Echuca-Moama Bridge EES

Landscape & Visual Impact Assessment Volume 1





Echuca-Moama Bridge EES

Landscape & Visual Impact Assessment

Volume 1

This report has been prepared from the office of SPIIRE for VicRoads Level 1, 144 Welsford Street Shepparton VIC 3632 Australia T 03 5849 1000 spiire.com.au

>i bY 8\$%)

© SPIIRE

The information contained in this document is intended solely for the use of the client identified on the report cover for the purpose for which it has been prepared and no representation is made or is to be implied as being made to any third party. Other than for the exclusive use of our client, no part of this report may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of SPIIRE.

Table of Contents

1 . 1.1 1.2	Introduction1Project Overview1Purpose of this document1
2. 2.1 2.2 2.3 2.4 2.5 2.6	Project Description2Project Background2The Project3Project Objectives3Preferred Alignment4Project Area5Study Area5
3 . 3.1 3.2	EES Scoping Requirements6EES Evaluation Objective6EES Scoping Requirements6
4. 4.1 4.2 4.3	Legislation, Policies and Guidelines. 7 Commonwealth 7 State 7 4.2.1 Victoria 7 4.2.2 New South Wales 10 Local 11
ΔΔ	4.3.1 Victoria 11 4.3.2 New South Wales 13 Landscape Planning Objectives 15
5 . 5.1 5.2	Existing Conditions 16 Methodology 16 Study Area Characteristics 16 5.2.1 Context 16 5.2.2 Land Use 16 5.2.3 Recreational Facilities 19 5.2.4 Cultural Heritage 21 5.2.5 Vegetation 22 5.2.6 Surface Geology 25 5.2.7 Hydrology 25 5.2.8 Slope Analysis 25 5.2.9 Elevation Analysis 26 5.2.10 Views and Visual Envelope 26 Landscape Character 29
0.0	5.3.1Landscape Character Types305.3.2Scenic Quality Assessment385.3.3Landscape Value405.3.4Sensitivity to Change42
6 . 6.1 6.2	The Project43Ultimate Duplication43Initial Alignment45
7. 7.1 7.2 7.3 Obje	Landscape and Visual Assessment 46 Landscape and Visual Effects and Determination of Significance 46 Mitigation Measures 47 Landscape and Visual Effects of the Project in relation to the Planning 47 Other Landscape and Visual Effects of the Project 49 Other Landscape and Visual Effects of the Project 41
1.4	Other Landscape and visual Effects of the Project

7.5	Assessment against Planning Objectives	
8.	Conclusion	64
9.	References	66
10.	Assumptions and Exclusions	68

Glossary of Terms

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.
Afflux	A rise in upstream water level caused by introducing a constriction such as a bridge, into a stream, channel or floodplain.
Alignment Option	The location and geometric form of a carriageway in both the horizontal and vertical directions. For this impact assessment, the Alignment Option being assessed is the Mid-West Option.
Arterial Road	The nominated traffic routes (such as Murray Valley Highway or Cohuna-Echuca Road / Warren Street), for longer distance travel and larger vehicles.
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.
Axel load limit	Restrictions on how much load can be carried on an axel, single or dual tyres, and on the vehicle or vehicle combinations.
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.
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 known as an embankment.
Benefit Cost Ratio (BCR)	The ratio of the discounted benefits over the life of a project to the discounted capital costs, or the project's discounted total agency costs.
Bored pile	A steel or reinforced concrete post that is inserted vertically into the ground by drilling, or formed in the ground in a pre-bored hole, to support a load.
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.
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.
Chainage	The distance of a point along a control line, measured from a datum point.
Clear Zones	An area within the recovery area which is ideally kept clear of hazards (or within which unmovable hazards are shielded). The

Term	Definition
	width of the clear zone reflects the probability of an accident occurring at that location and the cost-effectiveness of removing hazards. The clear zone width is dependent on traffic speeds, road geometry and traffic volume.
Concept Design	Initial high-level functional layout of a concept, such as a road or road system, to provide a level of understanding to later establish detailed design parameters.
Construction Environmental Management Framework (CEMP)	A site or project specific plan developed to ensure that appropriate environmental management practices are followed during the construction and/or operation of a Project.
Construction Area	The area defined for the Project within the Right of Way that would be directly impacted by construction activities. activities.
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 Option and Mid-West 2B Option) and the Mid-West Corridor, (which included the Mid-West Option).
Culvert	One or more subsurface adjacent pipes or enclosed channels for conveying surface water or a stream below road formation level.
Cut	The depth below the natural surface of the ground to the construction 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.
Deceleration lane	An auxiliary traffic lane provided to allow vehicles to decrease speed on the approach to an intersection.
Design speed	A speed fixed for the design and correlation of those geometric features of a carriageway that influence vehicle operation. The Mid-West Option has been designed to 90 kilometres per hour, for a posted speed limit of 80 kilometres per hour.
Driven Pile	A steel or reinforced concrete post that is driven vertically into previously unexcavated soil by striking it with a pile driving hammer.
Earthworks	All operations involved in loosening, removing, depositing, shaping and compacting soil or rock.
Environmental Management Framework (EMF)	Outlines the environmental measures recommended to be adopted as part of the EES.
Environment	For the purpose of the EES, environment incorporates physical, biological, heritage, 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 Environment Effects Act 1978, on the potential environment impact of a proposed development.
Fill	One or more of the following: 1. The depth from the pavement subgrade level to the natural

Term	Definition
	surface.
	2. That portion of road where the formation is above the natural
	surface.
	3 The material placed in an embankment
	Land that is identified as carrying active flood flows associated
Floodway	with waterways and open drainage systems
Freehold land	Privately owned land
Gradeline	The level and gradient of a road carriageway along the centreline.
High Productivity Freight	Larger combination vehicles such as B triples and super B
Vehicles (HPFV)	doubles that are restricted to specific arterial routes.
	Allows for higher axle loading for various axle groups in
Higher Mass Limits	compliance with National accreditation and restricted to specific
(HML)	routes
	A principal road in the road network with direct property access
Highway	such as the Murray Valley Highway
	For the nurnose of this EES, the initial alignment comprises the
Initial Alianment	construction of a two lange two-way carriageway road including
	bridges across the Campaspe and Murray Rivers
Intersection	The place at which two or more roads meet or cross
Intersection	The place at which two of more roads meet of closs.
l and use	commercial residential recreational or a combination of some or
	all of these different uses.
	For the purpose of this EES, the term 'landscape' here refers to
	the concept of visual and related natural qualities of the area
Landscape	providing an environmental value and a public good. It is
	distinct from the visual amenity experienced by individuals who
	and associated infrastructure
	Minor path generally located in a local or residential area that
Local access path	links road and/or off road cvcling routes, and off road pedestrian
	paths, such as those paths within Victoria Park.
Major Road	A road to which is assigned a permanent priority for traffic
	movement over that of other roads.
	The Mid-West Option extends from the Murray Valley Highway
	along Warren Street before diverting to the northwest where it
Mid-West Alignment	crosses Campaspe Esplanade and the Campaspe River, then
(Preferred Alignment)	turns north-east to cross the Murray River north of the Victoria
(g	Wales to cross Boundary Road in Moama and connect with the
	Cobb Highway at Meninya Street.
	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
Mid West 24 Alignment	Cemetery, before turning northeast towards Reflection Bend on
Mid-West 2A Alignment	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.
	The Mid-West 2B Option extends north/northwest on a new
Mid-West 2R Alianment	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

Term	Definition
	Sports and Recreation Reserve. This alignment 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.
No Project Option	This assumes no additional bridge crossing of the Murray River and assumes existing road conditions and networks remain unchanged.
Preferred Alignment	The preferred alignment within Victoria is the Mid-West Option.
Property	A property is land owned by a single or more landowners. It may include multiple contiguous titles owned by the same registered proprietor.
Recovery Area	The area beside the traffic lane required for a run-off-road vehicle to stop safely or be brought under control before re-joining the traffic lane.
Review of Environmental Factors (REF)	A report prepared to satisfy the planning approval requirements of the Environmental Planning and Assessment Act 1979.
Right-of-Way	The Right-of-Way is a strip of land that is reserved through a planning scheme amendment for the public purpose of a road (road reserve) and encompasses sufficient land to construct and maintain the Project. The Right-of-Way for the Project comprises the sealed road surfaces (including shoulders / verges) and a 5m to 10m wide strip of land on either side of the road formation of the ultimate duplication.
	Note: In NSW, a Right-of-Way is known as a Road Reserve.
Right-turn lane	Right-turn lanes are used to provide space for the deceleration
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)	Roads and Maritime Services is the co-proponent for the Echuca- Moama Bridge Project. Roads and Maritime Services is 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/Warren Street intersection, and on Warren Street. Both are three-leg roundabouts.
Scoping Requirements	The Scoping Requirements for the EES under the Victorian Environment Effects Act 1978 entitled 'The Second Crossing of the Murray River at Echuca-Moama', dated June 2014.
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.
Shared Path	A paved area particularly designed (with appropriate dimensions, alignment and signing) for the movement of cyclists and pedestrians.
Spill Basins	Engineered basins designed to contain spills on the new

Term	Definition
	carriageway, preventing contaminates from entering the floodplain.
Staged Construction	A construction sequence in which the initial alignment comprising a single traffic lane in each direction is constructed and then, should traffic demand warrant an increase in road capacity, the road and bridge structures are duplicated, providing two traffic lanes in each direction.
Study Area	The area identified by individual specialists to determine potential impacts for the Project relating to a specific discipline.
Super "T"	A type of bridge span construction where the load-bearing structure (usually reinforced concrete) has a T-shaped cross- section.
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.
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.
Turning lanes	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. VicRoads is responsible for project management of the planning and would manage the construction of the Project.
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 requires prior consent.

Executive Summary

VicRoads, in partnership with New South Wales Roads and Maritime Services (Roads and Maritime), is undertaking planning activities for a second Murray River crossing at Echuca Moama. The second crossing, known as the 'Echuca-Moama Bridge Project' (the Project) would alleviate congestion on the existing bridge, provide an alternate access for traffic between the two towns and cater for road freight, including vehicles with Higher Mass Limits (HML) and High Productivity Freight Vehicles (HPFV).

On 14 June 2013, the Minister for Planning determined that an Environment Effects Statement (EES) would be required to assess the potential environmental effects of the Project within Victoria. As the Project extends into NSW, a Review of Environmental Factors (REF) would be required to assess impacts within New South Wales. This impact assessment has been prepared to inform the EES and REF.

As part of the EES options assessment, the Mid-West Option was determined to be a better performing option when considering a balance between environmental, social and economic considerations and was selected by the Victorian Government as the Preferred Alignment for detailed risk and impact assessment. The Mid-West Option utilises existing road reserves for part of its length, has the least impact on biodiversity and habitat values, cultural heritage values and satisfies the Project objectives. This report considers the landscape and visual impacts of the Mid-West Option and supports its selection as the Preferred Alignment.

This Landscape and Visual Impact Assessment Report has been prepared in response to the EES Scoping Requirements for the Project. The assessment included review of previous investigations, consideration of the existing conditions and an impact assessment.

In summary, taking into account all the potential significant benefits and impacts, it is considered that the extent and significance of landscape and visual impacts of the Mid-West Option is *high* without mitigation measures in place and *moderate* once mitigation measures have been in place 10 years after development of the Project. Therefore, the Project meets the relevant draft EES evaluation objective only once mitigation measures are in place and established. As these measures will minimises the adverse landscape and visual amenity effects of the Project on values of the area, including the Murray and Campaspe rivers and floodplains.

The key impacts categorised as "moderate-high" and "high significance" are listed as follows:

• The visual and landscape impact of the introduction of twin road bridges over Murray River at Victoria Park boat ramp (up to 15.5 m above top of river banks) and removal of up to 45 m width of floodplain vegetation both sides of the river for the bridge structure resulting in a change to the recreation and tourism values of the River and at the boat ramp and picnic area and a change to existing views from paddle steamers, houseboats, the boat ramp and picnic area.

- The visual impact of the introduction of new road infrastructure and bridge over the Murray River through Victoria Park and removal of up to 85 m width of floodplain vegetation resulting in a change to the scenic quality of Victoria Park and a change to existing views from Victoria Park, Scenic Drive, Victoria Park Oval, Tennis and Netball Courts and Echuca Caravan Park.
- The landscape impact of the introduction of road infrastructure and bridge over the Murray River through Victoria Park and removal of up to 85 m width of open space reserve and severance of existing walking trails within the reserve resulting in a change to the recreation and public open space resources of Victoria Park.
- The landscape impact of the introduction of new road bridge through Echuca private property and across Campaspe River up to 5.9 m above existing ground level, removal of up to 45 m width of floodplain vegetation and realignment of access to Campaspe Esplanade resulting in a change to the recreational and sense of place values of the Campaspe River.

