to achieve acceptable environmental outcomes."

The EES provides an EMF which includes recommendations for the detailed design, construction and operational phases of the Project.

The EMF addresses the matters specified in the EES Scoping Requirements, with clear accountabilities for managing potential environmental impacts.

The EMF provides a proposed program for evaluating environmental outcomes, reviewing and revising the EMP, as well as the auditing and reporting of performance. The EMF specifies key roles and responsibilities for the construction and operational phases of the Project to provide for transparency and accountability in the management and monitoring of outcomes.

VicRoads would incorporate all relevant measures from the EMF, and any other management measures identified, through the Minister for Planning's assessment and conditions of subsequent statutory approvals into the contract specifications for detailed design and construction. Construction contractor(s) appointed by VicRoads, would incorporate these measures into

VicRoads would implement measures contained within the EMF that are not relevant to the CEMP, such as compensation for land acquisition and vegetation offsets and would be ultimately be responsible for the implementation of the EMF.

21.1.10 Integrated transport and sustainable development

"Overall, to demonstrate that the Project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term."

Australia's National Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992) defines Ecologically Sustainable Development (ESD) as:

"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

More simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.

A comprehensive set of principles for the achievement of ESD are also provided in Section 3A of the EPBC Act as follows:

- (a) *Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations*
- (b) *If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation*
- (c) *The principle of inter-generational equity – that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations*
- (d) *The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making*
- (e) *Improved valuation, pricing and incentive mechanisms should be promoted.*

The Project is consistent with the objectives of sustainable development for the following reasons:

- The Project would achieve sustainable benefits in transport efficiency within Echuca-Moama, and a demonstrable ability to meet appropriate levels of service within the local road network and at the two key river crossings
- The Project would make a significant contribution to the local economy during the two construction phases, and provide a foundation from which local businesses and the community could take advantage of improved local traffic conditions to make functional and design improvements to local business districts and assets
- The Project would provide associated benefits for the social environment of Echuca and Moama, given the interdependence of both communities, and strengthen the role of the existing and proposed bridge crossings in that provide accessibility, connectivity and support social cohesion
- The Project would promote community resilience by providing an alternative crossing of the Murray and Campaspe rivers during periods of flooding on the two river systems
- The construction and operation of the Project could be undertaken in manner that actively manages potential adverse impacts on the local biophysical environment
- The Project would be consistent with the adoption of the precautionary principle, in that all impact assessments have been undertaken by assuming the final fully developed Project footprint and the associated scale, character and intensity of impacts on the economic, social and biophysical environment
- In doing so, the Project integrates both long-term and short-term economic, environmental, social and equity considerations
- The Project has involved an extensive community engagement process that has facilitated community involvement in decisions and actions that directly affect them, principally around the use of recreational facilities, impacts on public open space, and the substantial reduction in heavy vehicle traffic in town centres.

The EES documents the predicted risks and impacts of the Project and identifies management measures to reduce the residual impacts to an acceptable level.

