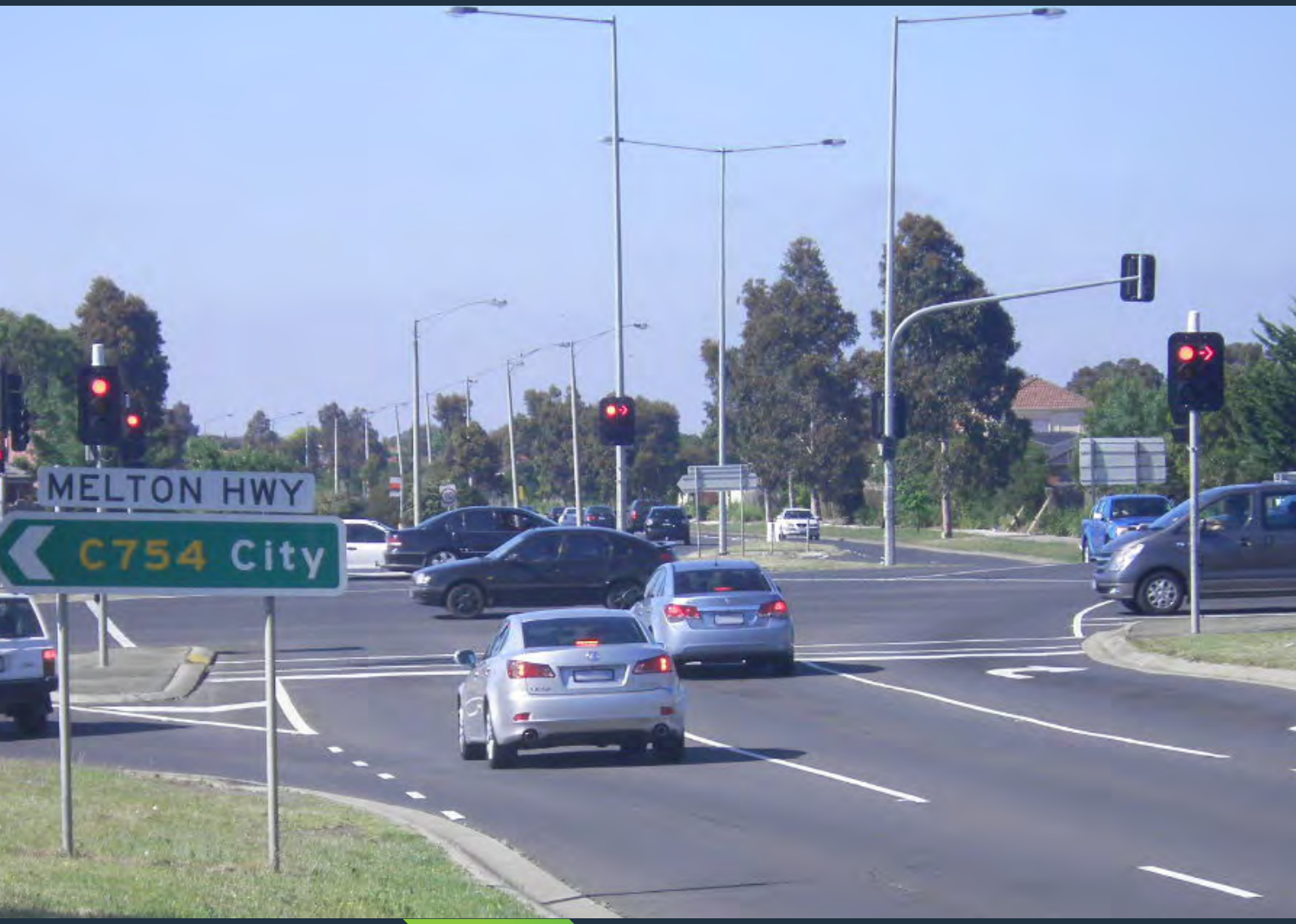
JULY 2015

vicroads

Palmers Road Corridor
(Western Freeway to Calder Freeway)
Environment Effects Statement
EES Volume 1 of 2



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Foreword

The Palmers Road Corridor from the Western Freeway to the Calder Freeway will be a critical north-south transport link in the west of Melbourne. The western suburbs of Melbourne are experiencing significant growth in residential development and employment. This expansion places pressure on the existing road networks and must be supported by suitable transport infrastructure. The Project will ensure a high level of accessibility is maintained in these areas and to reduce traffic through local streets and residential areas.

The upgrade of the Palmers Road Corridor has been identified as a long term Project to be implemented in stages. The Project will ultimately involve construction of a six-lane divided road (i.e. three-lanes in each direction), with off-road shared bicycle and pedestrian facilities on both sides of the road. Two existing railway crossings would be removed and two bridges would be constructed over Kororoit Creek. It is also proposed to construct a raised interchange at the Calder Freeway.

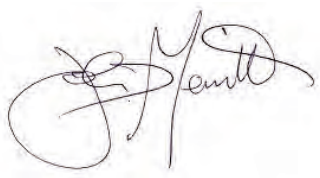
The Victorian Minister for Planning has determined under the *Environment Effects Act 1978* (Vic) (EE Act) that an Environment Effects Statement (EES) is required to inform statutory decision makers. In this case, amendments to the Brimbank Planning Scheme and Melton Planning Scheme are required to facilitate the Project. A separate approval process is required for matters of national environmental significance in accordance with the *Commonwealth's Environment Protection and Biodiversity Conservation Act 1999* (EPBC).

The Palmers Road Corridor EES report responds to the Scoping Requirements issued by the Minister for Planning in July 2013. The EES report describes the outcomes of the investigations, predicted environmental effects and proposed management measures for the Project. The Palmers Road Corridor EES report has been developed following consultation with the community and stakeholders including the Brimbank City Council, the Melton City Council and key Government agencies. A Technical Reference Group was established with Government stakeholders and other key agencies with meetings held in 2013 and 2014. Where appropriate and feasible, VicRoads has incorporated community and stakeholder advice into the investigation and evaluation of the alignment and potential mitigation measures.

The exhibition of the EES report, draft Planning Scheme Amendments and related documents provide a formal opportunity for the community and other stakeholders, to make written submissions on the EES, PSA and the proposed construction and operation of the arterial road. These submissions will be considered by an independent Inquiry that will provide a report to the Minister for Planning.

The Minister for Planning will then issue an assessment of the effects of the Project to inform the statutory approvals that are required for the Project to proceed.

VicRoads thanks all who have contributed their time and input to this Project.



John Merritt
Chief Executive, VicRoads

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EXECUTIVE SUMMARY

Purpose of EES report

On 13 November 2009, the Victorian Minister for Planning determined under the *Environment Effects Act 1978* that an Environment Effects Statement (EES) needed to be prepared by VicRoads for the Palmers Road Corridor Project - Western Freeway to Calder Freeway ('the Project'). The purpose of the EES is to provide a detailed description of the Project and to investigate its potential effects on the environment, to inform the public and stakeholders and then to enable an assessment of the Project by the Minister for Planning.

The upgrade of the Palmers Road Corridor has been identified as a long term Project to be implemented in stages. The focus of this EES is on the assessment of environmental effects of the Palmers Road Corridor between the Western Freeway and the Calder Freeway.

Robinsons Road, Westwood Drive and Calder Park Drive are local roads currently under the management of the Cities of Brimbank and Melton. The existing roads are two-lane undivided roads with no connection at Kororoit Creek. Consequently, there is a need to connect Westwood Drive and upgrade the roads in the future to a six lane arterial to provide the additional capacity for these roads to function as arterial roads.

Project Rationale

The aim of the Project is to provide a high standard north-south transport link in Melbourne's west. The western suburbs of Melbourne are experiencing significant growth in residential development and employment. This expansion places pressure on the existing road networks and must be supported by suitable transport infrastructure. The Project would provide a high level of accessibility in these areas, and will assist in the reduction of traffic through local streets and residential areas.

The Project would provide a link between the Western Freeway, Western Highway, Melton Highway and Calder Freeway. The Palmers Road Corridor is to be progressively upgraded to an ultimate six-lane divided carriageway arterial road to deliver significant road safety, capacity and efficiency benefits in response to the projected traffic volumes in a rapidly growing area in Melbourne's west.

The Project is supported by *Plan Melbourne* (Victorian Government, 2014), *Western Melbourne Transport Strategy* (Lead West, Western Transport Alliance, AECOM, 2012), *Growth Corridor Plans Managing Melbourne's Growth* (Growth Areas Authority, 2012), *Growth Area Framework Plans: Melton – Caroline Springs* (Department of Sustainability and Environment, 2006), *Melton East Strategy Plan* (GHD, 1997) and the *Outer Western Suburbs Transport Study* (Department of Infrastructure, 2001).

Project Approvals

The Project requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* amendments to the Brimbank Planning Scheme (Amendment 157) and Melton Planning Scheme (Amendment C143) under the *Planning and Environment Act 1987* and an approved Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006*. Approvals under other legislation for components of the project are also required and outlined in Chapter 3.

The draft planning scheme amendments (PSAs) and draft CHMP are being exhibited concurrently with the EES and public comments will be sought on the PSAs as well as the EES during the exhibition period. The PSAs include application of a Public Acquisition Overlay to land that needs to be compulsorily acquired for the Project, and provide an exemption from all planning permit requirements for the Project (subject to the Project meeting any other recommendations of the Minister's assessment of the project's environmental effects).

A CHMP has been developed for the Project, and will be submitted to the Registered Aboriginal Party and the Office of Aboriginal Affairs for evaluation and approval following the EES process.

The Project requires approval under the EPBC Act due to the potential to impact on matters of national environmental significance. The Federal Minister for the Environment will make a decision under the EPBC Act on the Project and this assessment will be based on separate documentation to the EES.

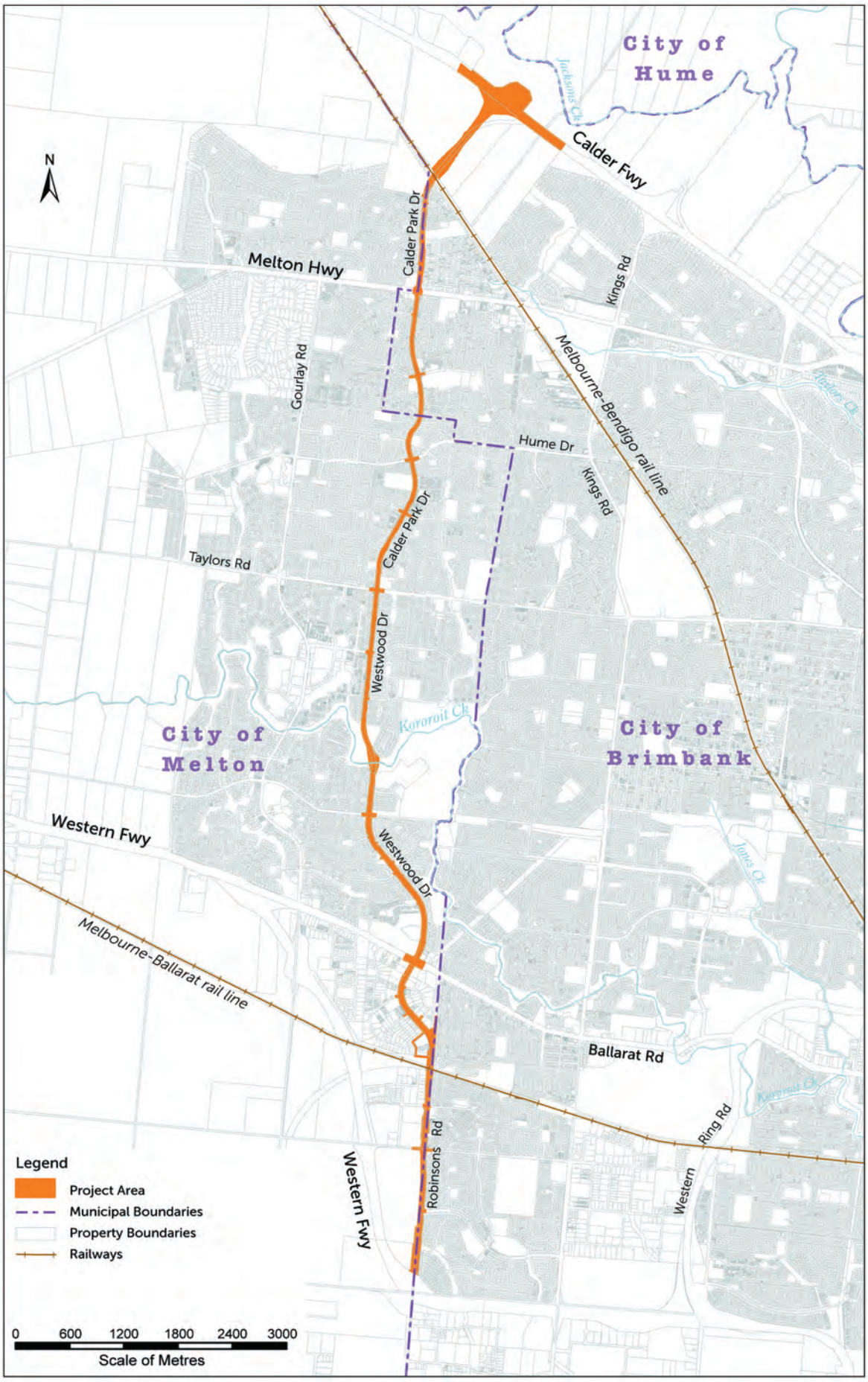


Figure 1 **Palmers Road Corridor (Western Freeway to Calder Freeway)**

Project Options

In deciding that an EES was required for the Project in 2009, the Minister for Planning required that alternative routes be considered in a preliminary report. The following alternatives have been considered as part of this EES:

- Gourlay Road Corridor to the west
- Kings Road Corridor to the east
- Palmers Road Corridor

Corridors further east or west of the three corridors were not considered as any primary arterial developed further afield would not serve this area effectively and would result in additional congestion on the three corridors.

The Kings Road and Gourlay Road Corridors are not suitable alternatives. This is due to constraints such as the limited width of the existing road reserve, the number of friction points at intersections with local streets, the location of activity centres, existing levels of local traffic and designation as part of the Principal Public Transport Network (PPTN).

The Palmers Road Corridor is a core element of the Growth Corridor Plan for Melbourne's west. The land use pattern has been designed so the Palmers Road Corridor can accommodate a six lane primary north-south arterial, with almost no direct property access.

Transport modelling shows a road connection across Kororoit Creek is critical to the arterial road network. Modelling also shows that at two and four lanes the Palmers Road Corridor will not meet the demand in the future and the six lane option provides a level of service with significantly less congestion, especially in the peak periods. With six lanes the Palmers Road Corridor will become the major north south route located between the adjacent Outer Metropolitan Ring Road and the Western Ring Road.

Project Description

The Project Area, for the purposes of the EES is shown on figure 1. The Project involves reserving a 16 kilometre long and 40-60 metres wide corridor for the future development of a continuous north south arterial road from the Western Freeway to the Calder Freeway. This corresponds with and connects the corridors of existing local roads: Robinsons Road, Westwood Drive and Calder Park Drive.

The Project will ultimately involve construction of a six-lane divided road (i.e. three-lanes in each direction), with off-road shared bicycle and pedestrian facilities on both sides of the road. Two existing railway crossings would be removed, one at the Melbourne-Bendigo rail line crossing with Calder Park Drive and another at the Melbourne-Ballarat rail line with Robinsons Road. Two bridges would be constructed over Kororoit Creek and it is also proposed to construct a raised interchange where the route connects with the Calder Freeway in the north.

The upgrade of the Palmers Road Corridor has been identified as a long term Project to be implemented in stages, with the initial Kororoit Creek bridge and Calder Freeway interchange planned to occur in the short term.

As the ultimate development is not proposed until 2046, minor changes to the alignment may occur during the detailed design stage. However, the level of detail in the existing design is considered sufficient for an assessment of potential project impacts.