These impacts can be mitigated somewhat through the following measures:

- Ensure all bridge structures are simple and elegant structures which make a positive visual contribution to the environment.
- Minimise vegetation removal and plant screen planting wherever possible between the road and bridge infrastructure and surrounding users of Victoria Park, Campaspe River environs and other key viewpoints.
- Reinstate connections to existing shared paths and ensure sufficient shade and shelter is provided along new shared paths.

The application of these mitigation measures would not remove the impacts of the Mid-West Option entirely, but would contribute to the reduction of impacts to a relatively moderate level.



A view of the proposed location of the Murray River bridge crossing.

1. Introduction

1.1 Project Overview

VicRoads, in partnership with New South Wales Roads and Maritime Services (Roads and Maritime), is undertaking planning activities for a second Murray River crossing at Echuca Moama. The Project, known as the Echuca-Moama Bridge Project would alleviate congestion on the existing bridge and provide an alternate access for residents and improved security of access for the local community, as well as catering for freight and agricultural machinery.

As part of the assessment and approval processes, the Project was referred to the Victorian Minister for Planning for a decision on whether an assessment under the *Environment Effects Act 1978* was needed to determine the Project's potential for significant effects on the environment. On 14 June 2013 the Victorian Minister for Planning determined that an Environment Effects Statement (EES) would be required.

This Landscape and Visual Impact Assessment has been prepared to inform the EES and the NSW Review of Environmental Factors (REF). The EES is required to consider the potential effects of the Project on the environment, inform the public and other stakeholders and enable a Ministerial Assessment of the Project to inform decision makers. The purpose of the REF is to document the likely impacts of the proposal on the environment and to detail recommended protective measures to be implemented during construction.

The EES for the Project has considered three alignment options. As part of the options assessment for the EES, the Mid-West Option was identified as a better performing option when considering a balance between environmental, social and economic consideration and this impact assessment has been prepared based on the Mid-West Option (the Preferred Alignment).

1.2 Purpose of this document

The purpose of this report is to document the existing conditions (landscape character), the landscape and visual impacts and to outline the methodology and proposed mitigation for the Project within both Victoria and New South Wales.

The assessment has been undertaken with consideration of the methodologies outlined in the following two documents:

- RMS' Environmental Impact Assessment Practice Note Guideline for Landscape Character and Visual Impact Assessment¹; and
- The Landscape Institute's Guidelines for Landscape and Visual Impact Assessment².

The Landscape and Visual Impact Assessment has been completed in four key phases:

¹ Roads & Maritime Services 2013, *Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment (EIA-N04)*, RMS, North Sydney ² The Landscape Institute 2008, *Guidelines for Landscape and Visual Impact Assessment - 2nd*

Edition, Spon Press, London

The Legislation, Policies and Guidelines component reviews the federal, state and local legislation and planning objectives applicable to the Project in order to ascertain the Landscape Planning Objectives of this study.

The Existing Conditions (landscape character) component is a baseline study of the Study Area and its visual conditions in order to fully appreciate and understand the existing landscape of the road corridor and identifies areas of distinct landscape character as well as the most significant landscape and visual resources and values in this road corridor.

The **Project** section describes the Project and summarises the physical changes resulting from the proposed works.

The Landscape and Visual Assessment draws on all of the previous phases of the study to identify the impacts and benefits of the Project and then assess the effects of the development against the Project's Landscape Planning Objectives.

This volume (Volume 1) reports the results of the study and should be read in conjunction with Volume 2 - Visual Material.

2. Project Description

2.1 Project Background

Echuca and Moama are currently linked by a single road bridge across the Murray River with a single carriageway in either direction. The existing bridge was built in 1878 and originally operated as a combined road/rail bridge until 1989, whereby a separate rail bridge was constructed. The nearest alternative road crossings of the Murray River are at Barham, 86 km to the west, Barmah 36 km to the east, or Tocumwal 120 km to the east.

The existing road bridge and its approaches have inherent safety and operational limitations including its inability to carry over-width loads and Higher Mass-Limited vehicles used by an increasing proportion of the freight transport industry. Rehabilitation works to upgrade the operational capacity of the bridge would require lengthy road closures and would be further complicated by heritage considerations.

The existing bridge does not provide a suitable level of service for the increased volume of light vehicle traffic experienced during peak summer tourist events. Extensive delays are commonly experienced at these times which are easily exacerbated by any minor traffic incidents. This results in sizeable delays and in particular restricts the movement of emergency services vehicles from one town to the other.

Early investigations to provide for a second Murray River Crossing at Echuca-Moama commenced in 1965. Since then, VicRoads has undertaken extensive planning investigations including route options development and environmental impact assessments. Over the past 15 years, five corridors have been considered for an additional Murray River crossing. These investigations have included:

- An Environment Effects Statement (EES) / Environmental Impact Statement (EIS) study in 2000/2001 whereby a Western Corridor was approved by the Planning Panel;
- Preparation of an Environmental Report in 2010 for a Mid-West corridor (this process was superseded in late 2010 following a change in Government); and
- The current EES process which formally commenced in 2013.

As a result of the investigations completed and stakeholder consultation conducted, VicRoads has amassed significant knowledge of existing environmental, social and economic conditions and community values in the Echuca-Moama region.

2.2 The Project

The Project involves the construction and operation of a second road bridge crossing of the Murray River and Campaspe River at Echuca-Moama. The Project extends between Echuca (within Victoria) and Moama (in New South Wales) and is therefore subject to the provisions of the Victorian and New South Wales approvals processes. As part of the EES (within Victoria), the proposed alignment is assessed against a 'No Project' option, whereby it is assumed that the existing road conditions and networks remain unchanged and REF is being prepared to consider the construction impacts of the Project.

The Project comprises a Right-of-Way sufficient to build a four lane road and duplicated bridges across both Rivers. The Project includes an elevated roadway and extensive bridging across the Campaspe and Murray River floodplains, as well as changes to existing approach roads.

Construction of the Project will be staged to meet traffic demands and includes the Initial Alignment and an ultimate duplication. The Initial Alignment comprises two lanes (a single carriageway in either direction) and the Ultimate Duplication, which comprises the two lanes in both directions and duplicated bridges next to the bridges built during the Initial Alignment.

2.3 Project Objectives

The Project objectives are to:

- improve accessibility and connectivity for the community of Echuca-Moama and the wider region;
- provide security of access with a second flood free crossing between Echuca and Moama;
- enable cross border access for high productivity freight vehicles and oversized vehicles;
- improve emergency services accessibility between Echuca and Moama during emergency situations and major tourist and flood events;
- provide road infrastructure that supports:
 - the state (Vic and NSW) and national economies through improved connectivity of goods and services; and

- the local and regional economy of Echuca-Moama

2.4 Preferred Alignment

VicRoads undertook an assessment of alignment options based upon the information from previous assessments and existing conditions in the area. The result was the selection of a Preferred Alignment option for consideration by specialists. The alignment, known as the "Mid-West" Option was determined to be a better performing option when considering a balance between environmental, social and economic considerations. The Preferred Alignment is approximately 4.1km in length and utilises existing road infrastructure along part of Warren Street (Echuca-Cohuna Road), and when compared with other options, has the least amount of vegetation removal and least amount of raised road formation and bridging, impacting on the overall cost of the Project. Refer to the Echuca-Moama Project EES Main Report for more details on the assessment of alignment options to support the selection of the Preferred Alignment.

The Preferred Alignment extends from the Murray Valley Highway along Warren Street before diverting to the northwest where it extends to the west of Victoria Park Oval. The Preferred Alignment then turns north-east to cross the Murray River before extending north to connect with the Cobb Highway.

More specifically, the Preferred Alignment comprises:

- A new roundabout at the intersection of the Murray Valley Highway;
- Upgrade works along Warren Street, including widening of the road pavement, shoulder sealing, upgrading flood relief structures, line marking and intersection upgrades at Homan Street and Redman Street;
- Construction of a new service road on the western side of Warren Street between Homan Street and Redman Street;
- Line marking for a dedicated right-turn lane for traffic turning into Homan Street;
- Construction of a new 'three-leg' roundabout approximately 120 m south of Campaspe Esplanade;
- Construction of a new road extending north-west from Warren Street and construction of a new bridge across the Campaspe River and Crofton Street;
- Construction of a new road extending north over part of the former Echuca College site and construction of a new road over a slab on the edge of an existing sand hill;
- A new road extending north-east over the western and northern tennis court in Victoria Park and to the north of the Echuca Caravan Park;
- Construction of a new bridge over the Murray River near the existing boat ramp;
- Construction of an elevated road east of the Murray River to connect with a realigned Meninya Street (the existing Cobb Highway) at a new signalised intersection; and

• Signalisation of the intersections at Cobb Highway and Perricoota Road and Cobb Highway and Francis Street.

The main construction activities associated with the Project would comprise:

- Civil and structural works associated with the construction of new elevated roadway and bridges across the Murray River and the Campaspe River;
- Construction of earthworks and flood relief structures (spill basins) for the new road across the Murray River and Campaspe River floodplains; and
- Improvements to existing roads and intersections on approaches in Victoria and New South Wales, including the construction of a large diameter roundabout at the Murray Valley Highway / Warren Street intersection and traffic signals with Meninya Street and Perricoota Road in Moama.

2.5 Project Area

The Project Area comprises the proposed Right-of-Way (acquisition area) for the Preferred Alignment considered as part of the EES. The width of the right-ofway ranges between approximately 32m and 64m for the length of the alignment due to batters and bridging requirements.

Figure 1 (Volume 2) illustrates the Project Area boundary.

2.6 Study Area

The Study Area for this Landscape and Visual Impact Assessment extends beyond the project area as defined above, to include and consider all areas potentially impacted by the Project in Echuca, Victoria and Moama, NSW. This includes areas of landscape value beyond the project area and any areas or vantage points with views towards the Project.

Figure 2 (Volume 2) illustrates the Project Area, as well as an indicative Study Area boundary.

3. EES Scoping Requirements

3.1 EES Evaluation Objective

For the landscape and visual impact assessment aspects of the Project, the relevant draft evaluation objective as outlined in the EES Scoping Requirements is:

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

3.2 EES Scoping Requirements

The EES Scoping requirements specific to the scope of this landscape and visual impact assessment are as follows:

Key issues for objective

- Potential for effects on the significant landscape values of the Murray River and Campaspe River corridors and Victoria Park.
- Potentially significant visual impacts for nearby sensitive receptors.

Priorities for characterising the existing environment

- Characterise the landscape character, features and values of the project site area, their significance and sensitivity to change.
- Identify nearby sensitivity receptors and significant public and private viewsheds to and from the project.

Design and mitigation measures

• Identify potential and proposed design options and measures to mitigate adverse effects on visual amenity and the landscape values of the river environs.

Assessment of likely effects

• Identify and assess the likely effects of the project on identified visual amenity and landscape values.

Approach to manage performance

• Identify any further measures that are proposed to either manage risks to landscape or enhance visual amenity outcomes for sensitive receptors in the vicinity of the project are to be included in the EES, including as part of the Environmental Management Framework (EMF) and resulting residual effects.

4. Legislation, Policies and Guidelines

To determine the sub-objectives of the Landscape and Visual Impact Assessment for the Project, it has been necessary to review and consider any relevant legislation, policies or guidelines that apply.

4.1 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. It is relevant only at a very high level to the extent that it provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, however it states no objectives specifically applicable to this Landscape and Visual Impact study.

Governance of the Murray River has been on the national agenda since 1914, when the *River Murray Waters Agreement* and associated Commission were established. *The Water Act 2007* (Clth), in conjunction with the *Water Amendment Act 2008* (Clth), specifically addresses the Murray Rivers water resources. There are no relevant clauses or objectives contained relating to landscape or visual issues within the Water Act 2007. However, the existence of a federal act directly concerning the Murray Darling Basin is a reflection of the importance to this system to the national community.

Further, not only is the Murray River an important recreational resource, it also plays a key role in the daily livelihood of Australian communities across three states. So although no federal legislation specifically protects the landscape values or visual amenity of the Murray River, it could be deemed to be a cultural landscape of national importance.

4.2 State

4.2.1 Victoria

Victorian Legislation

The following legislation guides and regulates development planning within Victoria and is relevant to the Project:

- *Planning and Environment Act 1987* (PE Act)- a key piece of planning legislation that provides a framework for planning in Victoria; and
- *Environment Protection Act 1970* (Vic) (EP Act) provides a legislative framework for the protection of the environment in Victoria.