22 References

- ABS (Australian Bureau of Statistics) (2011) *Census of Population and Housing 2011*.
- ABS (2013) *Tourist Accommodation, Small Area Data, June Quarter 2013*.
- AECOM (2012) *Mid-West 2 Corridor Planning Study – Social Impact Assessment*. Melbourne: AECOM.
- AECOM (2015) *Echuca-Moama Bridge EES: Social Impact Assessment Report*. Prepared for VicRoads by AECOM in association with Public Place.
- Andrew Ward & Associates (1992) *City of Echuca Heritage Conservation Study*.
- Beca (2011) *Echuca Housing Strategy*. Prepared for Campaspe Shire Council, 17 March 2011. Beca Pty Ltd.
- BL&A (Brett Lane & Associates) (2013) *Mid-West 2 Murray River Crossing at Echuca-Moama Detailed Flora, Fauna, Native Vegetation and Net Gain Assessment, Report 8194 (3.8)*. Prepared for VicRoads, Brett Lane and Associates Pty Ltd, East Hawthorn, Victoria.
- BL&A (Brett Lane & Associates) (2015a) *Echuca-Moama Bridge Project Biodiversity and Habitat Impact Assessment EES Report, Report 8194 (16.10)*. Prepared for VicRoads, Brett Lane & Associates Pty Ltd, Hawthorn, Victoria.
- BL&A (Brett Lane & Associates) (2015b) *Second Murray River Crossing Echuca-Moama, Squirrel Glider Habitat Linkage Strategy, Report 8194 (18.1)* Prepared for VicRoads, Brett Lane and Associates Pty Ltd, East Hawthorn, Victoria.
- Boulton, AJ and Brock, MA (2014) *Australian Freshwater ecology: processes and Management 2nd Edition*. John Wiley & Sons.
- BS (British Standards) (1992) *British Standards 6472-1992, Evaluation of human exposure to vibration in buildings (1-80 Hertz)*.
- BS (1993) *British Standards 7385-2:1993: Evaluation and measurement for vibration in buildings - Part 2: Guide to damage levels from groundborne vibration (1993)*.
- Campaspe Shire Council (2007) *Campaspe Walking and Cycling Strategy*.
- Cardno (2009) *Detailed Hydrology Study for the Echuca-Moama Bridge Planning Study*. Prepared for VicRoads, Vic.
- Cardno (2010) *Addendum: Detailed Hydrology Study for the Echuca-Moama Bridge Planning Study*. Prepared for VicRoads, Vic.
- Cardno (2013) *Detailed Hydrology Study for the Echuca-Moama Bridge Planning Study – Mid West 2 Alignment*. Prepared for VicRoads, Vic.
- Cardno (2015) *Echuca-Moama Bridge EES: Specialist Hydrology Report*, Prepared for VicRoads and NSW Roads and Maritime Services.
- Churchill, S. (2008) *Australian Bats*, Jacana Books, Allen & Unwin, Crow's Nest, NSW.
- Clemann N and Gillespie GR (2004) *Recovery Plan for Litoria raniformis 2004 – 2008*. Department of Environment and Heritage, Canberra.
- Commonwealth of Australia (1992) *National Strategy for Ecologically Sustainable Development*. Prepared by the Ecologically Sustainable Development Steering Committee, Endorsed by the Council of Australian Governments, December, 1992.
- Coulson, Helen (1995) *Echuca-Moama on the Murray*. Hyland House, South Melbourne.
- Curr, E.M. (1883) *Recollections of Squatting in Victoria*. Melbourne.
- Davies, PE, Steardson MG, Hilman TJ., Roberts JR and Thoms MC (2013) *Sustainable Rivers Audit 2: The ecological health of the rivers in the Murray-Darling Basin at the end of the Millennium Drought (2008-2010) Volume 2*. Murray-Darling Basin Authority, Canberra.
- DEC (Department of Environment and Conservation) (NSW) (2006) *NSW Recovery Plan for the Large Forest Owls: Powerful Owl (Ninox strenua), Sooty Owl (Tyto tenebricosa) and Masked Owl (Tyto novaehollandiae)*, Department of Environment and Conservation, Sydney, NSW.
- DECCW (Department of Environment, Climate Change and Water) (2010) *State of the Catchments 2010: Riverine Ecosystems*. Murray Region. Department of Environment, Climate Change and Water NSW.
- DELWP (Department of Environment, Land, Water and Planning) (2014) *Native Vegetation Information Management system*, Department of Environment and Primary Industries, East Melbourne, Victoria, viewed 11 June 2014, <<http://www.depi.vic.gov.au>>.
- Department of Employment (2014) *Small Area Labour Markets, June Quarter 2014*. Published by the Department of Employment, Australian Government.

Department of Primary Industries NSW (2015) *Aquatic Pest and Disease Distribution*. Data obtained through the NSW Department of Primary Industries website 10/02/2015.

DEPI (Department of Environment and Primary Industries) (2013a) *Advisory List of Threatened Vertebrate Fauna in Victoria*. Department of Environment and Primary Industries, East Melbourne, Victoria.

DEPI (2013b) *Index of Stream Condition: The third benchmark of Victorian River Condition, ISC North- Central Region*. Victorian Department of Environment and Primary Industries.

DEPI (2013c) *Permitted clearing of native vegetation: Biodiversity assessment guidelines (dated September 2013)*. Department of Environment and Primary Industries, East Melbourne, Victoria.

DEPI (2014) *Flora and Fauna Guarantee Threatened List 2014*, Department of Environment and Primary Industries, East Melbourne, Victoria, <<http://www.depi.vic.gov.au>>.

DIN (1999) *German Standard 4150 – Part 3 – Structural vibration in buildings – Effects of vibration on structures (1999)*.

DPCD (Department of Planning and Community Development) (2007) *Environment Effects Advisory Note: Aboriginal cultural heritage and the environment effects process*.

DSE (Department of Sustainability and Environment) (2011a) *Ecological Vegetation Class (EVC) Benchmarks by Bioregion*, Department of Sustainability and Environment, East Melbourne, Victoria, viewed 22nd September 2011, <<http://www.dse.vic.gov.au>>.

DSE (2011b) *Biodiversity Interactive Map 2.0*, Department of Sustainability and Environment, East Melbourne, Victoria, viewed 22 September 2011, <<http://www.dse.vic.gov.au>>.

DSWEPaC (Department of Sustainability, Environment, Water, Populations and Communities) (2012) *Environmental Protection and Biodiversity Conservation Act 1999 Protected Matters Search Tool*. Department of Sustainability, Environment, Water, Populations and Communities, Canberra, viewed 12 November 2012, <<http://www.environment.gov.au>>.

DSEWPaC (2013) *Nyctophilus corbeni in Species Profile and Threats Database*, Department of Sustainability, Environment, Water, Population and Communities, Canberra, viewed 9 January 2013, <<http://www.environment.gov.au/sprat>>.

Echuca Moama Tourism (2015) *Walking and Cycling Tours*, <<http://www.echucamoama.com/walking-and-cycling>>.

EPA (Environment Protection Authority) Victoria (1991) *Construction Techniques for Sediment Pollution Control*, EPA Victoria Publication 275.

EPA Victoria (1996) *Best Practice Environmental Guidelines for Major Construction Sites*, EPA Victoria Publication 480.

EPA Victoria (1997) *State Environment Protection Policy (Groundwaters of Victoria)*, Victorian Government Gazette No.S 160.