Consultation

Consultation with the community has been an integral part of the planning investigations. VicRoads has undertaken consultation with relevant stakeholders, potentially affected parties, the community and organisations in order to identify and respond to their concerns.

In 2013, a Consultation Plan was prepared for the EES and the PSAs which outlines how VicRoads would consult further with and seek input from stakeholders, interest groups and the wider community on the Project. A Technical Reference Group (TRG) was established with Government stakeholders and other key agencies with meetings held in 2013 and 2014. The purpose of the TRG was to obtain specialist technical input on any issues, to review and provide advice on the consultant's reports, provide updates in relation to policy changes and identify approval/permit requirements.

Two community information days were held in June 2013 to provide an opportunity for the community, including those directly affected along the corridor, to ask questions, provide input to the EES and PSA processes and provide feedback on the route.

The community has generally been supportive of the Project. Key issues raised by the community included impacts on amenity as a result of noise, construction dust and increased traffic, impacts on access and pedestrian safety and concerns regarding the impact on the value of homes in the area. Key design changes have occurred as a result of community and stakeholder consultation.

Evaluation Framework

The *Scoping Requirements for the Palmers Road Corridor Project – Western Freeway to Calder Freeway* (Victorian Government, 2013) (EES Scoping Requirements) sets out the range of environmental, social and economic matters to be investigated and documented in the EES. The Evaluation Framework for the Project used a rating scale which is summarised in Table 1. The assessment against each of the evaluation objectives is outlined in Table 2.

Table 1 Summary of rating scale

Rating	Description
Very Well	Negligible adverse effects Applicable standards met Strong policy compliance Best practice (incl. mitigation measures)
Well	Minor adverse effects Minor exceedances at small number of locations Good policy compliance Improved practice (incl. mitigation measures)
Neutral	Moderate adverse effects Minor exceedances at a large number of locations Partial policy compliance Standard practice (incl. mitigation measures)
Poor	Moderate-Major adverse effects Major exceedances at a small number of locations Policy non-compliance Poor practice (incl. mitigation measures)
Very Poor	Major adverse effects Major exceedances at a large number of locations Major policy non-compliance Very poor practice (incl. mitigation measures)

Potential Environmental, Social and Economic Effects

Road Safety and Capacity

Transport modelling of future travel demand has demonstrated a need for the upgrade of the Palmers Road Corridor. Without the upgrade, traffic conditions on the existing road network in the Cities of Brimbank and Melton (and the surrounding wider road network) would deteriorate, thus inhibiting accessibility and mobility for local residents, visitors and the business sector.

Construction of the bridge over Kororoit Creek and the new Calder Park Drive interchange with the Calder Freeway would provide significant improvements in connecting road users within and beyond the Cities of Brimbank and Melton. The Palmers Road Corridor would become the primary north-south arterial between the Western Ring Road to the east and the proposed Outer Metropolitan Ring Road to the west. The upgrade would provide sufficient capacity to attract traffic away from adjacent corridors providing for public transport routes and would improve efficiency and reliability of services along these corridors. Surrounding residents would also experience more efficient access to the wider transport network.

A high level of safety would be achieved for users of the corridor with separated carriageways, dedicated off road cycle and pedestrian paths and controlled crossing facilities at all signalised intersections. Two level crossings with the Melbourne-Ballarat and Melbourne-Bendigo rail lines would be removed.

Amenity and Environmental Quality

For the large majority of residences along the Palmers Road Corridor, modelling of the 2-lane road (with Westwood Drive connection) to a duplicated 6-lane road in 2046, showed that the traffic noise levels potentially change by -1 to +9dB(A). With the majority of residences predicted to experience an increase of between +1 to +3 dB(A). A 3 dB(A) change in road noise is just perceptible.

Application of the VicRoads *Traffic Noise Reduction Policy* (2005) to the proposed Calder Park Drive realignment on the approach to the interchange with the Calder Freeway, found that noise levels would be less than the threshold (63 dB(A)) and therefore no noise attenuation measures are required at residences in this area. Elsewhere along the Corridor, the Policy indicates that noise attenuation would not be required.

An air quality assessment using the VicRoads Air Quality Screening Tool developed in consultation with the EPA predicted that the concentrations of key air pollutants associated with vehicle emissions are within the requirements of the State Environment Protection Policy (Air Quality Management) using the predicted traffic volumes in 2046.

Noise and air quality issues associated with construction activities will be managed through the implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996) and 'Guidelines for Noise Control - EPA Publication 1254' (EPA Victoria, 2008).

Social, Land Use and Infrastructure

The long term planning for the area has ensured that land is available to support the Project and has therefore greatly minimised the need for property acquisition. As a result, no residential dwellings would be acquired as part of the Project. However, acquisition of some small parts of vacant residential land is required. No commercial buildings will be acquired, however, some businesses along Westwood Drive would be affected by property acquisition. This would be concentrated along the western side of Westwood Drive and affect land owned by businesses such as a petrol station, warehouses, a pool store and a truck driver education centre. Land is also required from the Calder Park Motor Sports Complex (situated on the western side of Calder Park Drive) and vacant industrial land (situated on the eastern side of Calder Park Drive).

North-south connectivity in the Study area would be substantially improved for motorists, cyclists and pedestrians when the Kororoit Creek Bridge is developed. Pedestrian safety would be increased when existing roundabouts are replaced with signalised crossing points, encouraging east-west and north-south pedestrian movements. These changes would increase access and mobility for residents of the study area. The use of open courts and other less informal opportunities for east west pedestrian and cyclist movements across the corridor would become impractical over time as traffic volumes increase or when the road is widened.

Visual and Landscape Values

The Project would not impact significantly upon the Organ Pipes National Park or on the key visitor destinations in the park including the Visitors Centre, Organ Pipes, Rosette Rock and Tessellated Pavement. Potential effects would be managed through mitigation measures such as retention of remnant vegetation, planting adjacent to the Organ Pipes National Park, the use of planting to screen the interchange and other elements of the road.

The proposed bridge over Kororoit Creek and associated road infrastructure would impact on the Kororoit Creek valley and visual amenity, through the introduction of built infrastructure into a valley with natural and heritage values. These impacts can be mitigated somewhat by providing maximum open, light spaces beneath the bridge structures and planting indigenous vegetation on the embankments.

Minor acquisition of the Banchory Grove Nature Conservation Reserve is proposed and the Ravenhall Magazine and Storage Facility will be impacted. Mitigation measures include the reconstruction of the drystone wall as a paving band along the original alignment where possible. Crushed rock will be used to fill gaps within the road reserve to the Banchory Grove Nature Conservation Reserve boundary to prevent weed infestations of the grassland.

Biodiversity and Habitat

The upgrade of the Palmers Road Corridor is not expected to have a significant impact on flora or fauna species listed under the FFG and EPBC Acts. The Project would require minimal removal of native vegetation. A general offset of 2.425 Biodiversity Equivalence Units is required to compensate for the removal of 2.64 habitat hectares of native vegetation and two scattered trees. Matters of national environmental significance for this Project would be assessed via preliminary documentation through a separate process to this EES.

The Project has the potential to impact on ecological values within the Project Area, such as through the loss of vegetation/habitats, habitat fragmentation and edge effects, noise and dust pollution, increases in fauna mortality and aquatic disturbance. Impacts have been avoided and minimised on native vegetation, listed flora and fauna species and ecological communities throughout the planning and design process. The Project will be managed in accordance with a Contractor Environmental Management Plan (CEMP). Given that the Project Area has been relatively disturbed and that mitigation measures and offset requirements would be implemented, adverse impacts would be limited.

Catchment Values

Potential impacts to surface water and catchment values, identified during construction and operation of the Palmers Road Corridor include activities that affect the function and quality of waterways and flood plains, such as increased flood levels at waterway crossings and reduced water quality due to contaminants entering the waterway. These potential impacts would be managed under a CEMP.

Waterway crossings would be designed in accordance with Melbourne Water requirements (channel profile, floodplain and revegetation) and construction would be undertaken in accordance with VicRoads Environmental Risk Management Guidelines (2012) and the State Environment Protection Policy (Waters of Victoria) requirements for receiving waterways. To further protect waterways and floodplain function appropriate design standards including Water Sensitive Road Design measures would be implemented.

Cultural Heritage

There are no heritage overlays directly affecting the Project Area and no heritage places of State cultural significance (VHR listed places) within the Project Area. There are three sites listed on the Victorian Heritage Inventory within the Project Area. One of these sites no longer seems to exist (VHI7822-0188 CS-H4 Cobbled Road). Mitigation or management measures have been proposed for the Ravenhall 2 Magazine and Storage Facility (H7822-0174) Robinsons Road, Ravenhall and the Drover's Hut (H7822-0160) north of Kororoit Creek.

The Project Area includes several large areas of Aboriginal cultural heritage sensitivity. Most of the known cultural heritage is in association with waterways. The project cannot avoid impacts to Aboriginal cultural heritage due to the nature of road and bridge construction. Where harm cannot be avoided specific measures will be required. These measures are being developed through the cultural heritage management plan process in consultation with the Wurundjeri the registered Aboriginal party for the section north of the Melbourne-Bendigo rail line crossing and the Office of Aboriginal Affairs Victoria and appropriate Traditional Owners for the remainder of the Project Area.

Evaluation Objectives and Assessment

Overall, the Project can be considered as rating "Well" when taking into account the ratings for each of the draft evaluation objectives set out to guide the EES investigations. The assessment against each of the evaluation objectives is outlined in Table 2.

The Technical reports in Appendices to the EES provide more details of the investigations that resulted in the assessment against each specific EES objective. The specialist findings are summarised in chapters 8 to 14 of the EES report.

Table 2 Draft evaluation objectives and assessment

Draft Evaluation Objective	Key Technical Investigations	Rating
Road Safety and Capacity To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	Transport Modelling – Palmers Road Corridor EES (AECOM, 2015) Access Management – Palmers Road Corridor EES (AECOM, 2015)	**Very Well**
Amenity and Environmental Quality To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	Traffic Noise Assessment – Palmers Road Corridor EES (AECOM, 2015) Air Quality Assessments – Palmers Road Corridor EES (VicRoads, 2013)	**Neutral**
Social, Land Use and Infrastructure To minimise adverse social and land use effects, including impacts on existing infrastructure.	Social Impact Assessment – Palmers Road Corridor EES (AECOM, 2014)	**Well**
	Land Use Planning – Palmers Road Corridor EES (AECOM, 2014)	**Very Well**
Visual and Landscape Values To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	Landscape and Visual Impact Assessment – Palmers Road Corridor EES (Spiire, 2014)	**Well**
Biodiversity and Habitat To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.	Flora and Fauna Assessment, and Biodiversity Offset Analysis – Palmers Road Corridor EES (Ecology and Heritage Partners, 2014)	**Well**
Catchment Values To maintain the functions and values of surface water and floodplain environments.	Surface Water Memorandum – Palmers Road Corridor EES (AECOM, 2013)	**Neutral**
Cultural Heritage To avoid or minimise effects on Aboriginal and historic cultural heritage values.	Historic Archaeology and Cultural Heritage (Dr Vincent Clark & Associates, 2014)	**Well**
	Draft Cultural Heritage Management Plan (Number 12662) (Dr Vincent Clark & Associates, 2014)	**Neutral**
Overall evaluation		**Well**

Environmental Management Framework

This EES includes an Environmental Management Framework (EMF) for the Project that outlines the process and procedures proposed for managing the environment during design, construction and operation.

VicRoads would develop a Project Environment Protection Strategy (PEPS) and contract specification(s) which would incorporate environmental management measures as described in Chapter 16 of the EES report and other requirements identified through the Minister's Assessment and conditions of subsequent approvals. These documents would inform the detailed design and construction of the Project, including the development of the Contractor(s) Environmental Management Plan (EMP). The implementation of VicRoads procedures would ensure that construction activities undertaken would be consistent with the EMP.

Integrated and Sustainable Transport

The Project directly supports and delivers, a key feature of planning policies including the *Melton East Strategy Plan (GHD, 1997*), which underpins the layout and development of the land in and around the Palmers Road Corridor. The Project considers and addresses the objectives and decision making principles in the *Transport Integration Act 2010*.

The Project would deliver a safe and efficient arterial road that would improve connectivity through the west of Melbourne. The improved connectivity would benefit residents and businesses alike, attracting investment and improving the safety and amenity of activity centres.

Based on the evaluation of the assessments discussed throughout this EES, the proposed upgrade of the Palmers Road corridor is rated "well" in relation to achieving a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.

Summary

The Project would improve accessibility and mobility within and beyond the Cities of Brimbank and Melton with limited impact on private properties and amenity.

The potential amenity and environmental quality, social, landscape and visual, biodiversity and cultural heritage effects of the proposed road development would be appropriately managed through design measures and implementation of the EMF for the Project.

VicRoads would compensate affected landholders in accordance with *the Land Acquisition and Compensation Act 1986* (Vic). Native vegetation losses would be offset in accordance with current Commonwealth and State policies and a CHMP would be implemented to manage impacts to Aboriginal cultural heritage

Overall, the Project was rated as "Well" by specialist consultants, having minor adverse effects and good policy compliance.

Exhibition of EES and PSAs

The EES and supporting documentation, including the PSAs, draft CHMP and technical reports have been placed on exhibition for public comment **from 30 July to 31 August 2015** and may be examined during normal business hours at the following locations:

<table>
<tr><td>Brimbank City Council
Keilor Office
704B Old Calder Highway
Keilor, Victoria.</td><td>Brimbank City Council
Sunshine Customer Service Centre
6-18 Alexandra Avenue
Sunshine, Victoria.</td></tr>
<tr><td colspan="2">Brimbank City Council
Watergardens Service Centre
Watergardens Town Centre (Located within the Sydenham Library),
1 Station Street, Taylors Lakes, Victoria.</td></tr>
<tr><td>Melton City Council
Melton Civic Centre
232 High Street
Melton, Victoria.</td><td>Melton City Council
Caroline Springs Civic Centre / Library
193-201 Caroline Springs Boulevard
Caroline Springs, Victoria.</td></tr>
<tr><td>VicRoads
Metro North West Region
499 Ballarat Road
Sunshine, Victoria.</td><td>State Library of Victoria
328 Swanston Street
Melbourne, Victoria.</td></tr>
</table>

The amendments can also be inspected free of charge at the Department of Environment, Land, Water and Planning website at www.dtpli.vic.gov.au/publicinspection.

Obtaining and Purchasing Copies of the EES

The EES, PSAs and supporting documents can be viewed and downloaded from the VicRoads Palmers Road Corridor EES Project website at www.vicroads.vic.gov.au/planning-and-projects/melbourne-road-projects/palmers-road-corridor. Note: If you experience any problems downloading any of the exhibited documents or require assistance accessing them please contact VicRoads on the phone number or email below.

Free copies of both the EES Summary Brochure and a DVD of the complete EES Main Report and Technical Reports are available from VicRoads – email palmerscorridor@roads.vic.gov.au or call 03 8391 7126. To purchase hard copies of the EES Main Report and Technical Reports contact VicRoads by email palmerscorridor@roads.vic.gov.au or call 03 8391 7126. Hard copies of the EES Main Report and Technical Appendix can be purchased for $75 each. Contact VicRoads by email **palmerscorridor@roads.vic.gov.au or call (03) 8391 7126.**

How to Lodge a Submission

Interested persons and organisations wishing to comment on the EES and the Amendments are invited to make written submissions **by 5.00pm on 31 August 2015.**

Submissions can be made online at: **www.delwp.vic.gov.au/palmers-road-corridor-ees**.

The online submission coversheet must be completed.

Parties wishing to post in a written submission will need to contact **Planning Panels Victoria on (03) 8392 6393** to obtain a hard copy of the submission coversheet.

All submissions must state the name and address of the person making the submission. Anonymous submissions will not be considered. Submissions will be treated as public documents.