The PE Act lists several objectives which are relevant to this study:

"(1) The objectives of planning in Victoria are—

(b) to provide for the protection of natural and man-made resources and the maintenance of ecological processes and genetic diversity;

(c) to secure a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria;

(d) to conserve and enhance those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value;"

Further, the EP Act states the following relevant principle:

"1B Principle of integration of economic, social and environmental considerations

(2) This requires the effective integration of economic, social and environmental considerations in decision making processes with the need to improve community well-being and the benefit of future generations."

State Planning Policy Framework

The State Planning Policy Framework forms part of the Campaspe Planning Scheme.

• Clause 11 Settlement

Clause 11.11 Loddon Mallee North regional addresses planning policy for the Loddon Mallee North Regional Growth Plan (2014). However, there are no specific objectives relating to the protection of landscape and visual values.

Clause 12 Environmental and Landscape Values

An overall objective of Clause 12 of the State Planning Policy Framework, Environmental and Landscape Values aims to "...conserve areas with identified environmental and landscape values." Further, that "Planning should protect sites and features of nature conservation, biodiversity, geological or landscape value."

Clause 12.04-1 Environmentally sensitive areas proposes a strategy relevant to this study:

"Protect environmentally sensitive areas with significant recreational value...as well as nominated urban conservation areas, historic buildings and precincts from development which would diminish their environmental conservation or recreation values."

The objective of Clause 12.04-2 Landscapes is *"To protect landscapes and significant open spaces that contribute to character, identity and sustainable environments."*

• Clause 15 Built Environment and Heritage

Clause 15 Built Environment and Heritage is particularly relevant to this study and lists numerous objectives worth noting:

The objective of Clause 15.01-1 Urban design is:

"To create urban environments that are safe, functional and provide good quality environments with a sense of place and cultural identity."

The objective of Clause 15.01-2 Urban design principles is:

"To achieve architectural and urban design outcomes that contribute positively to local urban character and enhance the public realm while minimising detrimental impact on neighbouring properties."

The following are relevant design principles:

"Context

Development must take into account the natural, cultural and strategic context of its location..."

"Landmarks, views and vistas

Landmarks, views and vistas should be protected and enhanced or, where appropriate, created by new additions to the built environment."

"Heritage

New development should respect, but not simply copy, historic precedents and create a worthy legacy for future generations."

"Architectural quality

New development should achieve high standards in architecture and urban design."

"Landscape architecture

Recognition should be given to the setting in which buildings are designed and the integrating role of landscape architecture."

Refer also to Clause 15.01-4 Design for safety:

"To improve community safety and encourage neighbourhood design that makes people feel safe."

And, Clause 15.01-5 Cultural identity and neighbourhood character:

"To recognise and protect cultural identity, neighbourhood character and sense of place."

• Clause 18 Transport

The objective of Clause 18.01-1 land use and transport planning is *"To create a safe and sustainable transport system by integrating land-use and transport."*

It lists the following pertinent objectives:

Refer to Clause 18.02-1 Sustainable personal transport:

"To promote the use of sustainable personal transport"

And, Clause 18.02-2 Cycling:

"To integrate planning for cycling with land use and development planning and encourage as alternative modes of travel."

4.2.2 New South Wales

NSW Legislation

The following legislation guides and regulates development planning within NSW and is relevant to the proposal:

• Environmental Planning and Assessment Act 1979 (NSW) (EPA Act) - a key piece of planning legislation that controls environmental planning instruments, with the most common being the Council level Local Environmental Plan.

State Environmental Planning Policies (SEPP)

The Regional Environmental Plan (deemed SEPP) (REP) which directly affects the proposed development is the *Murray Regional Environmental Plan No. 2 - Riverine Land* (Murray REP).

The objectives of the Murray REP are:

"(a) to ensure that appropriate consideration is given to development with the potential to adversely affect the riverine environment of the River Murray, and

(b) to establish a consistent and coordinated approach to environmental planning and assessment along the River Murray, and

(c) to conserve and promote the better management of the natural and cultural heritage values of the riverine environment of the River Murray."

The planning principles should be applied when:

"a public authority or person proposes to carry out development which does not require development consent but which has the potential to adversely affect the riverine environment of the River Murray".

The relevant planning principles under the Murray REP are:

• Access - "The waterway and much of the foreshore of the River Murray is a public resource. Alienation or obstruction of this resource by or for private purposes should not be supported."

and

"Development along the main channel of the River Murray should be for public purposes."

- Bank disturbance "Disturbance to the shape of the bank and riparian vegetation should be kept to a minimum in any development of riverfront land."
- Landscape "Measures should be taken to protect and enhance the riverine landscape by maintaining native vegetation along the riverbank and adjacent land, rehabilitating degraded sites and stabilising and revegetating riverbanks with appropriate species."

• River related uses - "Only development which has a demonstrated, essential relationship with the river Murray should be located in or on land adjacent to the River Murray."

and

"Development which would intensify the use of riverside land should provide public access to the foreshore."

RMS' Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment

Roads and Maritime has developed this practice note which applies to projects for which Roads and Maritime is seeking determination or approval to proceed under Part 4, 5 and 5.1 of the *Environmental Planning and Assessment Act 1979*. This impact assessment has been prepared with consideration of the methodologies outlined in the practice note.

- 4.3 Local
- 4.3.1 Victoria

Campaspe Planning Scheme

• Local Planning Policies

Clause 21.04

Clause 21.04-2 Environment, in relation to the Murray River Corridor:

"The SPPF seeks to protect and conserve environmentally sensitive areas and to protect landscapes that contribute to character, identity and sustainable environments. The NSW Regional Environment Plan No. 2 and the Murray Shire Local Environment Plan 1989 identify the Murray River as an asset of National and State significance. The Murray River and its environs serve a variety of environmental, economic, social, and recreational and tourist functions. It is a common strategy, at all levels of government, that the Murray River and its environs be maintained and enhanced. All waterways in the municipality form a vital part of the Murray Darling Basin."

The objective is to:

"To protect the environs of the Murray River recognising its importance for nature conservation, flooding, economic development, recreation and tourism."

• Zones

There are a number of planning zones within the Study Area relevant to this Landscape and Visual Impact Assessment, including:

- Urban Floodway Zone (UFZ);
- Public Use Zones (PUZ);
- Road Zone Category 1 (RDZ1);

- General Residential Zone (GRZ);
- Public Conservation and Resource Zone (PCRZ); and
- Public Park and Recreation Zone (PPRZ).

Of particular relevance are the following:

Public Conservation and Resource Zone (PCRZ) - The primary purpose of this zone is to protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values. Both the Campaspe and Murray Rivers exist within this zone.

Public Park and Recreation Zone (PPRZ) – The primary purpose is to recognise areas for public recreation and open space and to protect and conserve areas of significance where appropriate. Victoria Park and a large area adjacent to the Campaspe and Murray Rivers exist in this zone.

The majority of land within the Study Area boundary is within either the Public Conservation and Resource Zone (PCRZ) or the Public Park and Recreation Zone (PPRZ).

• Overlays

The following overlays are located within the Study Area and include:

- Floodway Overlay (FO) and Land Subject to Inundation Overlay (LSIO);
- Environmental Significance Overlay Schedule 1 (ESO1)
- Design and Development Overlay (DD03); and
- Wildfire Management Overlay (WMO).

Of particular note are the following:

Environmental Significance Overlay - Schedule 1 (ESO1) covers a large portion of the land within the Study Area. The Statement of environmental significance states:

"The remaining native riverine forests, woodlands and wetlands that adjoin the waterway of the Murray River are critically important for the maintenance of water quality, biodiversity, wildlife habitat and scenic beauty. It is the visual and landscape qualities of this environment that are the basis for the demand for tourist and recreation development as well as the expansion of rural, residential and urban areas."

The most relevant decision guideline is "The visual impact of the proposal on the riverine landscape and whether this may be lessened through the planting of a variety of appropriate indigenous vegetation species and by other means as appropriate."

Design and Development Overlay - Schedule 3 (DDO3) covers the Northern and Murray Valley Highway Precincts and provides guidance to development along these roads and includes the following objective: "To ensure that landscape treatments contribute to the boulevard streetscape character of the Northern and Murray Valley Highways, and rear setbacks are landscaped to reduce the impact of commercial development on the adjoining residential neighbourhoods."

Heritage Overlay (HO) seeks to ensure that development does not adversely affect the significance of heritage places. Although there are no specific sites within the Study Area boundary there are sites in close proximity to the proposed developmentNew South Wales

Murray Local Environmental Plan (LEP) 2011

The Murray Local Environmental Plan 2011 applies to the land within Murray Shire and contains two relevant aims to this study:

"(c) to identify, protect, conserve and enhance Murray's natural assets,

(d) to identify and protect Murray's built and cultural heritage assets for future generations,...

(g) to provide for future tourist and visitor accommodation in a sustainable manner that is compatible with, and will not compromise, the natural resource and heritage values of the surrounding area."

• Land Use Zones

There are a number of land use zones within the Study Area including:

SP2 Infrastructure (Classified Road);

and of particular note are the following:

B2 Local Centre includes the Moama retail strip along Meninya Street and an area along the western side of Cobb Highway. The following relevant objectives of the zone are worth noting here:

"To maximise public transport patronage and encourage walking and cycling.

and

To reinforce the role of Moama as the main commercial centre in Murray."

E3 Environmental Management covers the privately owned, low lying land to the east of the Murray. The objectives of this zone are:

"To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.

To provide for a limited range of development that does not have an adverse effect on those values."

W2 Recreational Waterways covers the Murray River corridor. The relevant objectives of this zone are:

"To protect the ecological, scenic and recreation values of recreational waterways.

and

To allow for water-based recreation and related uses."

• Miscellaneous Provisions

Clause 5.10 Heritage Conservation applies to one heritage conservation area adjacent to the Study Area:

Item I25 - Cranford House (located on the Cobb Highway north of Perricoota Road).

The relevant objective of this provision is:

"(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views"

Additional Local Provisions

Clause 7.2 Earthworks states an objective relevant to this study:

"(a) to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land"

Clause 7.4 Development on River Front Areas is particularly relevant to this study and states one objective as:

"(d) to protect the amenity, scenic landscape values and cultural heritage of those rivers and to protect public access to their riverine corridors"

Clause 7.6 Additional provisions—Development on River Bed and Banks of the Murray and Wakool Rivers reinforces this by stating the following objective:

"(b) to protect the environmental values and scenic amenity and cultural heritage of those rivers"

• Murray Development Control Plan (DCP) 2012

The Murray Development Control Plan 2012 applies to all land within the Local Government Area of Murray.

Chapter 10 Watercourses and Riparian Land is of particular relevance. The objectives of 10.1 Visual amenity is:

"To protect the visual amenity created by the natural river environment.

To avoid works and structures that have a detrimental visual impact."

4.4 Landscape Planning Objectives

The assessment of the relevant planning objectives has revealed three key and interlinked themes which recur across state boundaries and at the federal, state and local levels:

- 1. Public access to recreational open space
- 2. Visual amenity
- 3. Sense of place

Planning legislation recognises that the built environment can contribute to and influence personal health and safety as well as community wellbeing. Of importance is the protection and provision of safe access to areas of recreational value and the design of integrated transport solutions to increase opportunities for walking and cycling.

Linked to this is the theme of 'visual amenity'. Legislation identifies the need for pleasant, visually pleasing environments and the protection of scenic amenity and values. The protection and enhancement of landmarks, views and vistas are important.

This is further linked to the theme of 'sense of place'. Respect for cultural identity and character through the protection of heritage and natural values are important. Likewise, public access to and use of the riverine landscape is also identified.

The following specific study sub-objectives and assessment criteria to address the EES Scoping requirements are therefore recommended:

- Protect the scenic amenity, cultural and natural heritage and recreational values of the Murray River.
- Protect the visual amenity and key views of the river floodplains.
- Protect the recreational values of Victoria Park.
- Protect the scenic amenity, natural heritage and recreational values of the Campaspe River.
- Enhance existing networks that provide cycling and walking accessibility and connectivity.

5. Existing Conditions

5.1 Methodology

The purpose of this phase was to undertake an analysis of the existing landscape and visual character in order to fully appreciate and understand the Study Area. The current assets, values and uses of the land within the Study Area are known as the 'existing conditions'. These conditions are the baseline against which the potential impacts of the Project have been assessed.

The existing landscape character assessment for the Study Area included:

- Site investigations;
- A review of all relevant plans, maps, studies and strategies;
- Input from other EES consultant reports, such as Biodiversity and Habitat and Cultural Heritage;
- Identification of major views within and towards the Study Area with the potential of being affected by the Project;
- Identification of Landscape Character Types and the associated scenic quality of each; and
- Identification of the sensitivity to change for each of the Landscape Character Types.