EPA Victoria (2008) *Noise Control Guidelines*, EPA Victoria Publication 1254.

Essential Economics (2015) *Echuca-Moama Bridge Project Environment Effects Statement: Economic Impact Assessment*. Prepared for VicRoads by Essential Economics Pty Ltd.

Fairfull S and Witheridge G (2003) *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*. NSW Fisheries, Cronulla, 16pp.

GHD (2015a) *Report for VicRoads Echuca-Moama Bridge Project - Impact Assessment: Aquatic Flora and Fauna*. Melbourne, GHD Pty Ltd.

GHD (2015b) *Report for VicRoads Echuca-Moama Bridge Project: Planning and Land Use Impact Assessment Report*. Melbourne, GHD Pty Ltd.

Gratton, R (2015) *Echuca Bat Call review*. A report for NSW Roads and Maritime Services. Eco-Aerial, Newport, Victoria.

Heritage Insight (2015a) *Report for VicRoads Echuca-Moama Bridge EES: Report on an Archaeological Survey for Historic Cultural Heritage, Mid-West Option, Second Murray River Crossing at Echuca-Moama: EES Existing Conditions and Impact Assessment Report*. Heritage Insight Pty Ltd, Collingwood.

Heritage Insight (2015b) *Report for VicRoads Echuca-Moama Bridge EES: Report on Assessment for Aboriginal Cultural Heritage Values, Echuca-Moama Bridge Project*. Heritage Insight Pty Ltd, Collingwood.

Higgins, PJ (ed) (1999) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 4: Parrots to Dollarbird*, Oxford University Press, Melbourne.

Higgins, PJ & Davies, SJF (eds) (1996) *Handbook of Australian, New Zealand & Antarctic Birds, Volume 3 Snipe to Pigeons*, Oxford University Press, Melbourne.

Higgins, PJ & Peter, JM (eds) (2002) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 6: Pardalotes to Shrike-thrushes*, Oxford University Press, Melbourne.

Higgins, PJ, Peter, JM & Cowling, SJ (eds) (2006) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 7: Boatbill to Starlings*, Oxford University Press, Melbourne.

- Higgins, PJ, Peter, JM & Steele, WK (eds) (2001) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 5: Tyrant-flycatchers to Chats*, Oxford University Press, Melbourne.
- Jacobs (2015) *Report for VicRoads Echuca-Moama Bridge EES: Transport Impact Assessment*. IS076300.
- Kennedy, SJ & Tzaros, CL (2005) *Foraging ecology of the Swift Parrot Lathamus discolor in the Box-ironbark forests and woodlands of Victoria*, *Pacific Conservation Biology* 11, 158 – 173.
- Leonard, M & Hammond, R (1984) *Landscape Character Types of Victoria*, Forests Commission, Victoria.
- Marchant, S & Higgins, PJ (eds) (1990) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 1: Ratites to Ducks*, Oxford University Press, Melbourne.
- Marchant, S & Higgins, PJ (eds) (1993) *Handbook of Australian, New Zealand and Antarctic Birds, Volume 2, Raptors to Lapwings*, Oxford University Press, Melbourne.
- McCauley RD, J Fewtrell, AJ Duncan, C Jenner, M-N Jenner, JD Penrose, RIT. Prince, A Adhitya, J Murdoch and K McCabe (2000) *Marine seismic surveys – A study of environmental implications*. APPEA Journal 692.
- Menkhorst, P (1995) *Mammals of Victoria*, Oxford University Press, Melbourne.
- Murray-Darling Basin Authority (2015) *How the River Runs*, Available from: <<http://www.mdba.gov.au/about-basin/how-river-runs>>.
- NCCMA (North Central Catchment Management Authority) (2015) *Campaspe River*, Available from <http://www.nccma.vic.gov.au/Water/Rivers/Campaspe_River/>.
- Olsen, P, Weston M, Tzaros C & Silcocks A (2005) *State of Australia's Birds 2005: Woodlands and Birds*, *Wingspan* 15(4) Suppl., December 2005.
- PPK Environment and Infrastructure Pty Ltd (1998) *Murray River Crossings Transport Economic Study*, PPK Environment and Infrastructure Pty Ltd.
- Priestley, S (1965) *Echuca, A Centenary History*. The Jacaranda Press Pty Ltd, Queensland.
- Real Estate Investar (2014) *Data obtained from website*: <<http://www.realestateinvestar.com.au/ME2/Default.asp>>.
- Renzo Tonin & Associates (2015) *Report for VicRoads Echuca-Moama Bridge Project: EES Noise Impact Assessment Report. MB407-01F02 (r6) EMB EES Noise Impact Assessment Report*. Renzo Tonin & Associates Pty Ltd, Melbourne.
- Robinson D and Johnson G (1997) *Bush Stone-curlew Burhinus grallarius*. Flora and Fauna Guarantee Action Statement No 78. Department of Natural Resources and Environment, Melbourne.
- Shire of Campaspe (2005) *Campaspe Shire (Gaps) Heritage Study*. Prepared for the Shire of Campaspe.
- Shire of Campaspe (2011) *Echuca South East Industrial and Commercial Growth Corridor Land Strategy*.
- Shire of Campaspe (2014a) *Campaspe Planning Scheme Review Report (2014)*. Prepared by Keaney Planning, June 2014.
- Shire of Campaspe (2014b) *Draft Open Space Strategy*.
- Simon Leisure Consulting (2010) *Victoria Park & Environs Master Plan*, Prepared for the Shire of Campaspe.
- SKM (Sinclair Knight Merz) (1997) *Moama-Echuca Flood Study*. Department of Land and Water Conservation, NSW and the Department of Conservation and Natural Resources, Vic.
- SKM (2009) *Detailed Traffic Modelling for the Echuca - Moama Bridge Planning Study, Validation report*. VicRoads.
- SKM (2012) *Mid-West 2 Options Assessment for Echuca-Moama Bridge Planning Study, Modelling report*. VicRoads.
- Spiire (2015) *Report for VicRoads Echuca-Moama Bridge EES: Landscape & Visual Impact Assessment*. Welsford Street, Shepparton.
- Taylor, IR, Kirsten, I & Peake, P (2002) *Distribution and habitat of Barking Owls (Ninox connivens) in the west region of Victoria*. Owls 2000 – The biology, conservation and cultural significance of owls. Conference symposium.
- Terra Culture (2000a) *Murray River Crossing at Echuca/Moama Planning Study*. Report to VicRoads. Terra Culture Pty Ltd, Melbourne.
- Terra Culture (2000b) *Murray River Crossing at Echuca-Moama Planning Study: Revised Stage 1 Report with an Addendum Report on the Results of a Stage 2 Investigation of the Central Options*. Report to VicRoads. Terra Culture Pty Ltd, Melbourne.
- Thorncraft, G and Harris, JH (2000) *Fish Passage and Fishways in New South Wales: A Status Report. Technical Report 1/2000. Cooperative Research Centre for Technical Ecology*. Office of Conservation NSW Fisheries, Sydney.
- Tzaros, C (2005) *Wildlife of the Box-Ironbark Country*. CSIRO Publishing, Melbourne.