Inquiry and Panel Process

The Minister for Planning will appoint an Inquiry under the *Environment Effects Act 1978* to consider the exhibited documents and public submissions in response to it and then prepare a report for the Minister. The same persons may also be appointed as a Panel under the *Planning and Environment Act 1987*.

The Inquiry will hold a Directions Hearing on the week commencing 21 September 2015 to establish necessary arrangements and timetable for the public hearing. Public hearings are expected to begin in the week commencing 19 October 2015. Requests to be heard by the Inquiry must be received by the end of the Directions Hearing. All submitters who wish to present to the Inquiry are asked to note these arrangements and commence preparations in advance.

Information on the Inquiry process and timetable for the hearings will be published on the Internet as it becomes available – **www.dtpli.vic.gov.au/planning/panels-and-committees/current-panels-and-committees**.

1 INTRODUCTION

1.1 Background

In November 2009, the Victorian Minister for Planning (the Minister) determined under the *Environment Effects Act 1978* (Vic) (EE Act) that an Environment Effects Statement (EES) needs to be prepared by VicRoads for the Palmers Road Corridor Project - Western Freeway to Calder Freeway ('the Project'). The purpose of the EES is to provide a detailed description of the Project and its potential effects on the environment, to inform the public and stakeholders and then to enable an assessment of the project to be prepared by the Minister to inform decision-makers.

In May 2009, the Commonwealth determined that an approval would also be required under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) for potentially significant impacts on matters of national environmental significance.

Separate processes are being undertaken for other legislation, including the EPBC Act, *Planning and Environment Act 1987* (Vic) (P&E Act) and *Aboriginal Heritage Act 2006* (Vic). Details of the approval processes are included in Chapter 3 'Project Approval Requirements'.

The assessment of the Project under this EES is based on the impacts and benefits of the future construction, operation and maintenance of a six-lane arterial road.

The upgrade of the Palmers Road Corridor has been identified as a long term project to be implemented in stages, with the section of corridor between Sayers Road and the Western Freeway planned to occur in the medium term. Planning Scheme Amendments for that section have been completed.

The focus of this EES is on the assessment of environmental effects of the Palmers Road Corridor between Western Freeway and Calder Freeway.

1.2 Minister's EES decision

The Minister's decision in November 2009 to require an EES, outlined the procedures and requirements applying to its preparation, in accordance with section 8B(5) of the EE Act. These requirements included the following key matters:

i) *"Before commencing the EES process and to inform the development of scoping requirements for the EES:*

- *The proponent is to provide a preliminary report on the availability of potentially suitable alternatives for developing appropriate arterial route capacity and future road network performance in this region, either generally along the proposed stages two and three of the Palmers Road corridor or along an alternate north-south corridor.*
- *The preliminary assessment of alternatives is to consider variations to the current proposal (in terms of the alignment or part thereof and its design (e.g. in relation to its capacity, mitigation measures and so forth), as well as alternative alignments.*

ii) *The EES is to give particular attention to the investigation of potential environmental effects of the proposed arterial road development (i.e. the portion encompassed by stages two and three), and relevant alternatives (see above), including associated environmental mitigation and management measures, particularly regarding:*

- *Changes to the amenity and environmental quality of the adjacent residential areas from construction and operation, particularly due to increased noise levels;*
- *Social impacts (e.g. severance and dislocation) for residences and communities along the proposed arterial route;*
- *Effects on the landscape, visual and recreational values of areas in the vicinity of the proposed arterial road, in particular the Organ Pipes National Park;*
- *Residual impacts on biodiversity and associated native vegetation, in particular listed protected fauna and flora, and ecological communities; and*
- *Impacts on cultural heritage (Aboriginal and non-Aboriginal) within or adjacent to the proposed road."*

1.3 Relevant Alternatives

This EES documents consideration of alternative routes and the explanation of the corridor selection process for the Project. The discussion of relevant alternatives includes:

- an explanation of selection process for the proposed route;
- identification and evaluation of design and capacity alternatives;
- constraints and impacts; and
- documentation of the basis for the proposed project.

Adjacent north-south corridors between the Western and Calder Freeways – Kings Road corridor to the east and Gourlay Road corridor to the west – are not considered to be potentially suitable alternatives. This is due to constraints such as the width of the existing road reserve, the number of friction points at intersections with local streets, the location of activity centres, existing traffic volumes and designation as part of the principal public transport network.

The alternatives investigated are further outlined in Chapter 4 'Corridor Options and Assessment'.

1.4 The Proponent

The proponent for the Project is the Roads Corporation of Victoria (VicRoads). VicRoads is a statutory authority whose responsibilities are outlined in the *Transport Integration Act 2010* (Vic) and the *Road Management Act 2004* (Vic). It is one of several State Government agencies that assist the Government to achieve its integrated transport policy objectives. The VicRoads Chief Executive is accountable to the Minister for Roads and Road Safety, reporting through the Secretary of the Department of Economic Development, Jobs, Transport and Resources (DEDJTR).

VicRoads supports Victoria's liveability and economic prosperity by planning, developing and managing the arterial road network, and delivering registration and licensing services. VicRoads manages over 22,000 kilometres (km) of roads and 22 million transactions a year for 3.7 million licensed drivers and 4.9 million registered vehicles.

1.5 The Project

The Project involves development of a major north-south arterial road in the west of Melbourne between the Calder Freeway and Western Freeway.

In the short term the project involves reserving a 16km long and 40-60 metres (m) wide corridor for the future development of the arterial road in the Melton and Brimbank planning schemes, which corresponds with and connects the corridor of existing local roads: Robinsons Road, Westwood Drive and Calder Park Drive. VicRoads is not currently responsible for these roads since they are local roads managed by Brimbank or Melton City Councils.

The Project will ultimately involve construction of a six-lane divided road (i.e. three-lanes in each direction), with off-road shared bicycle and pedestrian facilities on both sides of the road. Two existing railway crossings would be removed, one at the Melbourne-Bendigo rail line crossing with Calder Park Drive and another at the Melbourne-Ballarat rail line with Robinsons Road. Two road bridges would be constructed over Kororoit Creek and it is also proposed to construct a raised interchange where the route connects with the Calder Freeway in the north.

The upgrade of the Palmers Road Corridor has been identified as a long term Project to be implemented in stages, with the initial Kororoit Creek bridge and Calder Freeway interchange planned to occur in the short term. Complete development of the arterial road would potentially result in construction by 2046. However, the corridor will be upgraded in stages as required by demand and subject to the availability of funding.

The project area, for the purposes of this EES, encompasses the road corridor between Western Freeway and Calder Freeway, as shown in Figure 1-1. The Project is described further in Chapter 5 'Project Description'.

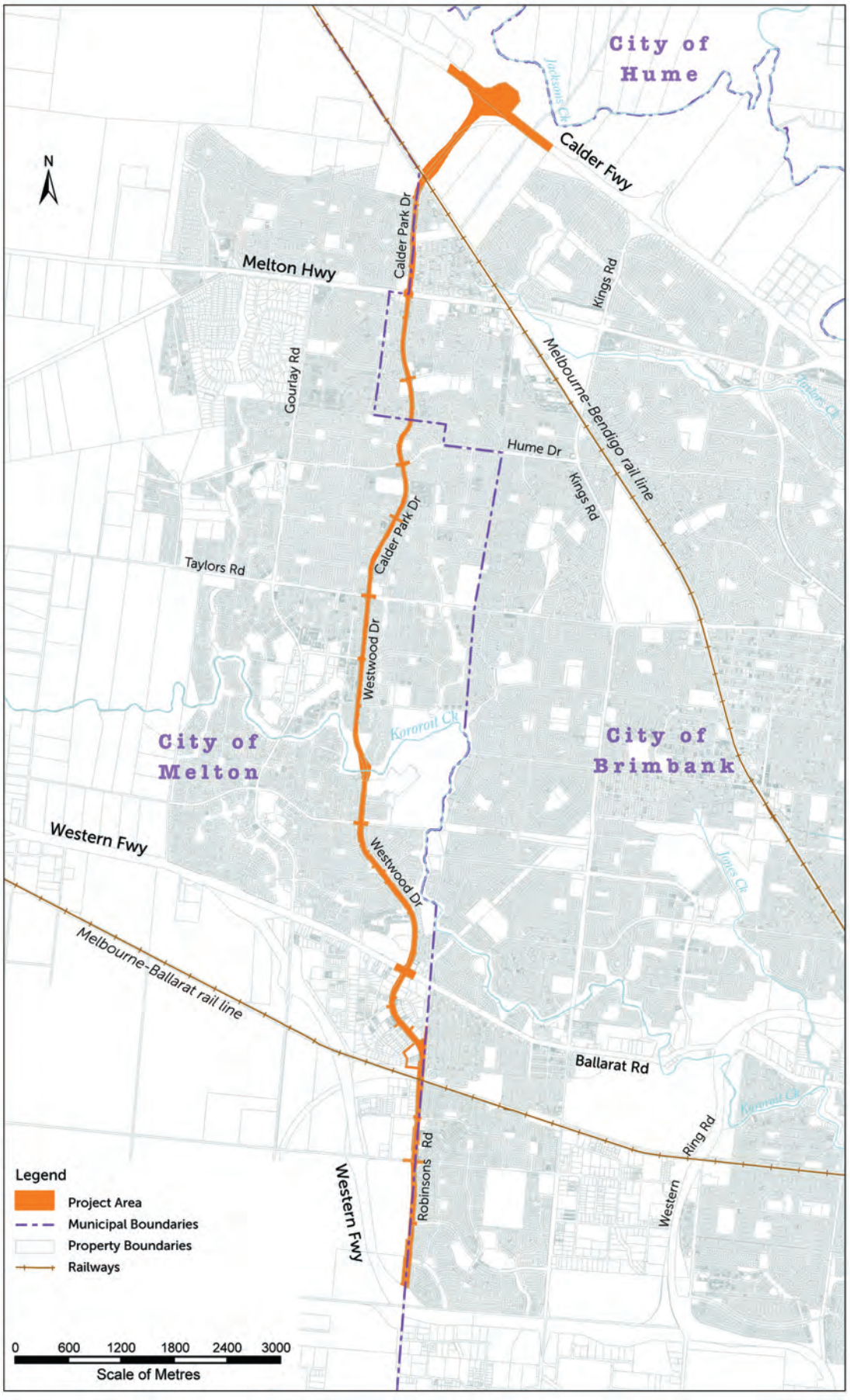


Figure 1-1 Palmers Road Corridor (Western Freeway to Calder Freeway)

1.6 Project Need

The aim of the Project is to provide a high standard north-south transport link in Melbourne's west. The western suburbs of Melbourne are experiencing significant growth in residential development and employment. This expansion places pressure on the existing road networks and must be supported by suitable transport infrastructure. The Project would provide a high level of accessibility in these areas, and will assist in the reduction of traffic through local streets and residential areas.

The Project would provide a link between the Princes Freeway, Western Highway, Melton Highway and Calder Freeway. The Palmers Road Corridor is to be progressively upgraded to an ultimate six-lane divided carriageway to meet the projected traffic volumes in a rapidly growing area in Melbourne's west.

The Project is supported by *Plan Melbourne* (Victorian Government, 2014), *Western Melbourne Transport Strategy* (Lead West, Western Transport Alliance, AECOM, 2012), *Growth Corridor Plans Managing Melbourne's Growth* (Growth Areas Authority, 2012), *Growth Area Framework Plans: Melton – Caroline Springs* (Department of Sustainability and Environment, 2006), *Melton East Strategy Plan* (GHD, 1997) and the *Outer Western Suburbs Transport Stud*y (Department of Infrastructure, 2001). These reports and plans identified Palmers Road, Robinsons Road, Westwood Drive and Calder Park Drive as future arterial roads.

This EES relates to Robinsons Road, Westwood Drive and Calder Park Drive which are currently local roads designated as future arterial roads to provide an important north-south link from the Western Freeway to the Calder Freeway. The existing roads are two-lane undivided roads. Consequently, there is a need to upgrade in the future to provide the additional capacity for these roads to function as arterial roads, and reduce the need for traffic to travel through local roads. Further information is provided in Chapter 2 'Project Rationale'.

1.7 EES Evaluation Objectives

The Draft Evaluation Objectives (refer Table 1-1) provide a framework to guide an integrated assessment of environmental effects, in accordance with the EES Scoping Requirements (DTPLI, July 2013). The objectives, together with specific assessment criteria are considered in the technical chapters in this EES.

The objectives reflect the key matters to be investigated for the EES, relevant legislation and policies, objectives and principles of ecologically sustainable development and environmental protection.

1.8 Purpose of this document

This EES has been prepared to document the potential environmental impacts of the construction and operation of the Project. It has been prepared in accordance with the EES Scoping Requirements and will be the primary document used to inform stakeholders, the community and Government about the potential benefits and impacts of the Project. The EES also documents the range of engagement activities that have been used to inform the community and stakeholders about the Project.

The Minister for Planning will consider the findings of the EES and the report of the Inquiry when making a 'Minister's Assessment' regarding the environmental acceptability of the Project.

Should the Project be approved, the EES and any subsequent documents or conditions of approval would be used to guide development of the Project. In particular, the detailed design, construction and operation of the Project would be undertaken in accordance with the specified Environmental Management Framework (EMF) and mitigation measures including any conditions of approval.

Table 1-1 Draft Evaluation Objectives & legislation

Draft Evaluation Objective	Key Legislation
Road Safety and Capacity - To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	• *Planning & Environment Act 1987* • *Road Management Act 2004*
Amenity and Environmental Quality - To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	• *Environment Protection Act 1970* • *Planning & Environment Act 1987*
Social, Land Use and Infrastructure - To minimise adverse social and land use effects, including impacts on existing infrastructure.	• *Land Acquisition & Compensation Act 1986* • *Planning & Environment Act 1987*
Visual and Landscape Values - To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	• *National Parks Act 1975 (Commonwealth)* • *Planning & Environment Act 1987*
Biodiversity and Habitat - To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy	• *Environment Protection & Biodiversity Conservation Act 1999 (Commonwealth)* • *Environment Protection Act 1970* • *Flora &Fauna Guarantee Act 1988* • *Planning & Environment Act 1987* • *Wildlife Act 1975*
Catchment Values - To maintain the functions and values of surface water and floodplain environments.	• *Planning & Environment Act 1987* • *Water Act 1989*
Cultural Heritage - To avoid or minimise effects on Aboriginal and historic cultural heritage values.	• *Aboriginal Heritage Act 2006* • *Heritage Act 1995* • *Planning & Environment Act 1987*
Environmental Management Framework - To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.	• *Aboriginal Heritage Act 2006* • *Environment Protection Act 1970* • *Planning & Environment Act 1987*
Integrated and Sustainable Transport - Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.	• *Environment Effects Act 1978* • *Environment Protection Act 1970* • *Planning & Environment Act 1987* • *Transport Integration Act 2010*

1.9 Structure of the EES

The EES Scoping Requirements provide guidance on the range of environmental matters investigated and documented in this EES. Table 1-2 summarises the structure of the EES document and the content of each chapter which is generally in accordance with the EES Scoping Requirements.

Table 1-2 Structure of the EES

Chapter No	Chapter Title	Chapter Summary
1	Introduction	Describes the Project and the proponent, and the objectives of the Project.
2	Project Rationale	Describes the rationale and policy context for the Project.
3	Project Approval Requirements	Outlines the approvals under Commonwealth and State legislation that are required for the Project to proceed.
4	Options Development and Assessment	Assesses the availability of potentially suitable alternatives for developing appropriate arterial route capacity and future road network performance.
5	Project Description	Outlines the proposed development and its components for both construction and operation.
6	Consultation	Describes the key stakeholders in the Project, the consultation undertaken in relation to the Project and the major issues identified.
7	Evaluation Framework	Sets out the method used to develop, assess and refine the Project.
8	Road Safety and Capacity	Chapters 8 to 14 describe the physical, biological, cultural, social and economic environments that the Project would operate within, the potential risks and impacts of the Project upon the existing environment and the mitigation and management measures that would be undertaken to minimise these risks and impacts. The Evaluation Framework is applied in each chapter to rate the Project against the relevant Draft Evaluation Objective.
9	Amenity and Environmental Quality	
10	Social, Land Use and Infrastructure	
11	Landscape and Visual	
12	Biodiversity and Habitat	
13	Catchment Values	
14	Cultural Heritage	
15	Integrated and Sustainable Transport	Demonstrates that the Project achieves a balance of economic, social and environmental outcomes.
16	Environmental Management Framework	Outlines the proposed environmental management system, and describes the environmental management plan that would be used in the construction and operation of the Project.
17	Conclusion	Summarises the key findings of the investigations outlined in the preceding chapters.