5.2 Study Area Characteristics

5.2.1 Context

Echuca and Moama are located at the junction of the Campaspe and Murray Rivers in the Northern District Plains subtype of the Landscape Character Type identified as the Murray Basin Plains³. The Murray Basin Plains are described as flat alluvial plains, with scattered open red gum forest along rivers and extensive agricultural clearings throughout. The Murray River is the main drainage line and a significant landscape feature of this character type. The land use pattern is mostly agricultural crops and grazing land with some scattered forest and settlements throughout.

5.2.2 Land Use

Figure 3 (Volume 2) illustrates the predominant visible land uses within and adjacent to the Study Area.

The Study Area is a patchwork of urban land uses within the towns of Echuca and Moama and both passive and active open space within Victoria Park.

Predominantly commercial and residential uses flank the Murray Valley Highway. The land on both sides of Warren Street is largely included within the Urban Floodway Zone (FO) and is undeveloped with the exception of the Echuca

³ Leonard, M & Hammond, R 1984, *Landscape Character Types of Victoria*, Forests Commission, Victoria.

Cemetery and an adjacent pocket of residential area to the north side of Warren Street.

The Campaspe and Murray Rivers are included in the Public Conservation and Reserve Zone (PCRZ) (Figure 3, Volume 2). Enclosed within the Campaspe and Murray Rivers and Crofton and Warren Streets exists a residential area which also includes St Joseph's Catholic College. South of Warren Street extends the main commercial area of Echuca.

North of Crofton Street and land-locked by both rivers is an extensive recreation area which includes Victoria Park, the Echuca Tennis Club, Victoria Park Oval, Echuca Caravan Park and an unused area which was formerly the Echuca College site. A large area of public reserve also exists between the Campaspe River and Campaspe Esplanade. Merool Holiday Park is a large private reserve used for recreation located on the north side of the Murray River at Reflection Bend.



The Campaspe River in Echuca.



Victoria Park, Echuca.

A large area of rural floodway exists on the north side of the Murray River and the main commercial area of Moama extends along Meninya Street and the Cobb Highway. The Moama Cemetery is located south of Perricoota Road and the Moama Recreation Reserve extends north of Perricoota Road. Numerous small open space areas are also located in the areas surrounding the Study Area. A small park area, known as the Moama Lions Park, exists within the Study Area and is bound by Boundary Road, Meninya Street and Forbes Street.

Overhead powerlines are found at the Murray Valley Highway intersection with Warren Street, along Warren and Crofton Streets in Echuca and along Boundary and Perricoota Roads in Moama.

5.2.3 Recreational Facilities

Figure 4 (Volume 2) illustrates the main recreational facilities within and surrounding the Study Area.

The twin towns of Echuca-Moama are well known as a tourist destination. This is largely based on the towns' location on the Murray River and the heritage associated with the working Port of Echuca that dates back to 1865. An extensive tourism precinct extends from the Port of Echuca north along the Murray River towards the Study Area boundary. The Port is a destination location and it is also the point at which tourists board paddle steamers to tour up and down the River. Numerous houseboat hire businesses also operate along both sides of the Murray River and in close proximity to the Study Area boundary. In the future, the Campaspe Shire Council proposes to relocate the houseboat moorings adjacent to the Victoria Park boat ramp within the Study Area boundary. Paddle steamers, houseboats and other forms of leisure craft cross the Study Area daily.

Other activities along the Murray River include picnicking, swimming, canoeing and leisure boating. The Southern 80 Ski Race is also held annually and starts from Torrumbarry Weir and terminates at the Victoria Park boat ramp which is located within the Study Area.

Numerous open space reserves sit within and adjacent to the Study Area boundary. In Echuca, Victoria Park is a large open space reserve which incorporates the Echuca Tennis Club, Victoria Park Oval and the Echuca Caravan Park. Components of all of these facilities sit within the Study Area. The Campaspe Shire Council, through their draft Master Plan for Victoria Park⁴, has proposed to extend the active recreation facilities to include additional ovals, tennis courts and community facilities and consolidate car parking. The Study Area also encompasses a section of Victoria Park which includes natural bushland, access and walking tracks, toilets, picnic tables and the river viewing area formed by constructed terraces adjacent to the boat ramp.

In Moama, the Moama Recreation Reserve is located adjacent to the Study Area boundary north of Perricoota Road and houses sporting ovals, harness racing and a velodrome. Merool Holiday Park, a large privately operated caravan and camping facility, is located on the north side of the Murray River opposite

⁴ Simon Leisure Consulting, 2010, *Victoria Park & Environs Master Plan*, Caulfield South

Victoria Park on Reflection Bend. The small triangular shaped Lions Park occurs with the Study Area at the intersection of Meninya Street and Cobb Highway and includes picnic tables and play equipment.

An extensive network of formal and informal bicycle and walking routes connect residents and tourists to the rivers, reserves, tourism destinations, areas of heritage interest and to Echuca and Moama. Some of these routes occur within, through and adjacent to the Study Area.



Lions Park in Moama.



Echuca Tennis Courts and Netball Courts, Victoria Park
5.2.4 Cultural Heritage

Figure 5 (Volume 2) maps the cultural heritage items of interest in relation to landscape and visual value.

The Study Area has a visible history of both Aboriginal and non-Aboriginal culture. Archaeological investigations by Heritage Insight have identified a total of fourteen Aboriginal archaeological sites within the Study Area. All of the recorded sites are scarred trees. The extensive sandhill, which occurs in Victoria Park between the former Echuca College site on Crofton Street and Reflection Bend on the Murray River, is considered an area of very high potential sensitivity for buried Aboriginal archaeological sites, including human burials.

The Campaspe Planning Scheme identifies several sites of heritage value in the Study Area through application of the Heritage Overlay. The Echuca Historic Precinct (H01), Echuca North Residential Precinct (H087), a Crofton St Dwelling (H041), Echuca Cemetery Gates (H043 and H073) and a Campaspe Esplanade Dwelling (H068) are located within the Study Area boundary. The Stand of Murray Pine (H079) located within the Study Area just north of the former Echuca College site, are important as they are the only remaining trees of their type in the region.

Another site, the Red Gum Memorial Archway (H072) was originally erected in 1884 and signifies the importance of the River Red Gum timber industry to Echuca at the time. The Archway is recognised as a heritage place on the Victorian Heritage Register. Adjacent to the Archway is the Fountain and Statuary (H033) which was built in the early 20th century to mark the entrance to Victoria Park. Both of these sites occur within the Study Area.



The Red Gum Memorial Archway, Fountain and Statuary at Victoria Park

The Moama Historic Precinct occurs some distance away from the Project Area and includes the land south of Hunt Street to the River, the existing Murray River Bridge, Echuca Wharf and west towards the Murray boat ramp. Another heritage site located just outside the RoW boundary is Cranford House, located on the Cobb Highway in Moama.



Echuca Cemetery gates.

5.2.5 Vegetation

The Murray River is one of Australia's longest river systems and forms much of the state border between Victoria and NSW. Its catchment area extends from southern Queensland, NSW, South Australia and Victoria and includes other natural assets such as the Australian Alps, waterways, inland plains, lakes, ocean mouths and natural reserves which contribute to local biodiversity, recreational, landscape and scenic quality.

The section river local to the study area dissects the Echuca- Moama settlement and forms part of a unique local recreation (both land based and on the river itself), landscape and viewing experience. It is characterised flat to gently undulating topography with open views north west and south east along the meandering river corridor. Generally, views are framed by riparian vegetation (indigenous/native trees and shrubs) and steep to sloping sandy embankments. The flat to gently undulating topography, vegetation densities and recreation purposes provide a variety of framed and/or open views from distant, middle distance and close locations. The vegetation structure, height, form and level of management is valuable in its contribution to landscape character (local and regional) and contribution to sense of place.

Water levels vary from season to season, and year to year, influencing the nature and composition of views. Seasonally, views of the area may vary from high water levels (including localised intermittent flooding events within river

floodplain zones) with shallow embankments, to low water levels exposing steep river embankments and significant areas of mud and aquatic vegetation.

Adjacent to the study area are significant tracts of recreational land. It is associated with leisure facilities including: informal open space; formal recreational facilities; water sports; jetties to river craft; cycle and walking routes; picnic facilities, and; well managed naturalistic and/or formal native and/or exotic planting. The scenic amenity of this area, influenced by the vegetation structure, forms part of the recreational experience. Due to its close proximity to Echuca-Moama, the area provides an important leisure facility and open space resource for the local community. It is recognised as a key resource and is valued within the aims of both the Campaspe Planning Scheme and the Murray Local Environmental Plan (2011) due to its attractive features, distinctiveness and recreational function.

Also within the Echuca-Moama township limits are the Barmah National Park (NSW) and Perricoota State Forest which reinforce the character and recreational value of the local area.

Figure 6 (Volume 2) maps the predominant vegetation found within the Project Area.

The Echuca-Moama Biodiversity and Habitat Impact Assessment report by Brett Lane & Associates (June2015) has identified extensive areas of native vegetation in varying degrees of intactness. Full details of the vegetation and habitat conditions specific to this study can be found in Brett Lane & Associates report, however a broad discussion of the native vegetation located within the Study Area is appropriate as it is a significant contributor to landscape character.

Within the Study Area five main native vegetation woodland and forest types exist.

Black Box dominated woodland is found on the Victorian side of the Murray River is typically to 15 m tall and has a diverse shrubby and grassy understorey. Its character species include Black Box (*Eucalyptus largiflorens*), River Coobah (*Acacia stenophylla*) and several species of Saltbush. Within the Study Area it typifies the vegetation within Victoria Park. It is also found predominantly on both sides of Warren Street and west and north of the intersection with the Murray Valley Highway.

River Red Gum (*Eucalyptus camaldulensis*) dominated forest is typically to 25 m tall with a ground layer dominated by graminoids (grasses, sedges and rushes). This vegetation type is located on the Victorian side of the Murray River, adjacent to the Campaspe River at the eastern end of Warren Street and between the Campaspe River and Campaspe Esplanade. In NSW, it is found in the areas close to Forbes Street.

River Red Gum dominated woodland is typically to 20 m tall with a ground layer dominated by graminoids and Saltbush shrub species. This type of vegetation is found on the north side of the Campaspe River and in the area between Campaspe Esplanade and Warren Street.

Murray Pines dominated woodland is distinguished by the dominance of non-Eucalypt trees such as Murray Pines (*Callitris gracilis ssp. murrayensis*). A distinct and isolated occurrence exists on the sandhill west of the Echuca tennis courts.

An area of River Red Gum and Black Box dominated woodland occurs on the NSW side of the river from the north bank to the River Red Gum dominated forest. This vegetation type is dominated by tree canopy with the understorey in varying degrees of intactness due to disturbance by past logging and farming activities.

Exotic vegetation exists intermittently throughout the Study Area largely as scattered weeds in the native vegetation areas or as plantings within the cemeteries, in and around Victoria Park and within residential or commercial properties. The most significant groupings of exotic trees within or in close proximity to the Study Area are found within the former Echuca College site and in Victoria Park, just north east of the oval. Palms, Gums, Silky Oaks, Olive and Carob trees can be found amongst the plantings here. Mature exotic trees such as Cypress and Casuarinas can be found at the Echuca Cemetery.

In summary the character and views are of an attractive, semi-natural and/or natural landscape with distinctive landscape (vegetation) elements that contribute to high degrees of amenity and tranquillity. Seven landscape character types have been identified within the study area and have been discussed in further detail in section 5.3 below.



Victoria Park vegetation.

5.2.6 Surface Geology

Figure 7 (Volume 2) maps the surface geology of the Study Area.

An understanding of the surface geology provides an appreciation of the processes which have created the landform of the Study Area and supports the landscape character description of this area as flat alluvial plains.

Two geological units are expressed at the surface of the Study Area: the Coonambidgal Formation and the Shepparton Formation (described in the Bendigo 1:250,000 Geological Map Sheet, Edwards et al. 2001).

Most of the Study Area is covered by the Shepparton Formation, deposited by an extensive network of shallow meandering streams that existed from the Pliocene to the early Holocene periods. These prior streams laid down clay, sand, silt, and gravel in valley-backfill and floodplain environments. Channel and levee remnants are still visible on the ground surface in some places.

Overlying the Shepparton Formation, and inset into it in some places, is the Coonambidgal Formation, shown in pale green on Figure 7 (Volume 2). It consists of floodplain, alluvial, and lacustrine deposits, comprising gravel, sand, silt and clay; it was mostly deposited within the last 10,000 years (during the Holocene period). These sediments are derived from existing streams and their recent ancestors, and consequently occupy the channel belt flanking the Murray and Campaspe Rivers. Sediments of the Coonambidgal Formation were also deposited in the large palaeolake Lake Kanyapella to the east of the Study Area (the green area on the upper right hand side of Figure 7). Signs of recent geomorphological activity are well displayed on the surface of the Coonambidgal Formation in fluvial landforms such as inset terraces, scroll plains, and billabongs.