URS (2009) *Detailed Social Impact Study for the Second Murray River Crossing at Echuca-Moama*. Prepared for VicRoads by URS, Camberwell.

URS (2011) *Detailed Social Impact Study for the Second Murray River Crossing at Echuca-Moama*. Prepared for VicRoads by URS, Camberwell.

van der Ree, R, Mitchell, B & Gow, L (2015) *Final Report of Targeted Squirrel Glider Surveys for Second Murray River Bridge Crossing - mid west alignment, Autumn 2015*. A report for NSW Roads and Maritime Services. Australian Research Centre for Urban Ecology, Melbourne.

Van Schooten, MV (2003) *Conceptualising social change processes and social impacts*. The International Handbook of Social Impact Assessment: Conceptual and Methodological Advances, 6:74-91.

VicRoads (2005) *VicRoads Traffic Noise Reduction Policy*.

VicRoads (2010) *VicRoads Supplements to the Austroads Guide to Road Design*.

VicRoads (2011) *Traffic Noise Measurement Requirements for Acoustic Consultants (2011)*.

VicRoads (2012) *Environmental Risk Management Guidelines*, May 2012.

VicRoads (2013) *VicRoads Integrated Water Management Guidelines*, June 2013.

VicRoads (2015a) *Echuca-Moama Bridge EES Soils and Geology Impact Assessment Report*. Report No: GR045-04.01.PRE.Rev3.

VicRoads (2015b) *VicRoads Report for the Second Crossing of the Murray Rover at Echuca-Moama EES – Air Quality Impact Assessment*, June 2015.

VIF (Victoria in Future) (2014) *Population and household projections to 2051*. Authorised and published by the Victorian Government.

Victorian Government (2003) *Variation to State Environment Protection Policy (Waters of Victoria)*. Victorian Government Gazette No.S 107.

Victorian Government (2013) *Victoria The Freight State: The Victorian Freight and Logistics Plan 2013*. Authorised by the Victorian Government.

Victorian Government (2014) *Loddon Mallee North Regional Growth Plan*. Authorised and published by the Victorian Government.

Wilson, S & Swan G (2003) *A Complete Guide to Reptiles of Australia*. Reed New Holland, Sydney.

Young, J and Rhodes, D (2009) *Proposed Campaspe River Shared Pathway Cultural Heritage Management Plan*, prepared for the Shire of Campaspe.

YYNAC (Yorta Yorta Nation Aboriginal Corporation) (2010) *Website information*, Available from <<http://www.yynac.com.au/history.php>>. Accessed 30 July 2010.