A number of detailed technical studies were completed to assess the potential environmental effects of the Project as identified in the EES Scoping Requirements. These reports and other supporting information are attached to the EES and are outlined in Table 1-3.

Table 1-3 EES Technical Studies

Study	Organisation	Relevant EES Chapter	Relevant EES Technical Appendix
Preliminary Assessment of Alternatives and Draft Study Program	AECOM	4	A
Transport Modelling	AECOM	8	B
Access Management	AECOM	8	C
Traffic Noise Assessment	AECOM	9	D
Air Quality Assessments	VicRoads	9	E
Social Impact Assessment	AECOM	10	F
Land Use Planning	AECOM	10	G
Landscape and Visual Impact Assessment	Spiire	11	H
Flora and Fauna Assessment and Biodiversity Offset Analysis	Ecology and Heritage Partners	12	I
Surface Water Desktop Assessment	AECOM	13	J
Desktop, Standard and Complex Assessment, Cultural Heritage Management Plan No 12662	Dr Vincent Clark & Associates	14	K
Historic Archaeology and Cultural Heritage	Dr Vincent Clark & Associates	14	L

Note that where the conditional tense is used through the EES (eg the use of the word 'would' rather than 'will'), this is in reference to the Project requiring approval before it can proceed. If the Project is approved and does proceed, all proposed management measures outlined in Chapter 16 ‘Environmental Management Framework’ would be implemented.

During the preparation of this EES, a number of changes to the names and structure of various Government departments took place. Those of most relevance to this Project include:

- Department of Economic Development, Jobs, Transport and Resources (DEDJTR) (comprising parts of the former Department of Transport, Planning and Local Infrastructure (DTPLI), and its predecessor the Department of Transport (DoT), the Department of State Development, Business and Innovation (DSDBI) and Department of Regional Development Victoria (RDV)))
- Department of Environment, Land, Water and Planning (DELWP) (comprising parts of the former Department of Transport, Planning and Local Infrastructure (DTPLI) and the Department of Environment and Primary Industries (DEPI) and the earlier Department of Planning and Community Development (DPCD) and part of Department of Sustainability and Environment (DSE))
- Commonwealth Department of the Environment (formerly known as the Department of Sustainability, Environment, Water, Populations and Communities)
- Office of Aboriginal Affairs Victoria (OAAV) part of Department of Premier and Cabinet (formerly known as Aboriginal Affairs Victoria, AAV).

Any references to these departments by their former names should be taken to apply to the new departments except where stated otherwise.

2 RATIONALE

This chapter discusses the rationale for the Project in the context of the existing and proposed urban development and transport environment, and its alignment with policy.

2.1 Project Need

2.1.1 Urban Development Context

Plan Melbourne and the Growth Corridor Plans (refer to Sections 2.2.1 and 2.2.2 respectively), set out the future development patterns for western Melbourne. These comprise concentrated employment centres south (East Werribee and industrial precincts) and east (Sunshine) of the Palmers Road Corridor and significant areas of residential development to accommodate projected population growth. The western industrial precinct is significant to the state of Victoria and is traversed by the Palmers Road Corridor. An expanded transport network throughout the growth corridor is also planned to provide optimal efficiency for the predicted transport demands. This expanded network is based on the existing transport network within already developed areas including aspects defined within the 1997 *Melton East Strategy Plan* (MESP). The MESP clearly sets out a transport network and places community facilities away from the Palmers Road Corridor which is intended to be developed over the long term as a six-lane arterial with minimal interaction with the surrounding road network. These plans are shown clearly in Figure 2-4 and Figure 2-5. Further information on the MESP is provided in Section 2.2.6.

The MESP has been embedded within the Melton Planning Scheme to ensure its place within the formal planning framework. However, while the land use intent of the MESP was implemented over time as the area was developed, development of the transport network has not kept pace.

Developing the road network as planned within the MESP is critical to ensuring it can support the transport demands of the population and industry within the area. Further, the future development identified within the Growth Corridor Plans is dependent on a structured, planned and implemented transport network across western Melbourne. An efficient transport network is critical to maintaining the viability and attractiveness of western Melbourne as a place to live and work.

2.1.2 Transport Context

The upgrade to the Palmers Road Corridor is proposed within a transport context that comprises three requirements namely, network efficiency and performance; safety; and access. These are discussed below.

Network Efficiency and Performance

Currently, the Palmers Road Corridor does not contribute to the north-south movement of vehicles between the Western Highway and Calder Freeway as Westwood Drive is incomplete, and it therefore serves predominately as two unconnected local roads. This is placing increasing pressure on Caroline Springs Boulevard to the west and the Station Road/Kings Road corridor to the east, which are both designed to provide access to community facilities and public transport. These adjacent corridors already experience relatively high levels of congestion. With traffic volumes forecast to continue growing as the industrial precinct to the south develops further, these adjacent corridors will be required to carry an increasingly unsafe mix of cars and freight vehicles.

Completion of Westwood Drive over Kororoit Creek would enable the Palmers Road Corridor to act as an arterial and attract through traffic from the adjacent corridors and the surrounding road network (refer to Chapter 8 'Road Safety and Capacity' for further information). It would provide a more efficient route for vehicles travelling longer distances, facilitating a reduction in travel time. The benefits of this would be enhanced as the corridor is progressively developed from a two-lane single carriageway to the six-lane divided carriageway as intended within the MESP (refer to Section 2.2.6 below). At two lanes, transport modelling indicates that for the morning peak in 2046 nearly 70% of the corridor will experience congestion (defined as when traffic volume exceeds 80% of the capacity of the road). With six-lanes, the corridor would carry nearly twice the amount of traffic significantly more effectively, with congestion reduced to 20%.

The improved efficiency of north-south arterial travel that the corridor would provide will significantly enhance traffic movements through the area and generate significant travel time savings. It will also reduce through traffic on local roads nearby.

Safety

As residential, commercial and industrial development continues across western Melbourne, growing transport demand and traffic volumes will put increasing pressure on the existing and established road network. This will result in greater congestion and increased safety risks. An upgrade to the Palmers Road Corridor will create additional road capacity in the area, provide a high capacity north-south arterial situated between the proposed Outer Metropolitan Ring Road (OMR) and the Western Ring Road, and attract traffic from the surrounding road network. A number of design features will manage a safety risk posed by increased traffic volumes and congestion, including:

- new interchange at Calder Freeway to improve access from Calder Park Drive;
- duplication of the carriageway manages a significant safety risk by separating opposing traffic flows;
- removal of level crossings at the Melbourne-Ballarat and Melbourne-Bendigo rail lines; and
- the provision of six-lanes will enable the corridor to carry the forecast traffic volumes, as demonstrated in Chapter 8 'Road Safety and Capacity'.

Access

The surrounding land use was developed around the planned provision of a six-lane arterial road through the area, such that the Palmers Road Corridor provides few direct access points to residences and community facilities, and has few intersecting roads. This enables the corridor to provide a high level of service for through traffic, whereas the adjacent north-south corridors that provide access to the community facilities are therefore designed for slower and shorter trips to and from community facilities.

The design standards for the proposed upgraded Corridor limits the number of, and spacing between, left-in and left-out turns and signalised intersections to maintain efficient traffic flows. Grade separated rail crossings and a new Calder Freeway intersection will also ensure high levels of accessibility whilst maintaining road safety.

Where properties do have direct access onto the Corridor, appropriate access arrangements will be provided. Access management is discussed further in Chapter 8 'Road Safety and Capacity'.

2.2 Policy Context

The proposed Project is closely aligned with, and supported by, a number of strategic planning documents. This section provides a summary of the following:

- Plan Melbourne (Victorian Government, 2014);
- Growth Corridor Plans - Managing Melbourne Growth 2012 (Growth Areas Authority (GAA), 2012);
- SmartRoads Guidelines (VicRoads, 2011);
- Western Metropolitan Transport Strategy 2012-2030 (LeadWest, Western Transport Alliance and AECOM, 2012);
- Precinct Structure Planning Guidelines (GAA, 2009) updated in 2013;
- Growth Area Framework Plans (Department of Sustainability and Environment (DSE), 2006);
- Outer Western Suburbs Transport Strategy: Framework for Transport Network Development 2001 (Department of Infrastructure (DoI), 2001); and
- Melton East Strategy Plan (GHD 1997) in Melton Planning Scheme.

2.2.1 Plan Melbourne

The Victorian Government has replaced *Melbourne 2030* with *Plan Melbourne* in May 2014 (amendment VC106), which would guide Melbourne's growth to 2050. A number of proposals in Plan Melbourne are relevant to the Project including:

- a Western Interstate Freight Terminal west of Robinsons Road;
- a new Caroline Springs railway station near the Western Freeway;
- national employment clusters in Sunshine and East Werribee;

- capacity to accommodate at least 164,000 jobs (referenced GAA, 2012); and
- future population growth estimated to be 500,000 to 650,000 people.

Plan Melbourne outlines a series of Directions which are directly supported by the proposed Palmers Road Corridor upgrade. These Directions include:

- improving access to job-rich areas across Melbourne and strengthen transport networks in existing suburbs (Direction 3.2);
- improving transport infrastructure and services in Melbourne's newer suburbs (Direction 3.3); and
- better aligning infrastructure delivery and growth (Direction 7.1).

Figure 2-1 shows the plan for the Western Subregion of Melbourne as presented within Plan Melbourne. The Palmers Road corridor is shown as a part of the higher order road network (white alignments) within the subregion. Located between the proposed Outer Metropolitan Ring Road (OMR) and Western Ring Road, it would operate as a primary north-south arterial route.

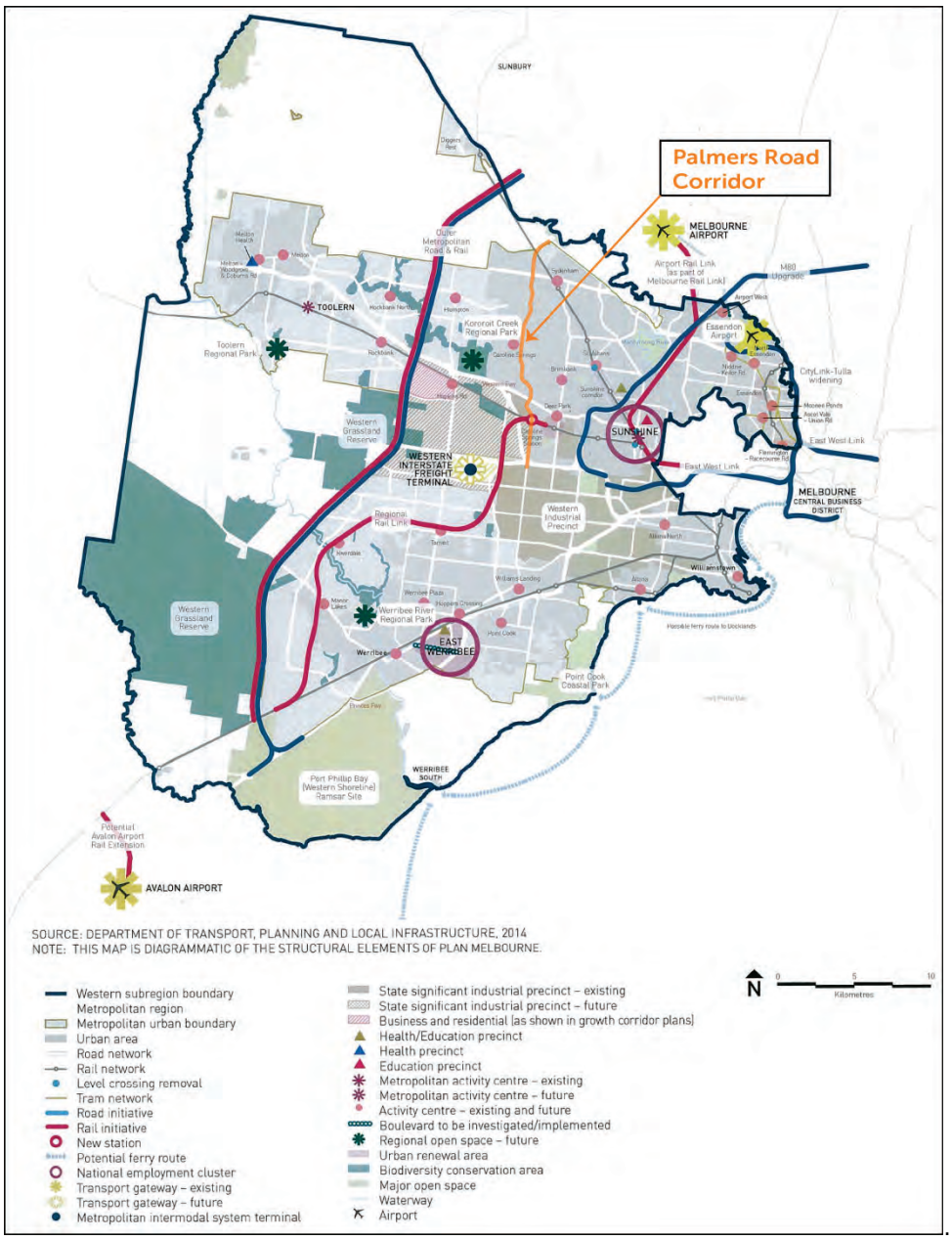


Figure 2-1 Plan Melbourne, Western Subregion (Victorian Government, 2014) with Palmers Road Corridor identified

2.2.2 Growth Corridor Plans – Managing Melbourne Growth 2012

The Metropolitan Planning Authority (MPA) (formerly the GAA) is the organisation responsible for the planning of Melbourne's growth corridors. The primary goal of the MPA is to '*develop communities in growth areas that are socially, environmentally and economically sustainable'*. The *Growth Corridor Plans – Managing Melbourne's Growth* (GAA, 2012) (the GCP) articulates strategic overarching principles for development within the growth areas. The GCP defines broad principles that are to be applied in each of the growth areas. The Palmers Road corridor lies within the West Growth Corridor.

A key principle that has been considered in the GCP is Principle 2 '*Integrate Transport and Land Use Planning*', which is crucial in '*delivering economically, socially and environmentally sustainable new communities*' (GAA 2012, p18). The GCP has developed a multi-modal transport network including a Principal Public Transport Network (PPTN), arterial road, and freight network to support communities and activity centres.

The arterial road network in the GCP has been developed with consideration to the SmartRoads hierarchy of roads, transport data and various strategies. The GCP was developed using a grid-based road network of arterial roads and PPTN routes alternating at 1.6km intervals across the West Growth Corridor, such that primary arterial routes are every second road in the grid, with an approximate spacing of 3.2km.

The Palmers Road Corridor is planned as the westernmost primary arterial in the established urban area. Located between the proposed OMR and Western Ring Road, it would operate as a primary arterial route, flanked by PPTN routes approximately 1.6km either side.

Such a network is provided within the GCP and its long term success depends on it being progressively implemented as planned, and that includes the Palmers Road corridor as a primary north-south arterial in the Western Growth Corridor.

The grid layout and prioritisation of road space within the West Growth Corridor as shown in Figure 2-2 will meet the long term accessibility goals for the transport network that underline economic development in the growth area if progressively implemented according to the GCP.