5.2.7 Hydrology

Figure 8 (Volume 2) illustrates the extent of predicted inundation within the Study Area.

Echuca and Moama exist within the floodplains of the Murray and Campaspe Rivers. The Hydrology Study by Cardno Victoria Pty Ltd shows that the majority of the Study Area is below the 20, 50 and 100 year flood event levels. The only areas not affected are the Warren Street / Murray Valley Highway intersection, the Echuca Cemetery, a proportion of the residential area north of Warren Street, a small section of Victoria Park including part of the tennis courts and oval and the Cobb Highway intersections with Meninya Street and Boundary and Perricoota Roads.

5.2.8 Slope Analysis

Figure 9 (Volume 2) indicates the degree of slope across the Study Area.

The majority of the Study Area contains shallow slopes (between 0 and 5%). Slight slopes (between 5-20%) coincide with levee bank locations and the sandhill formations such as at the Echuca Cemetery and adjacent to the former Echuca College. Medium slopes (between 20-60%) are only found along the banks of the Campaspe and Murray Rivers.

The slope analysis highlights the flat alluvial land form of the Study Area and identifies that the main areas of natural topographic relief are associated with the Campaspe River and Murray River waterforms.

5.2.9 Elevation Analysis

Figure 10 (Volume 2) indicates the height above sea level of the land across the Study Area.

The entire Study Area is between 85 and 102 m above sea level. The lower lying areas (between 84 and 90 m) coincide with the Campaspe and Murray Rivers and a mined sandhill located within Moama. The higher elevated areas (between 94 and 100 m) are found on the south west side of the Murray Valley Highway, the Echuca Cemetery, the sandhill adjacent to the former Echuca College, the area between the Campaspe and Murray Rivers and the area of Moama north of Boundary Road and Meninya Street. All other areas and the majority of land within the Study Area sit between 90 and 94 m above sea level.

The elevation analysis identifies that there is very little topographic relief across the Study Area and again reinforces that the main topographic features are the waterforms of the Campaspe and Murray Rivers.

5.2.10 Views and Visual Envelope

The views plan (Figure 11, Volume 2) identifies the major existing views within, towards or from the Study Area with the potential to be affected by the Project. The identification of these views has been informed by site investigations.

There are no significant vantage points within or adjacent to the Study Area. As the Study Area is relatively flat and heavily treed, the characteristics of the major views identified are very similar. Views are either short or to the middle distance and are always towards trees and vegetation. Therefore the location of tree cover has also been mapped.

The visual envelope plan (Figure 12, Volume 2) further illustrates the effect that tree cover and built form has on views to or from the Project. The shaded area is the approximate zone which can be seen from the Project Area boundary from a viewing height of 1.6 m to a destination height of 1.6 m. The density of tree cover and vegetation density varies in the areas directly adjacent to the Project Area. However site investigations have determined that the distance at which an object can be viewed through the vegetation before it is fully screened is in the order of 150 m.

Those experiencing/using the character types identified in Table 3 below, vary in their perception of the value of views, and sensitivity to their visual environment. Generally, this is dependent upon their interest in their visual environment and their viewing opportunity and duration. The changes that may arise in the composition of those views as a result the project, and people's responses to those changes, have been outlined in Table 3.

However Echuca and Moama rely on the attractiveness of their towns to draw tourists which in turn supports the economy of the region and this attractiveness is directly related to the existence of and proximity to the scenic quality of the natural and cultural heritage landscape. The most important views are considered those listed as follows:

- Views from the Victoria Park boat ramp and picnic area towards the activity on the Murray River and the trees and vegetated banks on the opposite side of the River;
- Views from the houseboats towards the trees and vegetated banks of the Murray River; and
- Views from the paddle steamers towards the trees and vegetated banks of the Murray River.



The boat ramp on the Murray River in Victoria Park.

Views of moderate importance are considered those listed as follows:

- Views from the Echuca Tennis Club and Victoria Park Oval towards the trees and vegetation adjacent to the courts within Victoria Park;
- Views from the Echuca Caravan Park towards the trees and vegetation adjacent to the caravan park within Victoria Park;
- Views from the rooms within the Madison Spa Resort towards the trees and vegetation to the south of the resort;
- Views within Victoria Park to the trees and vegetation of Victoria Park;
- Views from Scenic Drive to the trees and vegetation of Victoria Park and to the waterforms of the Campaspe and Murray Rivers; and
- Views from Echuca Cemetery.

Views of low relative importance are considered those listed as follows:

• Views from Warren Street residential properties towards the roadside trees and vegetation beyond the road reserve;

- Views from residential properties located along the Campaspe River towards the trees and the vegetation of the river;
- Views along Crofton Street towards the trees and vegetation along the Campaspe River at the western end of Crofton street;
- Views from Campaspe Esplanade and publicly accessible areas adjacent to the river towards the trees and vegetation along Campaspe Esplanade;
- Views along Warren Street towards the roadside trees and the trees and vegetation beyond the Warren Street road reserve;
- Views from Forbes Street towards the surrounding trees and vegetation; and
- Views from the private residence on Boundary Road towards the trees and vegetation south of the property.

The most sensitive receptors are therefore considered to be members of the public partaking in and enjoying recreational and tourism activities on the Murray River.

Moderately sensitive receptors are members of the public enjoying the recreational and natural facilities of Victoria Park or those staying at the Madison Spa Resort.

The least sensitive receptors are local residents living in proximity to the proposed project with existing views towards the natural vegetation and waterform features of the river floodplains.

5.3 Landscape Character

A landscape character type is an area of land with common visual characteristics and requires an assessment of landform, water form, vegetation and land use or built form pattern.

The Study Area has been assessed as having seven landscape character types. Each of these types are described in this section and are mapped on Figure 13 (Volume 2).

5.3.1 Landscape Character Types

Warren Street

The Warren Street landscape character type includes the pocket of low density residential land use and the Echuca Cemetery north of Warren Street. The area is bound by Nolan Street, Campaspe Esplanade and Payne Street. The landscape character of this area is defined by the presence of built form on land slightly elevated above the surrounding floodplains. A distinctive landscape feature found within the landscape character type is the Echuca Cemetery.



The Echuca Cemetery.



A typical view of the Warren Street landscape character type.

Crofton Street

The Crofton Street landscape character type exists in the area bound by Crofton Street, the east bank of the Campaspe River and the Murray River. The landscape character of this area is defined by the layout of the streets and the low density of residential properties including properties included on heritage overlays. There are also a number of mature exotic trees throughout this precinct both within gardens and along the streets which give some of the streets in this area a sense of grandeur. A distinctive landscape feature found within the precinct is the building complex of St Joseph's Catholic College.



A typical view of the Crofton Street landscape character type.

Victoria Park Active Recreation

The Victoria Park Active Recreation landscape character type incorporates the area which includes the former Echuca College, Echuca Tennis Club, Victoria Park Oval and Echuca Caravan Park. The landscape character of this area is defined by the infrastructure and built form which exists to accommodate active recreation pursuits such as sports fields, pavilions, caravan park accommodation, access tracks and car parking. Mature native and exotic trees exist as individual specimens or random groupings throughout the area and help to visually distinguish the active recreation character type from the remainder of Victoria Park which is heavily vegetated in remnant floodplain vegetation.



A view of the Victoria Park Oval within the Victoria Park Active Recreation landscape character type.

River Floodplain

The River Floodplain landscape character type occurs in two separate areas. The first area extends from adjacent to the Murray Valley Highway, along Warren Street and north to the Murray River incorporating the majority of Victoria Park. The presence of numerous public trails throughout the park results in this area of the character type being experienced by walkers and joggers. The second area exists in the low lying area between the settlement of Moama and the Murray River.



A typical view of the River Floodplain landscape character type within Victoria Park.



A typical view of the River Floodplain landscape character type in Moama.

The landscape character of this area is defined by the presence of remnant trees and understorey vegetation across the flat floodplain landform. The density of trees and understorey vegetation varies from relatively dense areas within Victoria Park to quite open areas south of Warren Street. A distinctive landscape feature found within the character type includes the native vegetation within Victoria Park, the Campaspe River and the sandhill adjacent to the site of the former Echuca College.



A view of the sandhill in Victoria Park.

Murray River

The Murray River landscape character type exists along the Murray River. The landscape character of this area is defined by the water form and riverine vegetation along the banks of the river and the associated tourist facilities and infrastructure such as the houseboats and paddle steamers. A distinctive landscape feature of this area is the Port of Echuca.



A view of the Murray River landscape character type and the houseboats and paddle steamers which operate on the river.

Murray Valley Highway

The Murray Valley Highway landscape character type occurs in the area directly surrounding the Murray Valley Highway intersection with Warren Street. The landscape character of this area is defined by the presence of the road and the expanse of bitumen slightly elevated above the surrounding floodplain. Some adjoining residential development backs onto this area but is quite some distance from the road. The road reserve is very wide with some scattered native trees and a grassed understorey.



A Typical view of the Murray Valley Highway landscape character type.

Cobb Highway

The Cobb Highway landscape character type exists in the area surrounding the Cobb Highway intersection with Boundary Road and Perricoota Road and extends down to Meninya Street. The landscape character of this area is defined by the existence of the roads and intersections and the predominantly commercial and residential land uses which flank the roads. Mature exotic and native trees occur along the road and within adjacent properties, and commercial signage dominates the road landscape.



A typical view of the Cobb Highway landscape character type

5.3.2 Scenic Quality Assessment

The publication 'Landscape Character Types of Victoria' (1984) provides descriptive criteria or 'frames of reference' for the Murray Basin Plains, Northern District Plains subtype providing a means to assess relative scenic quality.

The assumptions are that scenic quality increases with:

- greater degrees of uniqueness in rock outcropping, water, vegetation and other natural features;
- greater degrees of naturalness and lesser degrees of disturbance or modification;
- greater degrees of relative topographic relief and ruggedness; and
- greater degrees of vegetative diversity and landscape variety.

The Scenic Quality Classification provided for the Northern District Plains subtype is tabled below:

Description	High Scenic Quality	Moderate Scenic Quality	Low Scenic Quality
Landforms	 Isolated peaks or ranges with distinctive form or colour contrast that become focal points. Rock outcrops or jumbles of large boulders. Well defined steep- sided drainages. 	 Rounded hills, ridges, lunettes or peaks which are not visually dominant. Naturally established stream associated dissections. 	- Vast expanses of indistinctly dissected landforms that provide little illusion of spatial definition or landmarks with which to orient.
Vegetation	- Trees with some diversity of species, height & density. High form, line, colour & texture contrasts with surrounding landscape.	- Trees, with little diversity. Moderate contrasts with surrounding landscape.	 Extensive areas of similar vegetation. Few, if any, remnant trees. Very limited variation in colour & texture.
Waterforms	- Permanent streams, lakes, reservoirs & swamps.	- Intermittent streams, lakes, rivers, swamps & reservoirs.	- Waterforms absent.

Table 1: Murray Basin Plains, Northern District Plains - Subtype, Scenic Quality Classification - Frame of Reference $(p \ 62)^5$.

⁵ Leonard, M & Hammond, R 1984, *Landscape Character Types of Victoria*, forests Commission, Victoria

The scenic quality of the seven landscape character types within the Study Area can therefore be classified as follows:

Character Type	Landform	Vegetation	Waterform	Classification
Warren Street	Low	Low	Low	Low
Crofton Street	Low	Low	Low	Low
Victoria Park Active Recreation	Low	Low	Low	Low
River Floodplain	Moderate	High	High	High
Murray River	High	High	High	High
Murray Valley Highway	Low	Low	Low	Low
Cobb Highway	Low	Low	Low	Low

Table 2: Scenic Quality Classification of the Landscape Character Types.

The River Floodplain and Murray River Landscape Character Types are classified as being of 'high' scenic quality. The Warren Street, Crofton Street, Victoria Park Active Recreation, Murray Valley Highway and Cobb Highway Landscape Character Types are classified as being of 'low' scenic quality.



A typical view of the high scenic quality of the River Floodplain landscape character type.

It should be noted however, that the use of these 'frames of reference' have their limitations in areas where the landscape is substantially altered from its natural state through recent or historical development. The scenic quality assessment only identifies the visual values of a predominantly natural landscape. It is also important to identify the landscape values of the natural landscape as well as the visual and landscape values of the constructed landscape.

5.3.3 Landscape Value

The determination of the visual and landscape values of the Study Area, beyond just scenic quality, and their relative significance is important as it identifies the values which may be impacted by the Project.

Visual and landscape value is defined by the author as the contribution made by the landscape to the immediate and wider community through the provision of the following visual and physical attributes:

- accessibility and connectivity, through the provision of publicly accessible parks and walking, cycling or shared paths;
- provision of facilities for public use, such as passive and active recreation resources, seating, shelters, barbeque areas, drinking fountains, etc;
- contribution to a 'sense of place' through the provision of views of landscapes representative of the landscape character types or the existence of heritage buildings or structures; and
- contribution to improved urban amenity through the provision of trees and planting or 'wild' spaces.