23 Glossary and abbreviations

23.1 Glossary

Term	Definition
1 in 100 year flood	A flood which results from a storm which has a statistical probability of occurring once in every 100 years.
Access	The location by which vehicles and / or pedestrians enter and / or leave property adjacent to a road.
Activity area	Under the <i>Aboriginal Heritage Regulations 2007</i> , an 'activity area' means the area or areas to be used or developed for an activity. Refer to Chapter 11, section 11.2 for a definition of the activity area relevant to this Project.
Afflux	The rise in water level on the upstream side of an obstruction caused when the effective waterway flow area is reduced by an obstruction.
Alignment option	The location and geometric form of a carriageway in both the horizontal and vertical directions. For this Project the Alignment Option being assessed is the Mid-West Option.
Allotment	Refers to land as defined by a title or the State cadastre.
Ambient noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
Aquifer	A layer of underground sediments that holds water and allows water to flow through it. A rock, gravel or sand layer that holds water and through which water can move. A geological formation, group of formations, or part of a formation that stores and/or allows movement of groundwater.
Archaeological site	A collection of tools, bones etc. together in a small area that are the product of human activities.
Area of Cultural Heritage Sensitivity	Land within 200m of a named watercourse is an area of cultural heritage sensitivity. Land within 50m of a registered Aboriginal place is an area of cultural heritage sensitivity.
Arterial road	The nominated traffic routes (such as Murray Valley Highway or Cohuna-Echuca Road / Warren Street), for longer distance travel and larger vehicles.
Asset	Ecological, social, economic, cultural or heritage features considered important and that have been identified assessing the impacts of the Project.
At-grade intersection	An intersection where all roads cross at the same level. Usually controlled by traffic signals or Stop or Give Way signs.
Attenuation	The reduction in the magnitude of sound pressure level during transmission over a distance or around a barrier.
Average Recurrence Interval (ARI)	The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. It is implicit in this definition that the periods between exceedances are generally random.
Australian Height Datum (AHD)	The Australian standard height datum for calculating levels.
B-Double	A twin trailer articulated vehicle with the second trailer pivoting on the back of the first.
Background noise	The underlying level of noise present in the ambient noise, measures in the absence of the noise under investigation, when extraneous noise is removed.
Back swamp	A marshy area on a floodplain outside the main channel and behind a levee, where receding floodwater tends to deposit fine sediments.
Batter	In road construction, an artificial uniform slope created on the sides of fills or cuts. The proposed batters for the Project have a slope of 2:1 (vertical to horizontal). A batter is also called an embankment.
Best practice	The combination of techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of that industry sector or activity.
Biodiversity	The variety of all life forms – the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part.
Bridge	A bridge is a structure built to cross an obstacle in the road network. The Project comprises bridges across the Campaspe River, the Murray River and some bridging components over the Campaspe/Murray River floodplains.

Term	Definition
Carriageway	That portion of a road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes, such as the two-lane, two-way carriageway in the initial alignment.
Catchment	An area of land where run-off from rainfall goes into one river system.
Chainage (Ch)	The distance of a point along a control line, measured from a datum point.
Complex assessment	A complex assessment undertaken as part of a Cultural Heritage Management Plan means an evaluation of an activity area by means of subsurface testing and excavation with a view to identifying and recording buried Aboriginal cultural heritage.
Construction area	The area defined for the Project that will be directly impacted by construction activities.
Contaminants	Substances that, when present in the environment, have the potential to cause adverse biological effects.
Corridor	An area of travel between two points. It may include more than one major route and more than one form of transport. Two corridors were investigated prior to the development of the EES. These corridors were identified as the Mid-West 2 Corridor (which included the Mid-West 2A and Mid-West 2B options) and the Mid-West Corridor, (which included the MW option).
Critically endangered species	A threatened native species listed in the EPBC Act is critically endangered if it is facing an extremely high risk of extinction in the wild in the immediate future.
Culvert	One or more subsurface adjacent pipes or enclosed channels for conveying surface water or a stream below road formation level.
dB(A)	The human ear is not equally sensitive to all parts of the sound frequency range and the scale most commonly used is the A-weighted decibel or dB(A). This unit most accurately reflects human perception of the frequency range normally associated with road traffic noise.
Discharge	The outflow drainage of aquifer waters.
Earthworks	All operations involved in loosening, removing, depositing, shaping and compacting soil or rock.
Ecological communities	Any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationship and relatively independent of other groups. Ecological communities may vary in size, and larger ones may contain smaller ones. In the <i>Environment Protection and Biodiversity Conservation Act 1999</i> they are defined as assemblages of native species that inhabit particular areas in nature.
Ecology	Study of organisms' relations to one another and their surroundings.
Ecosystem	A dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment interacting as an ecological unity.
Environment	For the purpose of the EES, environment incorporates physical, biological, cultural, economic and social aspects.
Environment Effects Statement (EES)	A statement prepared at the request of the Victorian Minister for Planning, pursuant to the Victorian <i>Environmental Effects Act 1978</i> , on the potential environment impact of a proposed development.
Environmental Management Framework (EMF)	Outlines the environmental measures recommended to be adopted as part of the EES.
Fauna	The assemblage of animal species within a defined collection or area.
Floodplain	An area of low-lying ground next to a river, formed mainly of river sediments and subject to flooding.
Flood runner	A small anabranch of a waterway which only flows during periods of high flow from the waterway that it branches from.
Floodway	Land that is identified as carrying active flood flows associated with waterways and open drainage systems.
Flora	The assemblage of plant species within a defined collection or area.
FFG-listed species	Any flora and fauna species on the Flora and Fauna Guarantee (FFG) Act 1988 listing of taxa and communities of flora and fauna which are threatened or potentially threatened.
Fluvial / Fluvatile	Relating to or occurring in a river. A geomorphic process whereby sediments are transported and deposited by flowing river water.