Key features of the network in the Western Growth Corridor area include the Palmers Road Corridor between Dunnings Road, Point Cook and the Calder Freeway designated as an 'arterial road'.

- The following adjacent north-south corridors are shown as part of the PPTN (north of the Western Freeway):
    - Christies Road – Caroline Springs Boulevard – Gourlay Road (the Gourlay Road corridor); and
    - Mt Derrimut Road – Station Road – Kings Road (the Kings Road corridor).

The designation of the Gourlay Road and Kings Road corridors as part of the PPTN is broadly in keeping with the GCP road network philosophy as they are generally 1.5km to 2.5km from the Palmers Road corridor. This designation builds upon and further supports the *Growth Area Framework Plans 2006* for Melton-Caroline Springs, which identifies the Gourlay Road corridor as part of the PPTN bus route and the Palmers Road corridor as an 'arterial road'. Planning in the area has been managed so that activity areas are located on the public transport routes rather than the arterial roads.

Further to the east, and east of the Sunbury rail corridor, is Sunshine Avenue, also identified in the GCP as an 'arterial road'. This is between 3.5km east of the Palmers Road corridor at the north, and more than 6.5km east where the 'arterial road' designation ends at the intersection with the Western Ring Road.

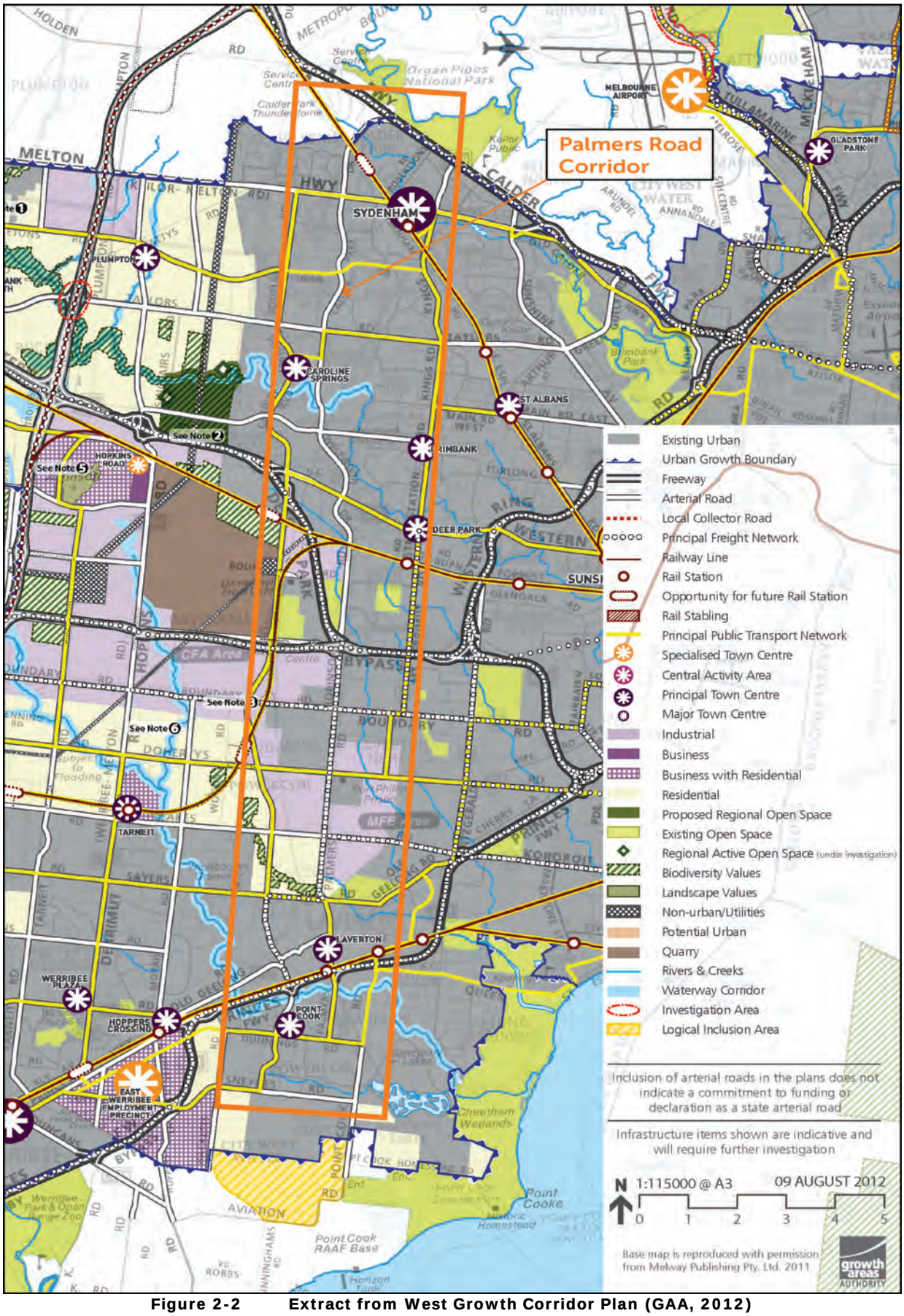


Figure 2-2 Extract from West Growth Corridor Plan (GAA, 2012)

2.2.3 VicRoads' SmartRoads Guidelines 2011

SmartRoads aims '*to provide a balance between competing interests for road space and managing congestion and safety on key arterial roads, while supporting the development of a sustainable transport system into the future'* (VicRoads, 2011, p 2). The policy gives priority to different transport modes depending on the time of day, or prioritises routes for particular modes. In relation to the proposed Project, where a route is designated as a Preferred Traffic Route, the priority and available capacity is designated to efficiently move traffic and facilitate network access.

SmartRoads includes the following key strategies for effectively managing congestion:

- reducing the overall demand for travel by ensuring that land use planning and the community objectives it embodies are coordinated with transport management policies;
- supporting and encouraging higher occupancy and sustainable travel modes;
- facilitating access and mobility for trucks on appropriate routes;
- better management of and response to incidents; and
- targeting investment in new transport links, such as in growth areas and addressing key congestion spots in built-up areas.

Closely linked to SmartRoads, VicRoads also developed Network Operating Plans with road use hierarchy maps showing priority modes within each local council area. The Melton Plan (VicRoads 2012) identifies the Palmers Road Corridor as the future 'Preferred Traffic Route'.

2.2.4 Growth Area Framework Plans 2006

The Growth Area Framework Plans (DSE, 2006) set long-term strategic planning directions in Melbourne's five growth areas: Casey-Cardinia, Hume, Melton-Caroline Springs, Whittlesea and Wyndham.

The Melton-Caroline Springs Growth Area Framework Plan outlines key aspects of the growth area, including activity centres, the urban growth boundary, areas of land supply, existing and proposed employment areas, the road network and PPTN. Robinsons Road and Westwood Drive are identified as arterial roads (refer to Figure 2-3).

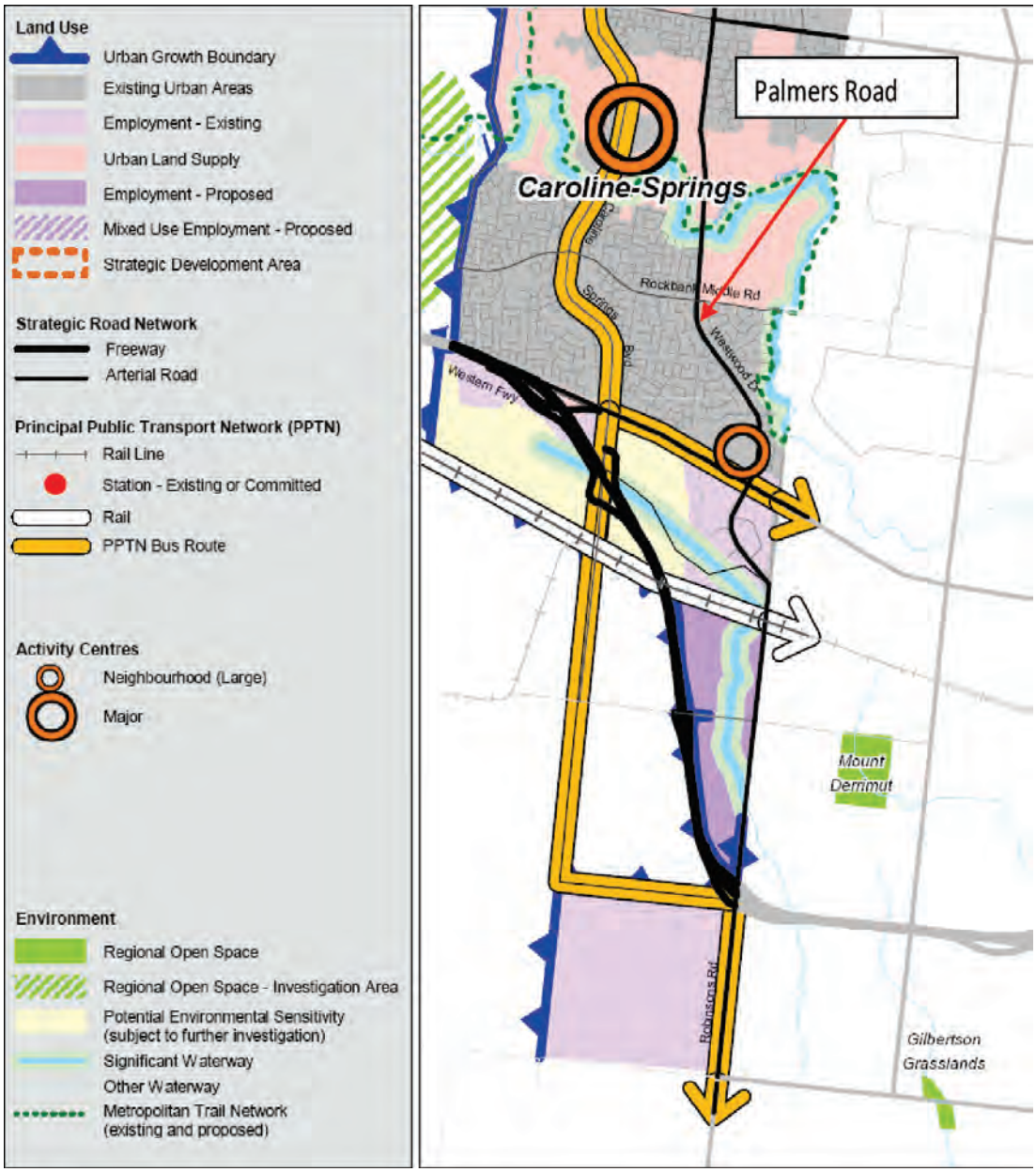


Figure 2-3 Growth Area Framework Plans (DSE, 2006) with Palmers Road Corridor identified

2.2.5 Outer Western Suburbs Transport Strategy: Framework for Transport Network Development 2001

The *Outer Western Suburbs Transport Strategy: Framework for Transport Network Development, 2001* (the OWSTS) provides an integrated transport strategy for the outer western suburbs within the municipalities of Wyndham, Melton and Brimbank. The OWSTS identifies strategic and regional scale transport projects to address the medium and long term needs of the area as development continues to increase the population and demand for the existing infrastructure.

The OWSTS has adopted '*the principles of the Melton East Strategy Plan* (GHD, 1997) *that outlined a regular pattern of north-south and east-west collector roads and arterials*' (DoI, 2001, p 29).The need to progressively widen and duplicate Calder Park Drive, as part of the Palmers Road Corridor, is identified by the OWSTS, which states that *'longer distance movements should be encouraged to utilise Calder Park Dr'* (DoI, 2001, p 29).

In relation to planning considerations and the road network, the OWSTS states that '*Calder Park Dr has been identified as the principal north-south arterial through the precinct. Beyond the medium term it will likely require a 6 lane cross-section'* (DoI, 2001, p 50).

2.2.6 Melton East Strategy Plan 1997 and Melton Planning Scheme

The MESP guides development in the Melton East area. The MESP sets out the framework '*by which council and government may participate with the private sector in the management of urban development in the area to produce a high quality of living environment for future residents, an efficient and environmentally sustainable level of public transport service and infrastructure and compatibility with its local regional and metropolitan context*' (GHD,1997).

The MESP is embedded in the planning scheme, notably in the Development Plan Overlay Schedule 1 (DPO1) and the Melton Planning Scheme in Clause 21.04-2: Melton East Growth Area, underlining its importance and credibility as a strategic planning document for the City of Melton.

Section 6 of the MESP discusses transportation within and through the area, and integration of transport services to the surrounding areas. A network of primary and secondary arterial routes was identified as follows:

- Primary arterial road network
    - Melton Highway
    - Western Freeway
    - The six lane north-south connection between Calder Park Drive and Westwood Drive [note: this is the northern extent of the Palmers Road Corridor]
- Secondary arterial routes
    - Gourlay Road, connecting Melton Highway and the Western Freeway
    - Rockbank Middle Road
    - Taylors Road
    - Hume Drive, extended west to Gourlay Road.

The primary arterial road network is clearly shown in Figure 2-4, with the Palmers Road corridor providing the north-south spine through the centre of the development. Figure 2-5 shows how this transport network has dictated the shape and land use pattern within the Melton East area by dividing the area into neighbourhoods and suburbs.

The Palmers Road Corridor is discussed within the MESP as a key strategic principle, and is referenced in the current planning scheme for the purpose of providing a six-lane north south arterial and sets out high level design principles to protect the corridor for this purpose.

Development over time has seen the implementation of the MESP and its strategic principles. While the Palmers Road Corridor has not yet been developed to its full extent as intended within the MESP, the 40m wide corridor with no direct residential access required by the MESP has been generally protected for that purpose. Where direct access does currently exist, the planned road reserve is sufficiently wide to facilitate the implementation of a limited access arterial route.

Key community infrastructure such as schools and activity centres are intentionally accessible from the secondary arterials to ensure that the designated primary arterial can be developed and used as intended within the broader regional context.