The identification of landscape value was informed by the study of the Study Area's existing conditions. The landscape character areas which contained a higher number of positive landscape attributes across a larger area were assessed as being relatively more significant than those containing fewer attributes across smaller areas. The relative landscape and visual significance of the landscape character areas is summarised in Table 3.

Table 3: Landscape	and visual	values of	the lan	dscape of	character	areas	and their
relative significance							

Character Type	Landscape and Visual Values	Landscape & Visual Significance
Warren Street	Some informal connectivity is provided within the residential streets to the north of Warren Street. The presence of heritage features and structures within the Echuca Cemetery contribute to a 'sense of place' on the entry into Echuca from the Murray Valley Highway.	Moderate
Crofton Street	As this character type is divided into residential streets there exists numerous pedestrian and bicycle routes. The existence of numerous properties of heritage value throughout this area contributes to Echuca's historical 'sense of place'.	Moderate
<i>Victoria Park Active Recreation</i>	There is a degree of accessibility and connectivity throughout this character type given there are a number of pedestrian and bicycle routes throughout the open space reserve which occupies much of the area. There are numerous recreation facilities such as the parkland, oval, tennis courts and caravan park. The parkland area of this character type contributes to improved urban amenity and a 'sense of place' through the provision of heritage features, mature trees and grassed areas.	High
<i>River</i> <i>Floodplains</i>	There is a high degree of accessibility and connectivity through a significant area of this character type such as within the publicly accessible areas and throughout Victoria Park. The Victoria Park area of the character type also provides opportunities for walking and running. The existence of substantial areas of remnant floodplain vegetation throughout this character type results in a significant contribution to a 'sense of place' for both Echuca and Moama. Both the accessible and inaccessible areas of this character type provide users and viewers with an improved urban amenity through the provision of wild spaces.	High

Character Type	Landscape and Visual Values	Landscape & Visual Significance
Murray River	There is a high degree of accessibility and connectivity provided along the river and the Echuca riverbank. There are numerous recreation resources within this character type such as the river, Port of Echuca, boat ramp, houseboats and paddlesteamers. The waterform, Port of Echuca, trees and vegetation provide a significant contribution to the 'sense of place' associated with Echuca and Moama. Much of the area within this character type provides a sense of wildness and improved urban amenity.	High
Murray Valley Highway	Some informal connectivity is provided within the Murray Valley Highway road reserve.	Low
Cobb Highway	There exists numerous pedestrian and bicycle routes throughout this area. Moama Lions Park is a small reserve offering limited opportunities for active and passive recreation.	Low

Table 3: Landscape and visual values of the landscape character areas and their relative significance.

5.3.4 Sensitivity to Change

The landscape character areas with the highest scenic quality and landscape and visual significance are more sensitive to change, than those areas with a low scenic quality or landscape and visual significance. The analysis of landscape areas and their sensitivity to change is therefore summarised as follows:

Character Type	Scenic Quality Classification	Landscape & Visual Significance	Sensitivity to Change
Warren Street	Low	Moderate	Low- Moderate
Crofton Street	Low	Moderate	Low- Moderate
Victoria Park Active Recreation	Low	High	Moderate
River Floodplain	High	High	High
Murray River	High	High	High
Murray Valley Highway	Low	Low	Low
Cobb Highway	Low	Low	Low

Table 4: Sensitivity to Change analysis of the Landscape Character Types.

6. The Project

6.1 Ultimate Duplication

The Murray Valley Highway at the intersection with Warren Street in Echuca is generally at or near existing surface level is upgraded to a large radius roundabout with two traffic lanes in all directions. Some fill would be required on Warren Street approach to the roundabout. An on road bicycle lane in the road shoulder is provided in all directions. Off road shared paths are provided which lead users to the existing shared paths along Butcher Street and Bridlington Avenue and connect users to Mt Terrick Road. Two spill containment basins are provided adjacent to the roundabout, one to the north and another to the east. A number of existing trees within the current road reserve would require removal.

Along Warren Street the cross section of the road is upgraded to two lanes each way with a centre median and flanked by on road sealed shoulders which double as bicycle lanes in each direction. The road descends down to the existing ground level from the elevated height at the Murray Valley Highway intersection at around chainage 300, follows the existing grade and then climbs back up to an elevated height approximately 3 m above the existing ground level at the proposed roundabout on Warren Street. Flood relief structures in the form of culverts or bridges are provided in four locations along Warren Street to maintain flood flows beneath the road. Spill containment basins are provided in three locations on the south side of the road. An off road shared path is provided along the length of Warren Street on the south side of the alignment. The majority of existing trees within the current road reserve on the south side of the alignment would require removal. However, on the north side the majority of existing trees would be retained.

Intersections are provided at Homan and Redman Streets and at Campaspe Esplanade (connecting to the south side of Warren Street only). Between Homan Street and Payne Street, a service road is provided to enable access to private properties on the northern side of Warren Street. The construction of this service road would require the removal of trees within the current road reserve.

The new road north of Warren Street consists of two lanes each way flanked with bicycle lanes and intersects with Warren Street 300 metres west of the existing Campaspe River Bridge with a new roundabout. East of the new roundabout to the Campaspe River, two additional culvert/bridge locations are proposed. Three spill containment basins are provided in this location. One on the north side of Warren Street and two north west of the new Warren Street roundabout. The majority of the existing vegetation within the existing road reserve on the north and south side of Warren Street in this location would require removal to accommodate the new infrastructure.

From Warren Street the new road heads north west through private property and across Campaspe Esplanade to cross the Campaspe River and then Crofton Street via a new bridge structure approximately 5.5 metres above the existing ground level at Crofton Street. A shared path is provided on the eastern side of the bridge structure. North of Warren Street, Campaspe Esplanade is truncated by

the new road, however shared path connections are provided under the new Campaspe River Bridge to link with Campaspe Esplanade and to the existing shared path which follows the Campaspe River towards the south. The existing vegetation along the new road would require removal. A 1.5 metre high noise wall is proposed on the east side of the new road between chainages 10,160 to 10,690.

On the northern side of the Campaspe River the new road heads to the north through the western end of the Echuca Tennis Club and Victoria Park before swinging to the east to cross the Murray River at the Victoria Park boat ramp. The new road is elevated on fill and a short length of structure between chainages 10,860 and 10,930, generally between 5.5 and 6.2 metres above the existing ground level. At the commencement of the new Murray River bridge structure at chainage 11,180 the road surface sits 11 metres above the existing ground level. Two spill basins are located on the north side of the alignment along this length of road. An off road shared path is provided along the south side of the route. Access to the boat ramp from the south via Scenic Drive is discontinued by the batters supporting the Murray River bridge structure requiring a new access road to be constructed to the south of the new bridge road. Six tennis courts are removed as well as the existing vegetation along the new alignment of the new road. A 2.0 metre high noise wall is proposed on the south side of the Ultimate Duplication alignment between Ch 10,800 and Ch 11,450.

The twin Murray River bridge structures commence at Ch 11,180 (north of the Echuca Caravan Park) and are up to 15.5 metres above the adjacent river bank levels. The cross section of the proposed bridge is two trafficable lanes and a bicycle lane/shoulder each way with an off road shared path provided on the southern side of the structure. The structure ends in private property on the Moama side of the Murray River at Ch 11,820. From this point the new road continues on batters through private property and descends from up to 11 metres above existing ground level to match the existing ground level at Boundary Road. A short bridge structure is provided between chainages 11,990 and 12,030. Two spill basins are provided on the north side of the Ultimate Duplication alignment through this section. An off road shared path is provided to the south side of the Ultimate Duplication alignment and connects with an existing route on Forbes Street.

A 3.5 metre high noise wall is proposed on the east side of the alignment adjacent to Madison Spa Resort. The noise wall commences at Ch 12,150 and finishing at Ch 12,260 (just north of Boundary Road). The existing vegetation along the new alignment of the new road between the Murray River and Boundary Road would require removal.

Boundary Road is truncated and a new intersection is provided with Meninya Street at the Moama Lions Park. The playground and some vegetation within Lions Park would require removal. The new road continues north to align with the Cobb Highway where an upgraded intersection is provided with Perricoota Road and a new intersection is provided with Francis Street. Shared paths are provided on both sides of the new road and to connect with all intersecting roads. Some existing vegetation within the Francis Street road reserve would require removal.

6.2 Initial Alignment

The configuration under the Initial Alignment is similar to the Ultimate Duplication route configuration. The only difference between the configurations are as follows:

- Along Warren Street the cross section of the road is one lane each way closely following the existing alignment of Warren Street. In the Ultimate Duplication configuration, the initial alignment cross section is duplicated to the south. No spill basins are provided on the south side of Warren Street for the Initial Alignment.
- Along the new road to the north west of the new Warren Street roundabout, in the Ultimate Duplication configuration the Initial Alignment cross section is duplicated to the west and north.
- There is no difference between the Initial Alignment and Ultimate Duplication configurations between Boundary Road and the northern extent of the Project on Cobb Highway, including the intersection with Perricoota Road.

7. Landscape and Visual Assessment

The purpose of this phase of the study was to assess the landscape and visual effects of the Project on the Study Area and against the Landscape Planning Objectives outlined in section 4.4 which address the EES evaluation criteria in section 3.1. The relative significance of each of these effects was then assessed both without mitigation measures and then with mitigation measures in place after a period of 10 years.

Based on this information, the Project was assessed against how well it met each of the Landscape Planning Objectives and was also given an overall rating.

7.1 Landscape and Visual Effects and Determination of Significance

Landscape effects are defined as the effects the Project has on the site's landscape character. Visual effects are defined as the effects the proposed road and bridge alignment (under the Ultimate Duplication) has on existing views. The effects may be negative (an impact) or positive (a benefit).

The significance of the effect is determined by two principal criteria: the size or magnitude of the effect in combination with the sensitivity of the location or the receptor to the identified effect.

The magnitude of a landscape effect is determined by the extent or size of change to the Study Area's existing landscape character. The sensitivity of an area is a measure of how sensitive the existing landscape is to change. For example the Murray River, Campaspe River and associated vegetated river floodplains are well established and mature landscapes containing diverse elements which are highly valued and in true to type condition and would be more sensitive to change than the landscapes of the Murray Valley or Cobb Highway intersections which contain newer and more uniform elements of lower value.

An effect occurring across a large area in a landscape highly sensitive to change will be more significant than an effect occurring in an isolated area to a landscape of low sensitivity.

The magnitude of a visual effect is determined by a consideration of the extent of area over which the change would be visible, the proportion of the existing view occupied by the effect, the duration of the view (whether permanent or temporary), the distance to the viewpoint and the degree of contrast between the existing view and the proposed view. The sensitivity of a receptor is a measure of the importance or quality of the view and how sensitive the existing view is to change. For example tourists enjoying the view of the Murray River from the Victoria Park picnic area would be more sensitive to a change in view than motorists commuting along Warren Street every day to their place of work.

An effect which is dominant, permanent, highly visible, in close proximity, with a high degree of contrast between the existing view and the proposed view and occurring where the view is highly sensitive to change will be more significant than a visual effect which is minor, temporary, barely visible, at a great distance, with minimal contrast between the existing and proposed view and where the view is not sensitive to change. In this study each effect was assessed and then given a rating of relative significance chosen from the following:

Rating	Landscape Impact	Visual Impact
High	Effect occurring across a large area in a landscape highly sensitive to change.	Permanent, highly visible effect in close proximity causing a high degree of contrast to a view highly sensitive to change.
Moderate- High	Effect occurring across a large area in a landscape moderately sensitive to change. Or, effect occurring across a medium sized area in a landscape highly sensitive to change.	Permanent, highly visible effect in close proximity causing a moderate degree of contrast to a view moderately sensitive to change. Or, semi-permanent, visible effect at a moderate distance causing a high degree of contrast to a view highly sensitive to change.
Moderate	Effect occurring across a medium sized area in a landscape moderately sensitive to change.	Semi-permanent, visible effect at a moderate distance causing a moderate degree of contrast to a view moderately sensitive to change.
Low- Moderate	Effect occurring across a medium sized area in a landscape not sensitive to change. Or, effect occurring across a small area in a landscape moderately sensitive to change.	Semi-permanent, visible effect at a moderate distance causing a minor degree of contrast to a view less sensitive to change. Or, temporary, barely visible effect at a great distance causing a moderate degree of contrast to a view moderately sensitive to change.
Low	Effect occurring across a small area in a landscape not sensitive to change.	Temporary, barely visible effect at a great distance causing a minor degree of contrast to a view less sensitive to change.
Negligible	No effect.	No effect.