Term	Definition
Freehold land	Privately owned land.
Geology	General term referring to all geological materials including surficial geology and consolidated rock. Includes the composition, age and origin of mineral and non-mineral components and their structural characteristics.
Groundwater	All subsurface water, generally occupying the pores and crevices of rock and soil.
Habitat	The place in which an organism lives; comprising its physical structure, such as reef, sediments or water column properties, as well as biological structure, such as the dominant plant types. Specific place where plants or animals live.
Heritage Place	Aesthetic, historic, scientific or social value for past, present or future generations.
High Productivity Freight Vehicle	Larger combination vehicles such as B triples and super B doubles that are restricted to specific arterial routes.
Higher Mass Limits	Allows for higher axle loading for various axle groups in compliance with National accreditation and restricted to specific routes
Highway	A principal road in the road network with direct property access, such as the Murray Valley Highway.
Hydrology	The science dealing with surface waters and groundwaters of the Earth; their occurrence, circulation and distribution; their chemical and physical properties; and their reaction with the environment.
Initial alignment	For the purpose of this EES, the initial alignment comprises the construction of a two lane, two-way carriageway road including bridges across the Campaspe and Murray rivers.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation.
Intersection	The place at which two or more roads meet or cross.
LAN	Statistical sound measurement recorded on the "A" weighted scale.
LA10 (Time)	The arithmetic average of the sound pressure level that is exceeded for 10 percent of the time specified. This is considered representative of the average maximum noise.
Land severance	Refers to land separated into two or more parts that are no longer connected
Land use	The type of development permitted in an area: industrial, commercial, residential, recreational or a combination of some or all of these different uses.
Lot	A land allotment as defined by a title or the State cadastre.
Major Road	A road to which is assigned a permanent priority for traffic movement over that of other roads.
Mid-West Option (Preferred Alignment)	The Mid-West option extends from the Murray Valley Highway along Warren Street before diverting to the northwest where it crosses Campaspe Esplanade and the Campaspe River, then turns north-east to cross the Murray River north of the Victoria Park Boat Ramp. This option then extends north in New South Wales to cross Boundary Road in Moama and connect with the Cobb Highway at Meninya Street.
Mid-West 2A Option	The Mid-West 2A option extends north/northwest on a new alignment from the intersection of the Murray Valley Highway and Warren Street, crosses the Campaspe River north of the Echuca Cemetery, before turning northeast towards Reflection Bend on the Murray River. This option then passes immediately south of Reflection Bend and crosses the Murray River north of the Victoria Park Boat Ramp, then extends north in New South Wales to cross Boundary Road in Moama and connect with the Cobb Highway at Meninya Street.
Mid-West 2B Option	The Mid-West 2B option extends north/northwest on a new alignment from the intersection of the Murray River Highway and Warren Street, crosses the Campaspe River northeast of the Echuca Cemetery, before turning north towards the Echuca Sports and Recreation Reserve. This option crosses the Murray River north of the Victoria Park Boat Ramp, then extends north in New South Wales to cross Boundary Road in Moama and connect with the Cobb Highway at Meninya Street.
Mitigation measures	Measures which are implemented to reduce an adverse impact caused by road construction and operation.
Native vegetation	Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses.
No Project Scenario	This assumes no additional bridge crossing of the Murray River and assumes existing road conditions and networks remain unchanged.