Figure 2-4 Indicative transport network (GHD, 1997) with Palmers Road Corridor identified

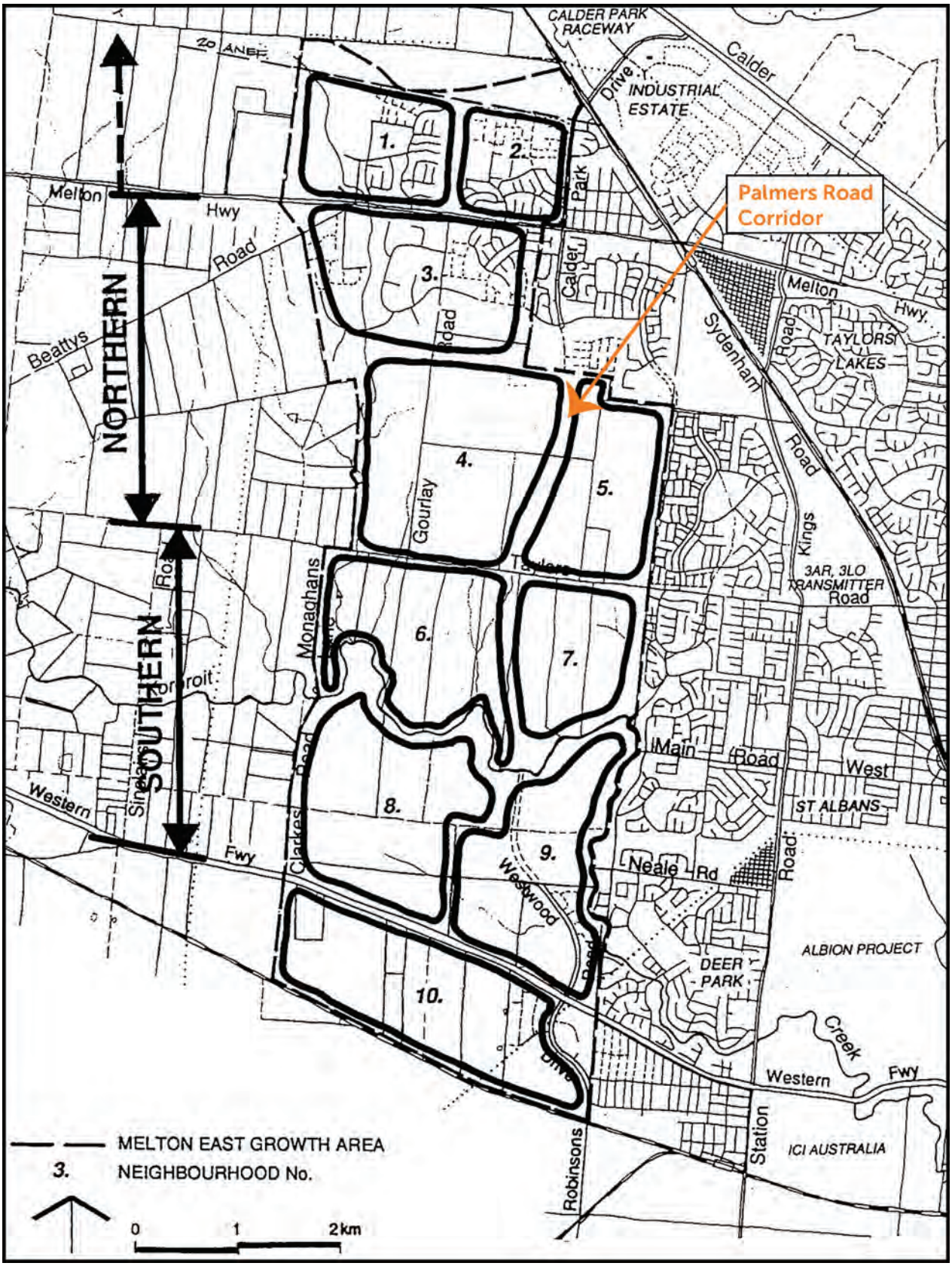


Figure 2-5 MESP neighbourhoods, suburbs and areas (GHD, 1997) with Palmers Road Corridor identified

2.2.7 Western Melbourne Transport Strategy 2012-2030

The *Western Melbourne Transport Strategy 2012-2030* has been developed by and for the western region of Melbourne. The Strategy outlines the strategic direction for the region's transport response and provides a context for the projects identified by the Western Transport Alliance and LeadWest as priorities for the region's development.

A suite of projects consistent with the strategic objectives of the Strategy have been identified in conjunction with stakeholders, with an emphasis on network-level project identification which would contribute to the development of a better integrated transport and land use system. The identified projects include growth area arterial roads including corridor upgrades such as the Palmers Road Corridor.

2.2.8 Precinct Structure Planning Guidelines 2009

The Precinct Structure Planning Guidelines, launched in 2009 and updated in 2013, provide direction to organisations responsible for developing Precinct Structure Plans (PSPs), with a series of PSP Notes detailing particular aspects of the design. The PSP Note *Our Roads: Connecting People* (GAA, 2009) sets out the network design principles and fundamental network components, including:

- primary or declared arterials
- secondary arterials
- connector streets
- local access streets.

The PSP Guidelines have a standard of arterial roads spaced at approximately 1.6km and connector streets spaced at 800 metres (m). Arterial roads at intervals of approximately 1.6m were introduced into all planning schemes in 2010 (Clause 56.06 – 4).

3 PROJECT APPROVAL REQUIREMENTS

3.1 Introduction

Separate to the Environment Effects Act process, there are a number of approvals under Commonwealth and State legislation that are required for the Project to proceed. Legislation which applies to the Project includes:

- *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) – for potential impacts on threatened species and ecological communities
- *Planning and Environment Act 1987* (Vic) – for amendments to the Brimbank and Melton Planning Schemes, including reserving land for road purposes and approval to remove native vegetation.
- *Aboriginal Heritage Act 2006* (Vic) – preparation and approval of a Cultural Heritage Management Plan (CHMP)
- *Heritage Act 1995* (Vic) – consents to disturb historical archaeology sites and/or permits to carry out works to a heritage place
- *Flora and Fauna Guarantee Act 1988* (Vic) – a licence to remove protected flora and fauna from public land
- *Wildlife Act 1975* (Vic) – permits to remove trees containing habitat or any other fauna habitat areas or fauna salvage and translocation
- *Water Act 1989* (Vic) – a licence to construct works on a waterway, and to take or use water from a waterway or groundwater
- *Road Management Act 2004* (Vic) – road opening permits to undertake road works for new roads or road closures.

Figure 3-1 shows the Project approvals pathway and the interrelationship of the EES with other statutory State approvals processes.

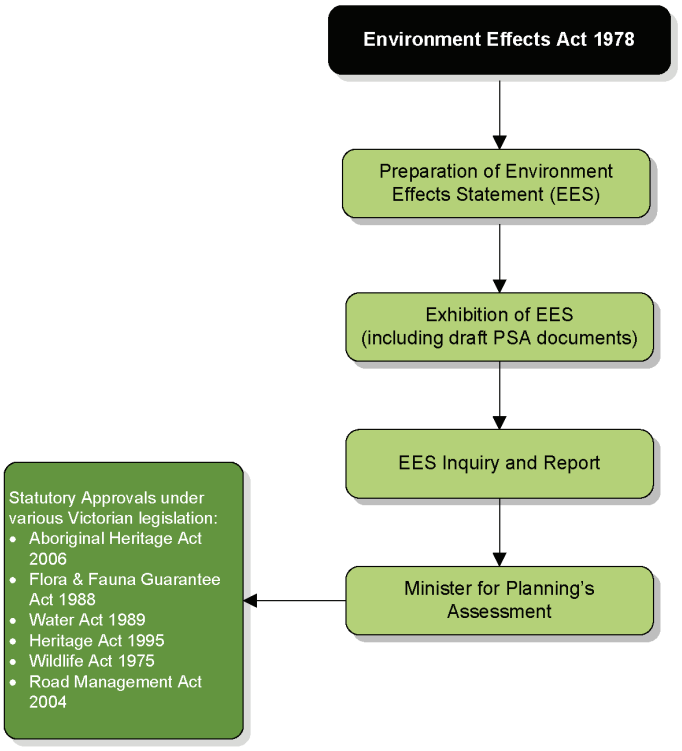


Figure 3-1 EES assessment and approvals process

3.2 Environment Effects Act 1978

The Environment Effects Act 1978 (EE Act) provides for the assessment of projects that are capable of having a significant effect on the environment. The EE Act does this by enabling the Victorian Minister for Planning (the Minister) to decide whether an EES should be prepared for a Project.

The Ministerial Guidelines for Assessment of Environmental Effects under the EE Act (DSE, 2006) specify criteria under which a project must be referred to the Minister for Planning for a decision on the need for an EES.

As the Project met several of these referral criteria, a referral for the Project was submitted to the Minister. A decision was made by the Minister on 13 November 2009, requiring VicRoads to prepare an EES under the EE Act for the section of the Palmers Road Corridor between the Western Freeway and the Calder Freeway.

The EES Scoping requirements (DTPLI, 2013) set out the environmental matters that are to be investigated and documented in the EES. The draft EES Scoping Requirements for the Project were placed on public exhibition in June 2013 and then issued by the Minister for Planning in July, 2013.

While VicRoads is responsible for preparing the EES, including organising technical studies and undertaking stakeholder consultation, DTPLI provided guidance on the EES process, including the adequacy of the EES documentation. The key steps of the EES process for the Project are outlined in Figure 3-2.

As part of preparation of the EES and PSA documentation, a range of consultation activities have occurred, which have provided opportunity for informal public comment.

Feedback from the community and stakeholders will be received as part of the public exhibition process and VicRoads will respond to any submissions received at this time with clarification or further information as required.

Following exhibition of the EES, submissions will be referred to an Inquiry, which will review the EES and submissions, conduct a public hearing, and provide a report to the Minister for Planning. The Inquiry will prepare its report in accordance with its Terms of Reference.

The EES process concludes with the Minister's Assessment of the environmental effects of the Project, which determines whether these effects are acceptable. The Assessment is then issued to the relevant statutory decision-makers to inform approval decisions on the Project. The Minister's recommendations are required to be considered by the relevant decision-makers, but do not constitute a statutory approval in its own right. While the Minister's assessment provides recommendations and is authoritative advice, it is not binding on decision-makers.

Further information on the EES process can be found on the DTPLI website at www.dpcd.vic.gov.au/planning/environment-assessment/environment-assessment-process-in-victoria2

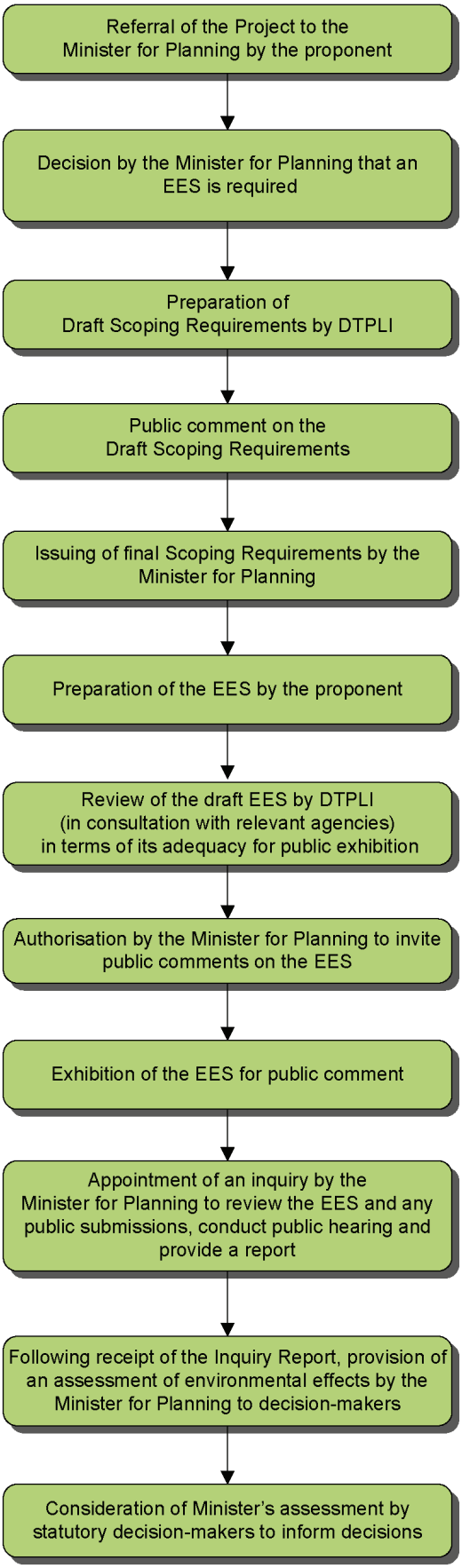


Figure 3-2 Key steps of the EES process

3.3 Commonwealth Approval Requirements

3.3.1 Environment Protection and Biodiversity Conservation Act 1999

The Project was referred to the Commonwealth Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) by VicRoads. Assessment under the EPBC Act for this project is a separate process to assessment via the statutory EES process, as required by the State of Victoria.

On 22 May 2009, the delegate for the Minister for Sustainability, Environment, Water, Population and Communities (now the Minister for the Environment), determined the Project to be a controlled action that requires assessment and approval under the EPBC Act.

The relevant controlling provision for the Project under the EPBC Act is threatened species and ecological communities (Sections 18 and 18A). The Project is to be assessed via preliminary documentation by the Commonwealth Minister for the Environment. The EPBC process is shown in Figure 3-3 and Figure 3-4. Matters relevant to the EPBC Act are specifically considered within Chapter 12 'Biodiversity and Habitat'.

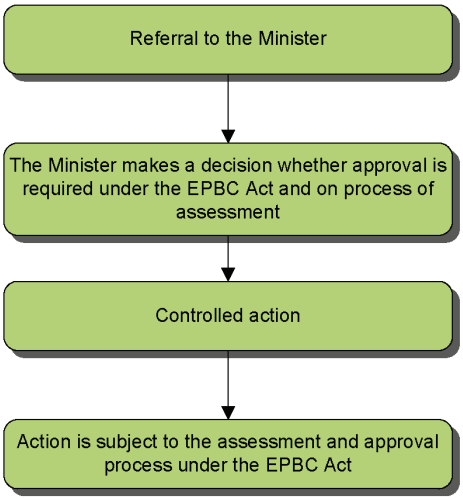


Figure 3-3 EPBC referral process

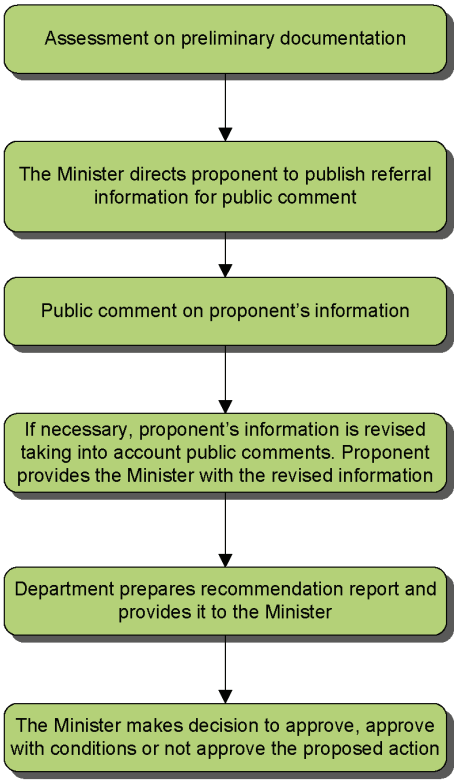


Figure 3-4 EPBC assessment process

3.4 Victorian Approval Requirements

3.4.1 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) establishes a framework for planning the use, development and protection of land in Victoria in the present and long-term interest of all Victorians.

The P&E Act provides for planning control through the establishment of planning schemes. A planning scheme is a statutory document which sets out objectives, policies and provisions relating to the use, development, protection and conservation of land in the area to which it applies. A planning scheme regulates the use and development of land through planning provisions designed to achieve those objectives and policies. The Project is located within the Brimbank and the Melton City Councils and the Brimbank Planning Scheme and the Melton Planning Scheme are the applicable planning schemes for the Project.

The Planning Scheme Amendments (PSAs) to the Brimbank and Melton Planning Schemes are included in Volume 2 of the EES. The exhibition of the PSAs with the EES, provides the opportunity for persons to understand the changes to planning and land use that the Project would require and provide formal comment on the PSAs.

In addition to reserving the land for the road upgrade via application of a Public Acquisition Overlay (PAO), it is proposed that the PSAs provide an exemption from all other planning permit requirements for the

Project. This will include any permit requirements for road construction and associated activities, and removal, destruction or lopping of vegetation. Further detail regarding the form and content of the PSAs can be found within the amendment documentation in Volume 2 of the EES.

VicRoads received approval from the Minister to prepare the amendments to the Brimbank and Melton Planning Schemes for the Project under the P&E Act.

A summary of the proposed PSA process for the Project is provided in Figure 3-5.