7.2 Mitigation Measures

Mitigation measures are defined as the methods adopted to reduce the impact or enhance the benefit a road development (such as the Project) has on the landscape.

Generally mitigation measures can be more effective in reducing the significance of visual impacts and less effective in reducing the significance of landscape impacts. This is because it is typically easier to screen views than to replace the landscape values disturbed or removed by the implementation of a new or duplicated road or bridge (such as is contemplated by the Project).

VicRoads provide a list of standard mitigation measures for landscape planning studies, which are listed below:

- Bridge/culverts to be located and designed to complement and accommodate wildlife links, revegetation and creek systems;
- Creek realignments to be minimised where possible and stabilised through revegetation with appropriate riparian species;
- Locate and design watercourse crossings to minimise loss of riparian vegetation and to accommodate erosion control methods;
- Unstable batters should be planted and mulched to reduce the risk of erosion;
- Plant between the road alignment and the Right of Way (ROW) boundary to screen adjacent access roads;
- Encourage indigenous planting to the ROW boundary to strengthen the extent of the landscape character where relevant;
- Use a combination of landform and planting to screen the road from adjacent residencies;
- Use local materials where possible to identify "town gateways" within intersection ROW boundaries, in the design of rest areas or to identify other significant landscape elements;
- Where noise attenuation is required noise mounds should be the first option, followed by noise walls; and
- Location and design of rest areas should coincide with significant cultural and landscape features, for example panoramic viewing points, historic sites and places of apparent change in landscape character.

In addition to these standard mitigation measures, it is recommended that the following design recommendations and landscape mitigation measures be considered:

- All roadside walls or retaining structures should utilise materials, pattern, colour and texture which are sympathetic to the setting and congruous with their surrounds.
- Bridge structures should:
 - Provide correct geometric relationships in the overall structural arrangement and display visual integration of the deck, beams, piers, railings, barriers, lighting, associated furniture and abutments;
 - Display visual integration of the structure with the road and landform;
 - Ensure lines that delineate elements of the structure are smooth and unbroken in both the horizontal and vertical planes;
 - Make use of the haunched main and adjacent spans to integrate with the piers and frame the river visually.
 - Surface treatments are in harmony with the structural shape and scale such that visual clutter is avoided;
 - Provide maximum open, light spaces beneath the structure; and

- For motorists, passengers, pedestrians and cyclists travelling over the bridge, provide views out beyond the sides of the bridge.

The assessment of the landscape and visual impacts of the Project was based on proposed long bridge spans for the Campaspe and Murray River bridges as shown in EES Technical Appendix A). The use of long bridge spans enables physical connectivity and views along the river banks and therefore minimise the landscape and visual impacts of the Project. The use of shorter bridge spans in combination with flood relief culverts would increase the impacts of the Project and would also effect the assessment of the Project against the Landscape Planning Objectives.

In considering the significance of the effects after mitigation, it is assumed that the abovementioned standard design recommendations and mitigation measures have been adopted if relevant. The particular design recommendations and mitigation measures identified in the following report are specific to the impact or benefit identified and to this study.

7.3 Landscape and Visual Effects of the Project in relation to the Planning Objectives

The landscape and visual effects of the Project are outlined in Table 5. The relative significance of these effects is also identified both before and after implementation of design recommendations and mitigation measures.

Cross sections have been prepared at representative locations, as listed below, to highlight the difference between existing conditions, proposed conditions without mitigation and proposed conditions with mitigation 10 years after implementation:

- Warren Street (Ch 500) (Figure 19)
- New road (Ch 10,300) between Warren Street and Crofton Street (Figure 20)
- New road (Ch 11,100) adjacent to Echuca Caravan Park (Figure 21)
- New road (Ch 12,240) adjacent to Madison Spa Resort (Figure 22)

Photomontages of key views have also been prepared to illustrate the difference between existing views, proposed views without mitigation and proposed views with mitigation 10 years after implementation. Four views have been modelled for the Ultimate Duplication:

- View from Crofton Street looking south-west towards the alignment (refer Figure 14).
- View from Victoria Park netball court looking west towards the alignment (refer Figure 15).
- View from Scenic Drive adjacent to the Echuca Caravan Park looking northwest towards the alignment (refer Figure 16).
- View from Victoria Park boat ramp looking north towards the alignment (refer Figure 17).

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	Т		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Protect the scenic amenity, cultural and natural heritage and recreational values of the Murray River	Visual Impact (Operational) - Introduction of 30 m wide twin road bridges over Murray River (between new road Ch 11,180 and Ch 11,840) at Victoria Park boat ramp (up to 15.5 m above top of river banks, plus 2 m high noise barrier on the approach to the river Ch 10,830 -11,345) and removal of up to 45 m width of floodplain vegetation both sides of the river for the bridge structures resulting in a change to the scenic quality and visual character of the Murray River and a change to existing views from paddle steamers, houseboats, the boat ramp and picnic area.	High Impact	Design the bridge to be a simple and elegant structure which makes a positive visual contribution to the environment. Minimise vegetation removal and replant indigenous floodplain vegetation where possible between the bridge and ROW to screen the bridge structure from adjacent river bank areas.	Moderate-High Impact
	Landscape Impact (Operational) - Introduction of 30 m wide twin road bridges over Murray River (between new road Ch 11,180 and Ch 11,840) at Victoria Park boat ramp (up to 15.5 m above top of river banks) and removal of up to 45 m width of floodplain vegetation both sides of the river for the bridge structures resulting in a change to the recreation and tourism values of the River and at the boat ramp and picnic area.	Moderate-High Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible between the bridge and ROW to screen the bridge structure from adjacent areas.	Moderate-High Impact

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	Т		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Protect the scenic amenity, cultural and natural heritage and recreational values of the Murray River (cont.)	Visual Impact (Construction) - Construction of 30 m wide twin road bridges over Murray River at Victoria Park boat ramp including removal of up to 45 m width of floodplain vegetation both sides of the river for the bridge structures resulting in a change to the scenic quality and visual character of the Murray River and a change to existing views from paddle steamers, houseboats, the boat ramp and picnic area.	High Impact	N/A	High Impact
	Landscape Impact (Construction) - Construction of 45 m wide twin road bridges over Murray River at Victoria Park boat ramp including removal of up to 30 m width of floodplain vegetation both sides of the river for the bridge structures resulting in reduced access to the boat ramp and associated picnic area, a change to the recreation and tourism values of the River.	Moderate-High Impact	Maintain access to boat ramp and picnic area if possible.	Moderate-High Impact
	Visual Benefit (Operational) - Provision of second Murray River crossing provides motorists and shared path users with scenic views of the river, associated floodplain vegetation and tourism facilities.	Moderate-High Benefit	Provide views out beyond the sides of the bridge	Moderate-High Benefit

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	Т		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Protect the visual amenity and key views of the river floodplains	Visual Impact (Operational & Construction) - On Warren Street between Ch 150 and Homan Street Ch 1000 removal of some existing trees within road reserve on north side and the majority on the south side to accommodate road, resulting in a change to the scenic quality and visual character of the river floodplains and a change to views from Warren Street.	Low-Moderate Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve.	Low Impact
	Visual Impact (Operational & Construction) - On Warren Street between Homan Street (Ch 1000) and Campaspe Esplanade (Ch 1800) removal of some existing trees within road reserve on north side and majority on south side to accommodate road, resulting in a change to the scenic quality and visual character of the river floodplains and a change to views from residential properties and users of Warren Street.	Low-Moderate Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve.	Low Impact

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	Т		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Protect the visual amenity and key views of the river floodplains (cont.)	Visual Impact (Operational & Construction) - Introduction of new road infrastructure through Echuca private property and across Campaspe Esplanade (between Ch 10,000 - 10,200) up to 5.7 m above existing ground level and removal of up to 75 m width of floodplain vegetation resulting in change to the scenic quality and visual character of the river floodplains and a change to existing views from Campaspe Esplanade.	Low-Moderate Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve.	Low Impact

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	T		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
	Visual Impact (Operational & Construction) - Introduction of new road infrastructure and bridge over the Murray River through Victoria Park (between Ch 10,500 to the Murray River's edge) up to 15.5 m above existing ground level, plus 2 m high noise barrier to eastern side of road (from Ch 10,700 - 11,400) and removal of up to 85 m width of floodplain vegetation resulting in a change to the scenic quality and visual character of the river floodplains and a change to existing views from Victoria Park, Scenic Drive, Victoria Park Oval, Tennis and Netball Courts and Echuca Caravan Park.	Moderate-High Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve. Ensure noise attenuation design and materials are congruous with the existing surrounding environment.	Moderate Impact

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMENT				
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)	
Protect the visual amenity and key views of the river floodplains (cont.)	Visual Impact (Operational & Construction) - Introduction of new road infrastructure through Moama private property (between Ch 11,980 - 12,280) up to 7.8 m above existing ground level, plus 3.5 m high noise barrier to east side of road and removal of up to 85 m width of floodplain vegetation resulting in a change to the views from 2 Boundary Road, Forbes Street, rear of Meninya Street properties and Madison Spa Resort.	Low-Moderate Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve. Ensure noise attenuation design and materials are congruous with the existing surrounding environment.	Low Impact	
	Visual Benefit (Operational) - Provision of the new road through the vegetated Victoria Park and private properties in Echuca and Moama provides motorists and shared path users with scenic views of the floodplains and associated vegetation.	Moderate Benefit	N/A	Moderate Benefit	

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMENT				
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)	
Protect the recreational values of Victoria Park.	Visual Impact (Operational & Construction) - Introduction of new road infrastructure and bridge over the Murray River through Victoria Park (between Ch 10,490 to the river's edge) up to 15.5 m above existing ground level, plus 2 m high noise barrier to eastern side of road (from Ch 10,800 to 10,770) and removal of up to 85 m width of floodplain vegetation resulting in a change to the scenic quality of Victoria Park.	Moderate-High Impact	Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve. Ensure noise attenuation design and materials are congruous with the existing surrounding environment.	Moderate Impact	
	Landscape Impact (Operational & Construction) - Introduction of new road infrastructure and bridge over the Murray River through Victoria Park (between Ch 10,490 to the river's edge) up to 19 m above existing ground level, plus 2 m high noise barrier to eastern side of road (from Ch 10,770) and removal of up to 85 m width of floodplain vegetation and open space reserve and severance of existing walking trails within the reserve resulting in a change to the recreation and public open space resources of Victoria Park.	High Impact	Minimise width of batters and road reserve. Minimise vegetation removal and replant indigenous floodplain vegetation where possible within the road reserve. Provide pedestrian connections across the road infrastructure where possible.	Moderate-High Impact	
	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMENT				
---	--	---	--	--	
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)	
Protect the recreational values of Victoria Park (cont.)	Landscape Impact (Operational & Construction) - Realignment of the boat ramp access road adjacent to the Caravan Park.	Low Impact	Provide temporary access until permanent realigned access is reinstated.	Negligible Impact	
	Landscape Impact (Operational & Construction) - Removal of 6 tennis courts from a total of 17 from the Echuca Tennis Club.	Moderate Impact	Replace tennis courts adjacent to remaining courts where possible.	Low Impact	
Protect the scenic amenity, natural heritage and recreational values of the Campaspe River.	Visual Impact (Operational & Construction) - Introduction of new road bridge through Echuca private property and across Campaspe River (between Ch 10,200 - 10,500) up to 5.9 m above existing ground level and removal of up to 45 m width of floodplain vegetation for the bridge structures resulting in change to the scenic quality and visual character of the Campaspe River and a change to existing views from residential properties on Campaspe River, from Crofton Street and Scenic Drive.	Moderate Impact	Design the bridge to be a simple and elegant structure which makes a positive visual contribution to the environment. Minimise vegetation removal and replant indigenous floodplain vegetation where possible between the bridge and ROW to screen the bridge structure from adjacent areas.	Low-Moderate Impact	

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMENT			
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Protect the scenic amenity, natural heritage and recreational values of the Campaspe River (cont.)	Landscape Impact (Operational & Construction) - Introduction of new road bridge through Echuca private property and across Campaspe River (between Ch 10,200 - 10,500) up to 5.9 m above existing ground level, removal of up to 45 m width of floodplain vegetation and realignment of access to Campaspe Esplanade resulting in a change to the recreational and sense of place values of the Campaspe River.	Moderate-High Impact	Maintain temporary access to Campaspe Esplanade during construction. Minimise vegetation removal and replant indigenous floodplain vegetation where possible between the bridge and ROW to screen the bridge structure from adjacent areas.	Moderate Impact
Enhance existing networks that provide cycling and walking accessibility and connectivity.	Landscape Benefit (Operational) - Provision of on road bicycle lanes and off road shared path from Murray Valley Highway intersection then along Warren Street to Campaspe Esplanade providing connectivity along road reserve.	Moderate Benefit	Provide safe connections across and to intersecting roads. Replant trees within the road reserve to provide shade and shelter.	Moderate-High Benefit
	Landscape Benefit (Operational) - Provision of bicycle lanes and off road shared path adjacent to new road and beneath Campaspe River bridge structure providing connectivity between Campaspe Esplanade, Warren St and Campaspe River.	Moderate Benefit	Provide safe connections across and to intersecting roads. Replant trees within the road reserve to provide shade and shelter.	Moderate-High Benefit