Term	Definition
Overlay	An overlay is a planning provision, but one which is in addition to the zone provision. Overlays ensure that important aspects of the land are recognised (such as areas of significant vegetation or special heritage significance). Overlays indicate the type of development and/or protection that may be appropriate in that area. When land has more than one important aspect, multiple overlays can be applied.
Planning scheme	A planning scheme sets out objectives, policies and provisions relating to the use, development, protection and conservation of land in the area to which it applies. A planning scheme is established under the Planning and Environment Act and regulates the use and development of land through planning provisions.
Potable water	Water that is fit for human consumption.
Preferred alignment	The preferred alignment within Victoria is the Mid-West Option.
Project Objective Noise Level	The noise level objective for a specific road project to be achieved for at least ten years after completion of the project.
Property	A property is land owned by one or more landowners. It may include multiple contiguous titles owned by the same registered proprietor.
Public acquisition	Acquiring privately held land for a public purpose by a public authority.
Ramsar wetlands	An area that has been designated under Article 2 of the international Ramsar Convention or declared by the Commonwealth Environment Minister to be a declared Ramsar wetland under section 16 of the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwlth.).
Review of Environmental Factors	Review of Environmental Factors pursuant to the <i>Environmental Planning and Assessment Act 1979</i> (NSW) to assess impacts of the Project in NSW
Right-of-Way	The Right-of-Way is a strip of land the extent of which is under a planning ordinance for the public purposes of a road that is reserved through a planning scheme amendment and encompasses sufficient land to construct and maintain the Project. The Right-of-Way comprises the sealed road surfaces (including shoulders / verges) and a 5-10 metre wide strip of land either side of the road formation of the ultimate duplication.
Right-turn lane	Right-turn lanes are used to provide space for the deceleration and storage of turning vehicles.
Risk assessment	The processes of reaching a decision or recommendation on whether risks are tolerable and current risk control measures are adequate, and if not, whether alternative risk control measures are justified or would be implemented.
Roads and Maritime Services	Roads and Maritime Services are the co-proponent for the Echuca-Moama Bridge Project EES. Roads and Maritime Services are the NSW state government department responsible for the environmental assessment on the NSW component of the Project.
Roundabout	A channelised intersection at which all traffic moves clockwise around a central traffic island. The roundabouts proposed as part of the Project are located at the Murray Valley Highway and on Warren Street, which are both three-leg roundabouts.
Scoping Requirements	The Scoping Requirements under the Victorian <i>Environmental Effects Act 1978</i> entitled 'The Second Crossing of the Murray River at Echuca Moama' dated June 2014.
Spill basins	Engineered basins designed to contain road drainage and spills on the new carriageway, preventing contaminants from entering the floodplain.
Semitrailer	A semi-trailer is a trailer without a front axle. A large proportion of its weight is supported by a road tractor (or 'prime-mover'). A semi-trailer attached to a tractor unit is easier to reverse, since it has only one turning point (the coupling)
Sensitive receptor Category A (noise)	VicRoads policy defines Category A sensitive receptors as residential dwellings, aged person homes, hospitals, motels, caravan parks and other buildings of a residential nature. The noise level objective is 63 dB(A) L10 (12hr), and this is measured between 6am and midnight.
Sensitive receptor Category B (noise)	VicRoads policy defines Category B sensitive receptors as schools, kindergartens, libraries and other noise sensitive community buildings. The noise level objective is 63 dB(A) L10 (12hr), and this is measured between 6am and 6pm.
Service road	A road designed or developed to be used, wholly or mainly, by traffic servicing adjacent land along the north west side of Warren Street as part of the Mid-West Option only.

Term	Definition
Shared path	A paved area particularly designed (with appropriate dimensions, alignment and signing) for the movement of cyclists and pedestrians.
SIDRA	SIDRA is a software package used for intersection (junction) and network capacity, level of service and performance analysis
Spoil	Dirt or rock removed from its original location and destroying the composition of the soil in the process.
Standard Assessment	A standard assessment undertaken as part of a Cultural Heritage Management Plan is an evaluation of an activity area by means of a survey with a view to identifying and recording Aboriginal cultural heritage and/or determining the probability that buried Aboriginal cultural heritage may be present.
Study area	The area identified by individual specialists to determine potential impacts for the Project relating to a specific discipline.
Surface waters	All waters whose surface is naturally exposed to the atmosphere, for example, rivers, lakes, reservoirs, streams, seas, estuaries.
The Project	The Echuca-Moama Bridge EES (the Project) involves the construction and operation of a second road bridge crossing of the Murray and Campaspe Rivers at Echuca-Moama.
Threatened ecological communities	The Environment Protection and Biodiversity Conservation Act lists threatened ecological communities as: critically endangered; endangered; or vulnerable.
Threatened species	Any species that is likely to become an endangered species within the foreseeable future, throughout all or a significant part of its range. A species of wildlife or plants listed as 'threatened' in a specific Act (the Environment Protection and Biodiversity Conservation Act and/or the Flora and Fauna Guarantee Act).
Title	A title is an official record of who owns a parcel of land. Adjoining titles in the same ownership are considered and assessed as a 'property' in the impact assessment.
Total Dissolved Solids	Total Dissolved Solids are used as a measure of salinity (water quality). They include inorganic salts including sodium, potassium, calcium, magnesium, chloride, sulphate, bicarbonate, carbonate and nitrate ions and often a small amount of organic matter dissolved in water.
Traffic Management Plan	Plans that detail how traffic is to be managed during the interruption to roads due to Project works.
Turning lane	An auxiliary lane reserved for turning traffic, providing deceleration length and storage for turning vehicles.
Two-way carriageway	A carriageway with two traffic lanes allotted for use by traffic in opposing directions.
Ultimate duplication	For the EES, the ultimate duplication comprises the construction of a duplicated roadway and bridges. The ultimate duplication would be constructed if future traffic demand warrants an increase in road capacity. The EES considers the potential impacts of the ultimate duplication.
VicRoads	VicRoads (Roads Corporation) is the co-proponent for the Echuca-Moama Bridge Project EES. VicRoads is responsible for project management of the planning and would manage the construction of the Project.
Volume-capacity ratio	A basic measure of road congestion. Volume-capacity ratios less than 0.8 typically indicate a road operating well within its nominated capacity. Values between 0.8 and 1.0 indicate a road approaching capacity, often with stop-start traffic. Values above 1.0 indicate that traffic demand exceeds the capacity of the road, leading to extended queues forming during peak periods.
Water quality	A description of the condition of water in the context of one or more beneficial uses. Usually described in terms of water quality indicators (such as pH, temperature and concentrations of nutrients or contaminants).
Waterway	A general term for any stream, river or watercourse, either flowing or dry. Also includes artificial cuts, canals and channels.
Work hours	'Work' is defined as any activity other than office bound duties, including the starting up of plant and machinery. Work for the Project would not be undertaken outside the hours of 7am or sunrise, whichever is the later, and 6pm or sunset, whichever is earlier. Work outside these hours would require prior consent.
Zone	A zone is a planning provision. Zones reflect the primary character of land (such as residential, industrial or rural), and indicates the type of use and development that may be appropriate in that zone.