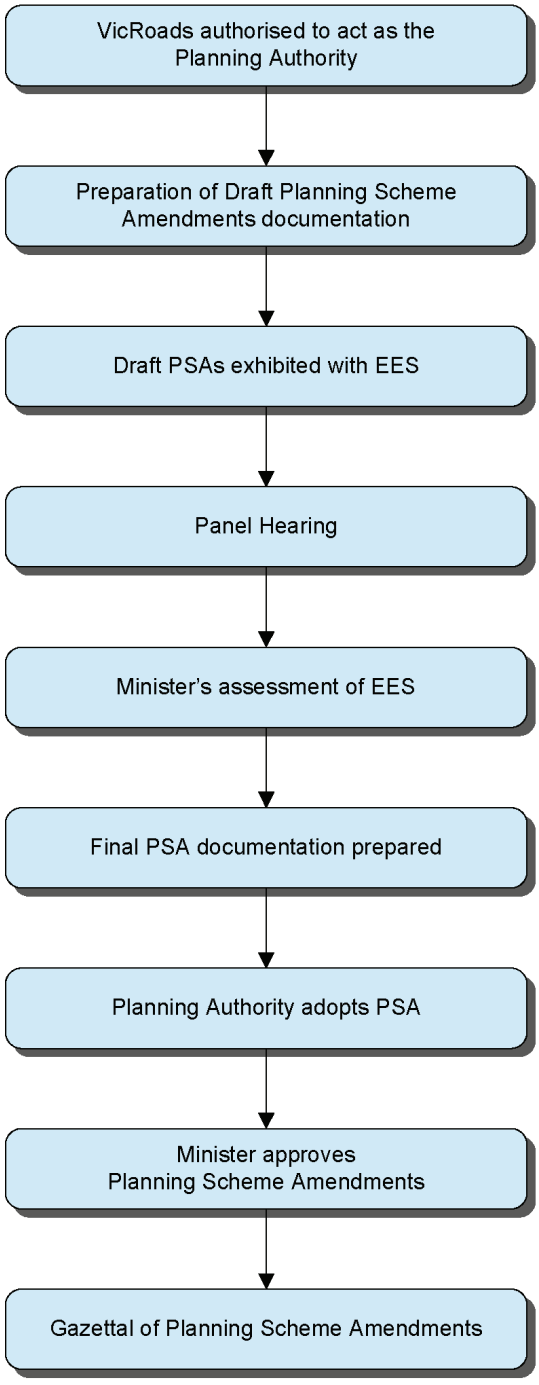


Figure 3-5 Planning Scheme Amendment process

3.4.2 Aboriginal Heritage Act 2006

The *Aboriginal Heritage Act 2006* (AH Act) and associated regulations require the preparation of a CHMP for activities which are defined as High Impact Activities (activities which cause significant ground disturbance) and are within an Area of Cultural Heritage Sensitivity. Under Section 49 of the AH Act, a CHMP must be prepared prior to commencing works for any project for which an EES has been required.

Under the AH Act, Registered Aboriginal Parties (RAPs) are the cultural heritage decision-makers for a designated area and are determined by the Aboriginal Heritage Council. For the Calder Park Drive section (north of the Bendigo railway line), the Wurundjeri Tribe Land Cultural Heritage Council is the RAP. There is no RAP for the section south of the Bendigo railway line to the Western Freeway.

The *Environmental Effects Advisory Note: Aboriginal cultural heritage and the environment effects process* (DPCD, 2007) allows for a draft CHMP for the Project to be prepared in conjunction with the EES and assessed after the Minister for Planning makes the Assessment of the Project's environmental effects. This enables the details of a CHMP to be considered and resolved, in the broader context of other environmental, social and economic issues.

A desktop, standard and complex assessment (as required by the Aboriginal Heritage Regulations) has been prepared and this assessment is included in the EES Technical Appendix L. The CHMP will be submitted to the Wurundjeri and OAAV for evaluation and approval. Figure 3-6 outlines the CHMP process.

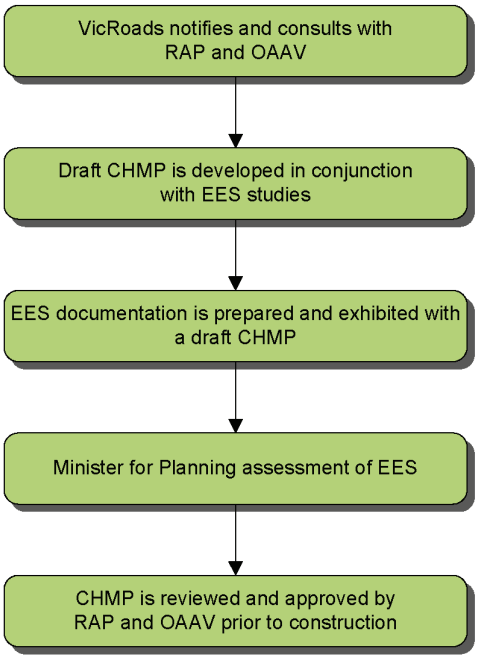


Figure 3-6 Cultural Heritage Management Plan process

3.5 Other Approvals

There are other approvals required for the Project which would not be considered until after the Minister for Planning has released his assessment of the Project's environmental effects. All other statutory approvals required for the Project would be obtained by VicRoads or the contractor under the relevant applicable legislation closer to the construction date. As outlined previously, these include approvals, consents, and licences under:

- *Flora and Fauna Guarantee Act 1988*
- *Water Act 1988*
- *Heritage Act 1995*
- *Wildlife Act 1975.*

3.5.1 Flora and Fauna Guarantee Act 1988

The FFG Act is the main piece of Victorian legislation for the protection of threatened species and communities and for the management of potentially threatening developments. Under the FFG Act, a permit is required from the DELWP for the removal of listed flora species that are members of listed communities or protected flora where this occurs on public land. A permit under the FFG Act would be required to remove any areas of listed ecological community or protected/listed plants. A permit would be required for the Project for the removal or temporary holding of any listed fish species.

3.5.2 Water Act 1989

The *Water Act 1989* defines water rights and establishes the instruments for managing Victoria's water resources. The Project will require consent to undertake works over Kororoit creek and near waterways under the Water Act. VicRoads is required to submit an application to Melbourne Water and receive a permit to work, before any works for the Project are commenced near waterways.

3.5.3 Heritage Act 1995

The purpose of the *Heritage Act 1995* is to provide for the protection and conservation of places and objects of cultural heritage significance and the registration of such places and objects. There are two levels of protection for cultural heritage places:

- the Victorian Heritage Register (VHR), which is a register for cultural heritage places of State significance; and
- the Victorian Heritage Inventory (VHI), which is an inventory of archaeological sites (of varying significance).

Under the Act, it is an offence to damage or disturb unregistered archaeological places or objects, registered places or objects without consent and the discovery of archaeological places or objects must be reported. Consent to disturb historical archaeology sites and/or permits to carry out works to a heritage place are required for the project.

3.5.4 Wildlife Act 1975

The *Wildlife Act 1975* is the primary legislation in Victoria providing for protection and management of wildlife. The Act requires people engaged in wildlife research (e.g. fauna surveys, salvage and translocation activities) to obtain a permit under the Act to ensure that these activities are undertaken in a manner consistent with the appropriate controls. Should fauna salvage be required for the Project the ecological consultant will have to hold a management authority for the proposed actions under the Wildlife Act.

4 CORRIDOR OPTIONS AND ASSESSMENT

In deciding that an EES was required for the upgrade of the Palmers Road Corridor between the Western Freeway and the Calder Freeway, the Minister for Planning required that:

"Before commencing the EES process and to inform the development of scoping requirements for the EES:

- *The proponent is to provide a preliminary report on the availability of potentially suitable alternatives for developing appropriate arterial route capacity and future road network performance in this region, either generally along the proposed stages two and three[1] of the Palmers Road corridor or along an alternate north-south corridor.*
- *The preliminary assessment of alternatives is to consider variations to the current proposal (in terms of the alignment or part thereof and its design (e.g. in relation to its capacity, mitigation measures and so forth), as well as alternative alignments"* (Victorian Government, 2013).

The development and assessment of alternative corridors in addition to the Palmers Road Corridor and alternative arterial route capacity for the Palmers Road Corridor are discussed in this chapter.

Information presented in this chapter draws on the following technical specialist reports, which have been prepared to document the potential impacts on the Project:

- Preliminary Assessment of Alternatives and Draft Study Program: Palmers Road Corridor (Western Freeway to Calder Freeway) (AECOM 2013)
- Palmers Road Corridor Western Freeway to Calder Freeway Transport Modelling Report (AECOM 2015)

4.1 Corridor Options Considered

The upgrade of the Palmers Road Corridor has been identified as a long term project to be implemented in stages, with the section of the corridor south of the Western Freeway planned to occur in the medium term. A Planning Scheme Amendment for that section has been completed, and the approvals necessary to reserve the land are in place.

As such, alternative corridors south of the Western Freeway have not been considered as this would make redundant the work completed to date, in particular, the design interaction with the Williams Landing Station, and direct connectivity between the Calder Freeway and the Point Cook area.

North of the Western Freeway, the section of the corridor relevant to this EES, the following corridor options were considered (shown in Figure 4-1):

- Palmers Road Corridor;
- Gourlay Road Corridor to the west; and
- Kings Road Corridor to the east.

The latter two corridors are named in reference to the northern most road in each corridor.

These three corridors were investigated as each is used for north-south travel through the area. However, they differ in their strategic intent and surrounding land use pattern, such that each corridor has been developed to serve a different purpose.

Corridors further east or west have not been considered. If a primary arterial were developed further afield it would not serve this area effectively and would result in additional congestion on these corridors.

A high level summary of the land use, traffic and social considerations is presented in the following section, based on key planning documentation, and discussions with stakeholders conducted during the preparation of the Preliminary Assessment of Alternatives and Draft Study Program (AECOM 2013).

[1] Stages two and three refers to the section from Western Freeway to Calder Freeway.

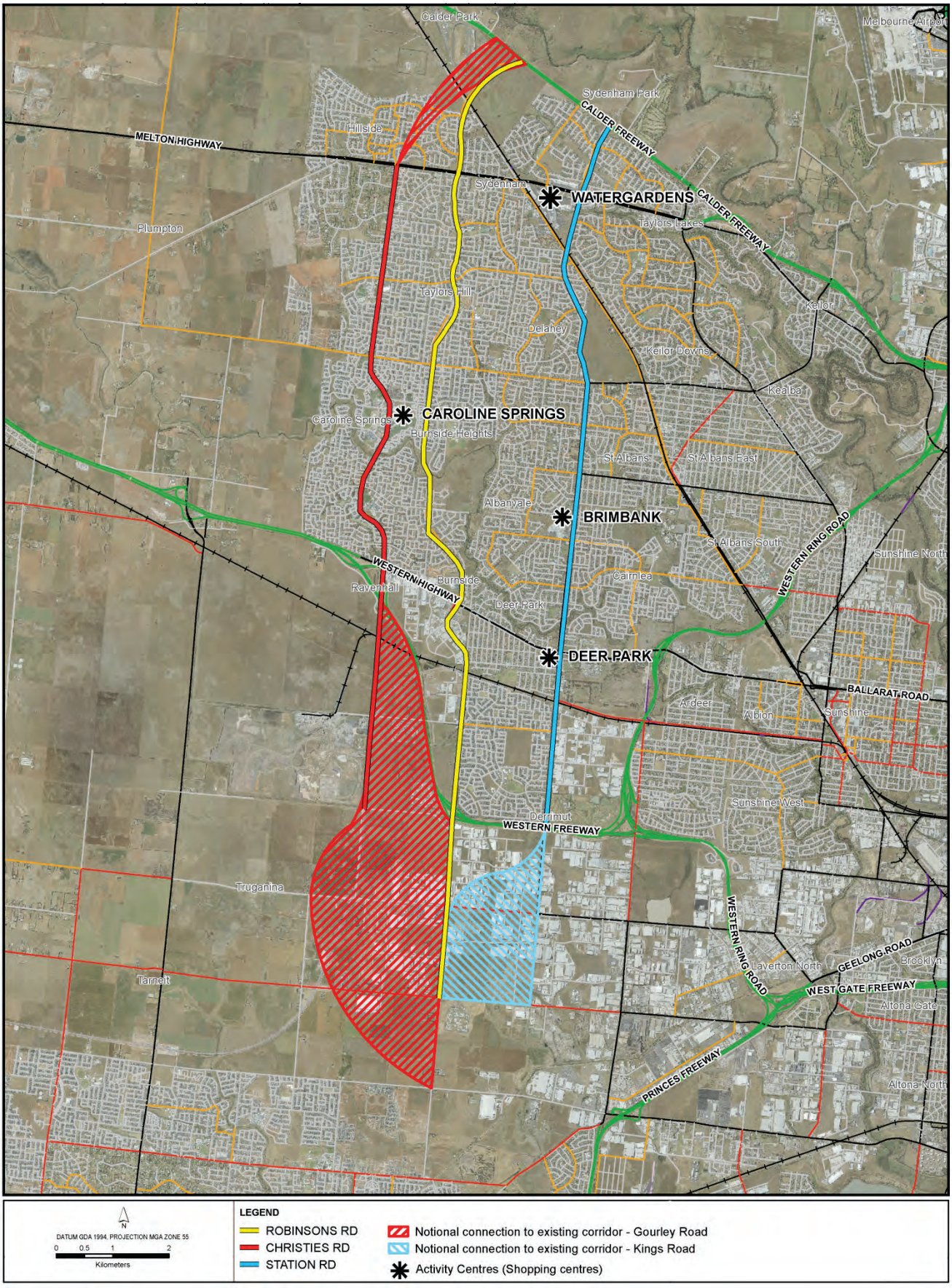


Figure 4-1 North-south corridor options

4.2 Palmers Road Corridor

The Growth Corridor Plans (GCP) establishes a grid pattern of alternating arterial and public transport routes at 1.6km intervals based on the SmartRoads framework. The grid pattern assists with the prioritisation of conflicting transport demands onto routes designated arterial or Principal Public Transport Network (PPTN) and is consistent with the Melton East Strategy Plan (MESP), which designates the Palmers Road Corridor as a primary arterial route.

As the surrounding land has been planned and developed for the ultimate Palmers Road Corridor to be a primary arterial road, the properties adjacent to the corridor generally do not access the road directly.

4.2.1 Existing conditions

The MESP and growth area plans have dictated a land use pattern around a primary six-lane dual carriageway arterial. The corridor has been progressively established to service the demand of the developing residential areas, and currently comprises a single carriageway with one lane in each direction.

The only section that has not yet been constructed is the crossing of Kororoit Creek at Westwood Drive. This section extends for a length of approximately 650m. Once completed, this would create a continuous road corridor with few 'friction points' between the upgrade south of the Western Freeway and the Calder Freeway, and would commence carrying through traffic that currently utilises the Gourlay Road or Kings Road Corridors.

4.2.2 Upgrade to primary arterial

Land use

The 40m wide road reserve has been protected within the residential areas to ensure that a six-lane arterial can be developed progressively to meet demand. Activity centres and community facilities have been located away from this corridor and the residential areas are designed with no direct access from the arterial. Where existing direct access occurs, the corridor is of sufficient width to facilitate the implementation of a limited access arterial road.

Traffic

Following completion of the bridge over Kororoit Creek, the Palmers Road Corridor would relieve 'through traffic' pressure off the two adjacent parallel routes. The Palmers Road Corridor has been planned to serve the function of an arterial route with the adjacent parallel routes better serving local traffic and public transport.

Social

Prior to any development within the area, the MESP designated the Palmers Road Corridor as a six-lane arterial road. Information regarding the Development Plan Overlay that applied to the MESP area was available to residents purchasing land in the newly formed subdivisions. This information made reference to the MESP, alerting residents to the future proposed function of this route, and the limited access and crossing opportunities at specified locations.

A Social Impact Assessment was undertaken in 2009, and updated in 2014 for this EES. The Social Impact Assessment identified that although amenity impacts, mainly related to traffic noise, may be experienced along the direct corridor, the easing of congestion issues along the Gourlay Road and Kings Road Corridors would result in a net social benefit for the area.

4.3 Gourlay Road Corridor

4.3.1 Existing conditions

Caroline Springs Boulevard and Gourlay Road have been designed as secondary arterials within the broader transport network in accordance with the MESP. This corridor is the spine of the Caroline Springs residential development and provides both direct access to the Caroline Springs activity centre and community infrastructure including schools. The corridor is part of the PPTN, linking Caroline Springs to Watergardens via Gourlay Road and the Melton Highway and is also seen as a future public transport corridor linking residences to the proposed Caroline Springs railway station. The corridor has been designed and developed to distribute traffic onto collector roads and into the residential areas.