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMEN	Т		
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Enhance existing networks that provide cycling and walking accessibility and connectivity (cont.)	Landscape Benefit (Operational) - Provision of bicycle lanes and off road shared path on Campaspe River bridge structure (between Ch 10,200 - 10,500) providing connectivity along the new road.	Moderate Benefit	N/A.	Moderate Benefit
	Landscape Benefit (Operational) - Provision of bicycle lanes and off road shared path (between Ch 10,200 - 11,180) providing connectivity along the new road.	Low-Moderate Benefit	Provide connections to existing trails within Victoria Park north and south of the new road alignment.	Moderate-High Benefit
	Landscape Impact (Operational and Construction) - Severance of existing trails within Victoria Park (between Ch 10,500 - 11,180).	Moderate Impact	Where possible reinstate connections across new road alignment.	Low-Moderate Impact
	Landscape Benefit (Operational) - Provision of bicycle lanes and off road shared path on Murray River bridge and on new road (between Ch 11,180 and 12,030) and off road shared path (between Ch 12,400 and 12,550) providing connectivity along new road and connections to Forbes Street, Boundary Road, Meninya Street, Perricoota Road and Cobb Highway.	Moderate Benefit	Provide safe connections across and to intersecting roads. Replant trees within the road reserve to provide shade and shelter.	Moderate-High Benefit

	Table 5: Landscape and Visual Effects MID-WEST OPTION - ULTIMATE ALIGNMENT			
EVALUATION CRITERIA (PLANNING OBJECTIVE)	BENEFIT OR IMPACT (PRE MITIGATION)	SIGNIFICANCE OF BENEFIT / IMPACT (PRE-MITIGATION)	DESIGN RECOMMENDATIONS AND MITIGATION MEASURES	SIGNIFICANCE OF BENEFIT / IMPACT (10 YEARS POST MITIGATION)
Enhance existing networks that provide cycling and walking accessibility and connectivity (cont.)	Landscape Impact (Operational and Construction) - Relocation of existing shared path connection along Boundary Rd north 80 m to new intersection with Meninya St.	Negligible-Low Impact	Provide signalized pedestrian crossing at Cobb Highway and Meninya Street intersection. Replant trees within the road reserve to provide shade and shelter.	Negligible Impact

Echuca-Moama Bridge EES Landscape and Visual Impact Assessment

7.4 Other Landscape and Visual Effects of the Project

Although not directly related to the Landscape Planning Objectives of this study, it is worth noting the following additional effects of the Project.

Landscape Impacts

• Removal of a portion of the Moama Lions Park at Meninya Street as well as the existing playground to accommodate the new intersection, this impact could be mitigated somewhat through the installation of a new playground elsewhere on the site or at an appropriate location in Moama.

Landscape Benefits

- The anticipated reduction in traffic volumes in Meninya Street Moama would result in a quieter, less traffic dominated retail strip. This may enable the main retail strip in Moama to be modified to become a more shaded and pedestrian friendly place.
- The anticipated reduction in traffic volumes in High Street Echuca, through the Historic Port Precinct would also result in improved amenity in this important tourist precinct.

7.5 Assessment against Planning Objectives

The Project was assessed against its ability to meet the Landscape Planning Objectives both with and without mitigation measures (as outlined in Table 5). A measure of the relative number and significance of landscape and visual impacts as well as a consideration of the benefits created, determines how well the Project meets the Landscape Planning Objectives.

The rating scale is defined as follows:

<i>Meets objective Very Well</i>	The extent and significance of landscape and visual impacts is very low.
<i>Meets objective Well</i>	<i>The extent and significance of landscape and visual impacts is low.</i>
<i>Meets objective Moderately Well</i>	<i>The extent and significance of landscape and visual impacts is moderate.</i>
<i>Meets objective Poorly</i>	<i>The extent and significance of landscape and visual impacts is high.</i>
<i>Meets objective Very Poorly</i>	The extent and significance of landscape and visual impacts is very high.

Protect the scenic amenity, cultural and natural heritage and recreational values of the Murray River.

The Preferred Alignment would have a very high impact on the scenic amenity, cultural and natural heritage and recreational values of the Murray River through the implementation of a twin bridge structure across the Murray River. The highest impacts would be during and at the completion of construction, however given the location of the bridge in close proximity to the house boat moorings and across the route of the touring paddle steamers, the impacts of this bridge crossing would continue through its operational phase. If the new bridge clear span is designed to be an elegant structure that provides a positive visual contribution to the landscape, then these impacts would be reduced to a high level. An example of an elegant structure is a cast in-situ bridge with haunched soffit and clean lines. A super-T structure of the size required to cross the Murray River would be bulky and visually aesthetically poor.

Protect the visual amenity and key views of the river floodplains.

The Preferred Alignment would require the removal of existing trees and vegetation along Warren Street and the new road connection to the Cobb Highway, as well as the introduction of road and bridge infrastructure into Victoria Park would result in a moderate impact on the visual amenity and key views of the river floodplains. However, the introduction of the new road and bridges provides motorists and shared path users with a new elevated view of the floodplains. The impact of the road and bridge infrastructure can be mitigated somewhat by replanting indigenous vegetation to screen views of the Project.

Protect the recreational values of Victoria Park.

The Preferred Alignment would have a very high impact on the recreational values of Victoria Park through the introduction of the new road into the Park. This requires the removal of open space areas and vegetation, the severance of walking paths and access roads and the introduction of highly visible road and bridge infrastructure, including lighting and noise associated with the construction and operation of road development. These impacts can only be mitigated to some degree by reinstating shared path and access road connections and the planting of screening vegetation between the road and users of Victoria Park.

Protect the scenic amenity, natural heritage and recreational values of the Campaspe River.

The Preferred Alignment would have a moderate impact on the scenic amenity, natural heritage and recreational values of the Campaspe River. The new road crosses the River at right angles in only one location and in an area surrounded by existing floodplain vegetation. However, the construction and operation of the new road requires the removal of native vegetation as well as altered access to Campaspe Esplanade and the public areas flanking the River. If the new bridge clear span is designed to be an elegant structure that provides a positive visual contribution to the landscape and indigenous vegetation is planted to screen the road bridge structure from surrounding viewpoints, then these impacts would be reduced to a low level.

Enhance existing networks that provide cycling and walking accessibility and connectivity.

The Preferred Alignment contributes to Echuca and Moama's bicycle and walking networks through the provision of on road bicycle lanes in both directions and an off road shared path following the length of the alignment under the Ultimate Duplication and therefore meets this objective well. This could be improved however, by ensuring that connections are made to all existing paths, as well as providing shade and shelter along any off road paths.

PLANNING OBJECTIVE	PRE-MITIGATION	POST MITIGATION
Protect the scenic amenity, cultural and natural heritage and recreational values of the Murray River	Very Poorly	Poorly
Protect the visual amenity and key views of the river floodplains	Moderately Well	Well
Protect the recreational values of Victoria Park	Very Poorly	Poorly
Protect the scenic amenity, natural heritage and recreational values of the Campaspe River.	Moderately Well	Well
Enhance existing networks that provide cycling and walking accessibility and connectivity	Well	Very Well
Overall Rating	Poorly	Moderately Well

Table 6: Assessment Against Planning Objectives

8. Conclusion

In summary, taking into account all the potential significant benefits and impacts, it is considered that the extent and significance of landscape and visual impacts of the Mid-West Option is *high* without mitigation measures in place and *moderate* once mitigation measures have been in place 10 years after development of the Project. Therefore, the Project meets the relevant draft EES evaluation objective only once mitigation measures are in place and established, as these measures will minimise the adverse landscape and visual amenity effects of the Project on values of the area, including the Murray and Campaspe rivers and floodplains.

The key impacts categorised as "moderate-high" and "high" significance are listed as follows:

- The visual and landscape impact of the introduction of twin road bridges over Murray River at Victoria Park boat ramp (up to 15.5 m above top of river banks) and removal of up to 45 m width of floodplain vegetation both sides of the river for the bridge structure resulting in a change to the recreation and tourism values of the River and at the boat ramp and picnic area and a change to existing views from paddle steamers, houseboats, the boat ramp and picnic area.
- The visual impact of the introduction of new road infrastructure and bridge over the Murray River through Victoria Park and removal of up to 85 m width of floodplain vegetation resulting in a change to the scenic quality of Victoria Park and a change to existing views from Victoria Park, Scenic Drive, Victoria Park Oval, Tennis and Netball Courts and Echuca Caravan Park.
- The landscape impact of the introduction of road infrastructure and bridge over the Murray River through Victoria Park and removal of up to 85 m width of open space reserve and severance of existing walking trails within the reserve resulting in a change to the recreation and public open space resources of Victoria Park.
- The landscape impact of the introduction of new road bridge through Echuca private property and across Campaspe River up to 5.9 m above existing ground level, removal of up to 45 m width of floodplain vegetation and realignment of access to Campaspe Esplanade resulting in a change to the recreational and sense of place values of the Campaspe River.

These impacts can be mitigated somewhat through the following measures:

- Ensure all bridge structures are simple and elegant structures which make a positive visual contribution to the environment.
- Minimise vegetation removal and plant screen planting wherever possible between the road and bridge infrastructure and surrounding users of Victoria Park, Campaspe River environs and other key viewpoints.

• Reinstate connections to existing shared paths and ensure sufficient shade and shelter is provided along new shared paths.

The application of these mitigation measures would not remove the impacts of the Mid-West Option entirely, but would contribute to the reduction of impacts to a relatively moderate level.

9. References

Brett Lane & Associates 2011, *Second Murray River Crossing at Echuca-Moama – Detailed Flora and Fauna Assessment*, BL&A, Hawthorn

Campaspe Shire Council 2008, *Campaspe Walking and Cycling Strategy 2007*, Shire of Campaspe, Echuca

Campaspe Shire Council 2013, *Wayfinding Strategy and Style Guide*, Shire of Campaspe, Echuca

Leonard, M & Hammond, R 1984, *Landscape Character Types of Victoria*, Forests Commission, Victoria

Murray Local Environmental Plan 2011 http://www.murray.nsw.gov.au

Murray Shire 2010, Strategic Land Use Plan 2010-2030 (Version#15), Murray Shire

NSW State Environmental Planning Policies Murray Regional Environmental Plan No 2-Riverine Land (Current Version for 21 May 2014), NSW www.planning.nsw.gov.au

Planning and Environment Act 1987 (Version incorporating amendments as at 1 July 2014), Victoria

Environment Protection Act 1970 (Version incorporating amendments as at 1 August 2014), Victoria

www.legislation.vic.gov.au

Renzo Tonin & Associates 2015, *Echuca-Moama Bridge Project - EES Noise Impact Assessment Report*, Renzo Tonin & Associates, South Melbourne

Rhodes, D & Young, J 2010, *Detailed Aboriginal Cultural Heritage Study for a Second Murray River Crossing at Echuca-Moama – Final Report to VicRoads 2010*, Heritage Insight, Richmond

Rhodes, D 2009, *Report on Archaeological Survey for Post-Contact Heritage Sites, Murray River Crossing at Echuca-Moama Study Corridor –Report to VicRoads September 2009*, Heritage Insight, Richmond

Roads & Maritime Services 2013, *Environmental Impact Assessment Practice Note - Guideline for Landscape Character and Visual Impact Assessment (EIA-N04)*, RMS, North Sydney

Simon Leisure Consulting, 2010, Victoria Park & Environs Master Plan, Caulfield South

Sommerville, H 2015, *Echuca-Moama Bridge EES - Specialist Hydrology Report* (v4.1), Cardno Victoria, Collingwood

State Planning Policy Framework

Campaspe Planning Scheme (last updated 4 September 2014 to include VC120) http://planningschemes.dpcd.vic.gov.au/schemes/campaspe

The Landscape Institute 2008, *Guidelines for Landscape and Visual Impact* Assessment – 2^{nd} Edition, Spon Press, London

Echuca-Moama Bridge EES Landscape and Visual Impact Assessment

10. Assumptions and Exclusions

Amendment C101 was placed on exhibition by the Campaspe Shire Council during the finalisation of this impact assessment. As the final extent of boundaries of Heritage Overlays (including C79) is not yet known, it has not been possible to determine if they impact upon any findings of this report.

www.spiire.com.au