23.2 Abbreviations

Abbreviation	Expanded term
AAQ	Ambient Air Quality
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AQM	Air Quality Management
AQST	Air Quality Screening Tool
ARI	Average Recurrence Interval
BEU	Biodiversity equivalence unit
BL&A	Brett Lane & Associates
C2Z	Commercial 2 Zone
CBD	Central Business District
CCG	Community Consultation Group
CEMP	Construction Environmental Management Plan
Ch	Chainage
CHMP	Cultural Heritage Management Plan
CFA	Country Fire Association
cm	Centimetre
CMA	Catchment Management Authority
CoM	Committee of Management
CoRTN	Calculation of Road Traffic Noise
Cwlth.	Commonwealth
dB	Decibel
dB(A)	Unit of Measurement for Sound Pressure Level
DBYD	Dial Before You Dig
DDO	Design and Development Overlay
DDO1	Design and Development Overlay – Schedule 1
DDO3	Design and Development Overlay – Schedule 3
DELWP	Department of Environment, Land, Water and Planning
DEPI	(Former) Department of Environment and Primary Industries
DET	Department of Education and Training
DoE	Department of the Environment (Commonwealth)
DPCD	(Former) Department of Planning and Community Development
DTF	Department of Treasury and Finance
DTPLI	(Former) Department of Transport, Planning and Local Infrastructure
EES	Environment Effects Statement
EHNV	Epizootic Haematopoietic Necrosis Virus
EIS	Environmental Impact Statement

Abbreviation	Expanded term
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
ESA	Environmental Site Assessment
ESD	Ecologically Sustainable Development
ESO	Environment Significance Overlay
ESO1	Environment Significance Overlay – Schedule 1
EVC	Ecological Vegetation Class
FFA	Flood Frequency Analysis
FFG Act	<i>Flora and Fauna Guarantee Act 1988</i> (Victoria)
FO	Floodway Overlay
FTE	Full Time Equivalent
GoV	Groundwaters of Victoria
GRZ	General Residential Zone
ha	Hectares
HabHa	Habitat hectares
HI	Heritage Inventory
HML	Higher Mass Limit
HO	Heritage Overlay
HPFV	High Productivity Freight Vehicle
HR	Heritage Register
ICOMOS	International Council of Monuments and Sites
km	Kilometres
km ²	Square kilometres
km/h	Kilometres per hour
LOS	Level of Service
LOT	Large old tree
LPP	Local Planning Policy
LPPF	Local Planning Policy Framework
LSIO	Land Subject to Inundation Overlay
m	Metres
m/s	Metres per second
m ²	Square metres
m ³	Cubed metres
m ³ /s	Metres cubed per second
mg/L	Milligrams per litre

Abbreviation	Expanded term
MLALC	Moama Local Aboriginal Land Council
MNES	Matters of National Environmental Significance as defined by the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
MSS	Municipal Strategic Statement
MT	Medium tree
MW2A	Mid-West Option 2A
MW2B	Mid-West Option 2B
µg/m ³	Micro grams per cubic metre
NCCMA	North Central Catchment Management Authority
NEPM	National Environment Protection Measure
NSW	New South Wales
NVIM	Native Vegetation Information Management
OAAV	Office of Aboriginal Affairs Victoria
P&E Act	<i>Planning and Environment Act 1987</i> (Victoria)
PAH	Polycyclic Aromatic Hydrocarbons
PAO	Public Acquisition Overlay
PBS	Performance Based Standards
PEM	Protocols for environmental management
PIW	Prescribed Industrial Wastes
PM ₁₀	Particular Matter up to 10 micrometres in size
PONL	Project Objective Noise Level
PPRZ	Public Park and Recreation Zone
PRCZ	Public Conservation and Resource Zone
PSA	Planning Scheme Amendment
PTV	Public Transport Victoria
PUZ	Public Use Zone
PUZ2	Public Use Zone – Schedule 2 Education
RAP	Registered Aboriginal Party
RCA	Road Construction Authority
RCS	Regional Catchment Strategy
RDZ1	Road Zone Category 1
REF	Review of Environmental Factors
RGP	Regional Growth Plan
RTA	Roads and Traffic Authority
SCATS	Sydney Coordinated Adaptive Traffic System
SEPP	State Environment Protection Policy
SES	State Emergency Service
SPPF	State Planning Policy Framework
TDS	Total Dissolved Solids

Abbreviation	Expanded term
TRG	Technical Reference Group
UFZ	Urban Floodway Zone
VAHR	Victorian Aboriginal Heritage Register
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
Vic.	Victoria
VLOT	Very large old tree
VMS	Value Management Study
vpd	Vehicles Per Day
VPP	Victoria Planning Provisions
WMO	Bushfire (Wildfire) Management Overlay
WONS	Weeds of National Significance
WoV	Waters of Victoria
WSE	Water surface elevation
YYNAC	Yorta Yorta Nation Aboriginal Corporation