The opportunities and constraints of the Gourlay Road Corridor, in terms of road safety, access and mobility, transport efficiency and environmental considerations, are presented in Table 4-1 at the end of this Chapter.

4.3.2 Upgrade to primary arterial

A high level summary of the land use, traffic and social implications of upgrading the Gourlay Road Corridor to a primary arterial is presented below.

Land use

The majority of the corridor is four lanes, and while the Gourlay Road section may be able to accommodate six lanes, Caroline Springs Boulevard is a 34m wide road reserve, which is narrower than the 40m required for a primary arterial. The corridor also directly serves activity centres and community facilities (including schools), which have been purposefully placed on this secondary arterial designed to carry local traffic and public transport to these centres.

In the north, the Gourlay Road ends at a T-intersection, further north of which is the suburb of Hillside, part of which has been developed in the past 3-5 years. In the south, Christies Road would require a link to the southern upgrade of the Palmers Road Corridor around numerous constraints including the Western Freeway, the Melbourne Remand Centre and Dame Phyllis Frost Centre, the Regional Rail Link corridor, the Boral Quarry and land zoned Industrial 2 earmarked for future development.

Traffic

In 2013, the Gourlay Road section of the corridor was carrying approximately 24,000 vehicles per day (vpd), and has recently been duplicated to cope with demand. As a secondary arterial with a design capacity of up to 40,000 vpd, there is insufficient spare capacity to accommodate more than 40,000 vpd that is required by a primary arterial.

The addition of arterial traffic, coupled with this existing volume of short trip local traffic would be expected to significantly congest the area, particularly with the number of 'friction points' primarily within Caroline Springs at the roundabout intersections with collector roads.

Social

The social impacts of developing the Gourlay Road corridor would be greatest within Caroline Springs, where Caroline Springs Boulevard may require widening and therefore acquisition of a significant number of residential and commercial properties. In addition, direct access to a number of properties would decrease the efficiency of the arterial.

Caroline Springs Boulevard is characterised by local traffic, a high number of 'friction points', some direct access points, and activity centres including schools. The volume of freight traffic required to use this road would have significant amenity and safety impacts in a corridor not designed to accommodate such traffic, especially in areas of high pedestrian movements.

A direct and efficient connection to the Calder Freeway would require the acquisition of a significant number of dwellings through Hillside. In addition, options to connect to the freeway through Hillside are restricted by existing land uses including Cana Catholic Primary School, the Sunbury rail corridor, an SP Ausnet terminal station, the Calder Park Motor Sports Complex, railway stabling and maintenance yards, and the proposed OMR. A diamond interchange may also intersect land within the boundary of the Organ Pipes National Park. If the existing right-angle turns were retained in this area, primary arterial traffic would congest Melton Highway and reduce the efficiency of both the north-south and east-west arterials.

4.4 Kings Road Corridor

4.4.1 Existing conditions

The Kings Road Corridor has been designed as a secondary arterial within the broader transport network in accordance with the MESP. This corridor serves the residential areas of Cairnlea, St Albans, Albanvale, Kings Park, Delahey, Taylors Lakes and Sydenham providing both direct access to a number of commercial activity centres and community infrastructure. The corridor is part of the PPTN and is also seen as a future public transport corridor linking residences to the Deer Park Station, which will experience a significant uplift in use following the proposed electrification of the rail corridor.

The opportunities and constraints of the Kings Road Corridor, in terms of road safety, access and mobility, transport efficiency and environmental considerations, are presented in Table 4-1 at the end of this Chapter.

4.4.2 Upgrade to primary arterial

A high level summary of the land use, traffic and social implications of upgrading the Kings Road Corridor to a primary arterial is presented below.

Land use

The direct access to residential areas and presence of commercial centres such as Watergardens, Delahey Village and Brimbank Central Shopping Centre would impact on the safe and efficient movement of the arterial road users. The direct connectivity of this corridor to these activity centres underlines its importance in the PPTN, and it is seen as the future public transport corridor linking Watergardens, residential areas and a proposed Deer Park rail station which, if the Ballarat line is electrified at least to Caroline Springs, would create an opportunity for a significant increase in accessibility to central Melbourne.

There is sufficient land within the majority of the road reserve to potentially accommodate a six-lane dual carriageway, except for a narrow section of Station Road. A link across to the southern upgrade of the Palmers Road Corridor would be required. This link would be significantly constrained by the West Park Industrial Estate (which is partially established) and a Melbourne Water retarding basin.

Traffic

Demand on Station Road in particular has increased significantly with the recent development of Cairnlea. As large sections of the corridor are already six-lanes, it is unlikely that this corridor can accommodate the uplift in demand commensurate with designation as a primary arterial, over and above the local traffic movements.

Social

Significant social and business impacts would arise from widening Station Road between Tilburn Road and Ballarat Road. This would require the acquisition of a number of residential and commercial properties along an 800m section of Station Road, of which approximately half would directly impact the potential heritage significance of the Orica site.

The designation of the Kings Road Corridor as a primary arterial would create safety and amenity impacts along a corridor not designed for that purpose, particularly within activity centres which have high volumes of pedestrian traffic.

4.5 Summary of Corridor Options

Palmers Road Corridor

There has been more than 15 years of land use and strategic growth area planning that has and continues to shape development in western Melbourne. Each major plan has adopted the principles of the previous plan or strategy, which all identify the Palmers Road Corridor as the primary arterial.

The Palmers Road Corridor has provision for and is intended to ultimately carry more than 40,000 vpd, which would otherwise be required to share the Kings or Gourlay Road Corridors with a higher proportion of short trip local traffic. Both these corridors are already intended and designed, within the broad network, to carry 12,000 to 40,000 vpd.

Gourlay Road Corridor

At a local level, it would be highly undesirable and inappropriate to develop the Gourlay Road Corridor as the primary arterial due to indirect access to the Calder Freeway, the high impact and cost of acquiring residential properties, and freight traffic heading south from the freeway to the industrial sites mixing with local traffic.

Due to the narrow road reserve through Caroline Springs, the ‘friction points’ at the intersections and existing capacity constraints on Gourlay Road, and the loss of industrial zoned land south of the Western Freeway, this option is not considered to represent a suitable alternative to the Palmers Road Corridor. Furthermore, significant safety and amenity impacts would arise from the increase in traffic.

Kings Road Corridor

The potentially significant and avoidable cost arising from the property acquisition required to widen and upgrade Station Road, the social (and potentially) heritage impact of that acquisition, the existing volume of traffic along the corridor, and the presence of activity centres and areas of residential development along the corridor all contribute to this option not representing a suitable alternative to the Palmers Road Corridor. Furthermore, a link across to the southern section of the Palmers Road Corridor would require acquisition and displacement of industrial properties from land designated within the GCP as a significant employment centre to underpin economic development in the growth corridor.

Table 4-1 Summary of project alternatives against project objectives

Project Objective	Palmers Road Corridor	Gourlay Road Corridor	Kings Road Corridor
Road Safety • Provide an ultimate facility that promotes the reduction of crashes	• Separates arterial traffic from local traffic and activity centres • Activity centres located away from the corridor	• Mixing of arterial traffic and local traffic potentially reduces road safety • Activity centres developed on corridor generates low speed destination traffic	• Mixing of arterial traffic and local traffic potentially reduces road safety • Activity centres developed on corridor generates low speed destination traffic
Access and Mobility • Provide an ultimate facility that caters for future growth • Provide an ultimate facility that promotes bicycle and pedestrian travel	• Provides capacity for 40,000+ vpd • Eases congestion on existing PPTN • Corridor generally wide enough for typical primary arterial cross section • Cross section allows adequate bicycle facilities to be incorporated into design	• Existing traffic volumes reaching capacity associated with secondary arterials • Congestion on PPTN will increase over time • 34m width in the corridor is inadequate for a primary arterial • Reserve already narrow and large sections require retrofitting of bicycle facilities	• Existing traffic volumes reaching capacity associated with secondary arterials • Congestion on PPTN will increase over time • Narrow width of a section of Station Road would require acquisition of residences. • Large sections require retrofitting of bicycle facilities
Transport Efficiency • Provide an ultimate facility that caters for predicted long term traffic volumes • Provide an ultimate facility that caters for long term public transport needs • Provide an ultimate facility that caters for commercial access to industrial and employment precincts	• Provides capacity for vpd40,000+ vehicles per day • Eases congestion on existing PPTN • Separates arterial traffic from local traffic • Limited connectivity to local roads incorporated into neighbourhood design • Corridor already earmarked as primary arterial	• Existing traffic volumes reaching capacity associated with secondary arterials • Current inefficient connectivity to the Calder Freeway • No existing connection to the southern section of the Palmers Road corridor upgrade • High number of 'friction points', particularly on Caroline Springs Boulevard • Corridor already designated on PPTN	• Existing traffic volumes reaching capacity associated with secondary arterials • No current connection to the Princes Freeway • Current inefficient connectivity to the southern section of the Palmers Road Corridor upgrade • High number of 'friction points', particularly at activity centres • Corridor already designated PPTN

Project Objective	Palmers Road Corridor	Gourlay Road Corridor	Kings Road Corridor
Environment • Minimise impact on the natural and built environment and retain significant conservation areas	• Minor changes to access for small number of properties • Potential amenity impacts due to traffic noise • Environmental impacts largely understood. Potential ecology and heritage impacts • No physical impact to Organ Pipes National Park	• Impacts likely on the built environment if efficient connection is constructed to the Calder Freeway • Social impacts likely with upgrading Caroline Springs Boulevard • Acquisition of residences likely with potential widening of Caroline Springs Boulevard • Impacts on the natural environment currently unknown. • Potential impact to Organ Pipes National Park if a new diamond interchange is constructed at a location other than that for Palmers Rd	• Impacts likely on the built environment in linking to the southern section of the Palmers Road Corridor upgrade. • Acquisition of residences and or industrial buildings likely with widening Station Road. • Impacts on the natural environment currently unknown. • No impact to Organ Pipes National Park

4.6 Alternative Arterial Route Capacity Palmers Road Corridor

Transport modelling of the Palmers Road Corridor between the Western Freeway and the Calder Freeway provided data to determine whether there was a need to upgrade Palmer Road Corridor to a two, four or a six lane arterial road. The 2046 traffic model was used to test the following four alternative network assumptions for the Palmers Road Corridor:

- Base Case (two lanes from the Western Freeway to the Calder Freeway with no bridge across the Kororoit Creek);
- Two lanes from the Western Freeway to the Calder Freeway;
- Four lanes from the Western Freeway to the Calder Freeway; and
- Six lanes from the Western Freeway to the Calder Freeway (the entire corridor).

Traffic Volumes

Under the future Base Case with a two lane road on the Palmers Road Corridor with no bridge crossing at Kororoit Creek, forecast traffic volumes for the year 2046 are relatively low when compared to the alternative north south routes of Kings Road and the northern extension of Hopkins Road. The Palmers Road Corridor carries approximately half the traffic of these other two roads.

The traffic volumes and network performance for the four scenarios were then compared against each other. Figure 4-2 shows a summary of the modelled traffic for the four scenarios at the location with the highest daily volumes (just south of Taylors Road). This indicates that upgrading the Palmers Road Corridor to four (or six) lanes enables more travel in the corridor at both the AM peak and daily level.

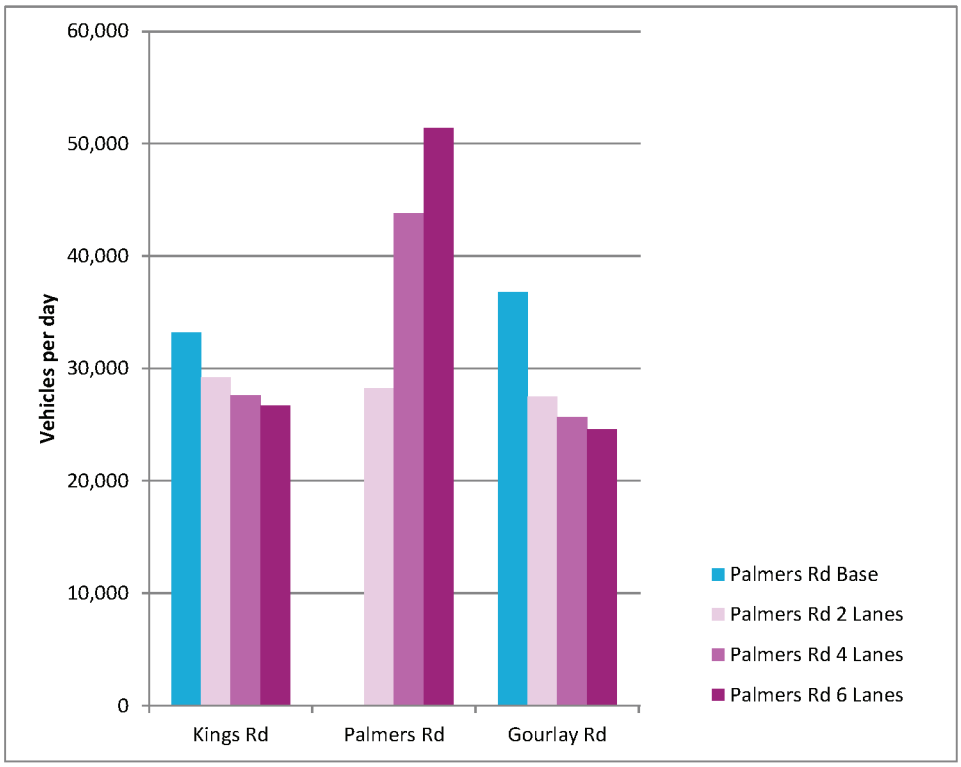


Figure 4-2 Change in Traffic on Palmers Road Corridor and Adjacent Routes

Traffic Impacts of the Palmers Road Corridor

The Palmers Road Corridor becomes more attractive as capacity is increased, and therefore reduces traffic on adjacent routes. This increases the level of service of the adjacent routes both in terms of reduced travel times and increased reliability. Modelling of travel in the AM peak indicates that at two and four lanes, the Palmers Road Corridor is operating over capacity at 68% and 55% of the time respectively. The percentage of all kilometres travelled in congested conditions decreases substantially when the Palmers Road Corridor is increased to six lanes.

Table 4-2 Percentage of peak direction travel in congested conditions (VCR>0.8)

Congested travel	
2 lanes	68%
4 lanes	55%
6 lanes	20%

Summary

Analysis of the traffic model outputs indicates that introducing the bridge increases traffic on the Palmers Road Corridor, upgrading the road from two lanes to four lanes improves the network performance and allows for an increase in traffic volumes on the road. Upgrading from four to six lanes provides a further increase in network performance while allowing even greater volumes of traffic. Analysis of travel in the AM peak indicates that at two and four lanes, the Palmers Road corridor is operating over capacity. The percentage of all kilometres travelled in congested conditions decreases substantially when increasing from four to six lanes. Palmers Road also reduces traffic and increases speeds on nearby adjacent routes.

4.7 Conclusion

The Palmers Road Corridor is a core element of the GCP for Melbourne's west. The land use pattern in the Melton East area has been designed to accommodate a 6 lane primary north-south arterial along the Palmers Road Corridor, including fewer intersections with feeder roads into the residential areas, almost no direct property access, and no community facilities or activity centres on the corridor.

The Kings Road and Gourlay Road Corridors are not considered to be potentially suitable alternatives. This is due to constraints such as the width of the existing road reserve, the number of 'friction points' at intersections with local streets, the location of activity centres, existing levels of local traffic and designation as part of the PPTN. Furthermore, Palmers Road Corridor as the primary arterial underpins the road network as set out in the GCP for Melbourne's west, which is designed to create an efficient transport network to facilitate the sustainable economic development within the growth corridor.

Modelling shows a road connection across Kororoit Creek is critical to the arterial road network. Modelling also shows at two and four lanes the Palmers Road Corridor is over capacity and the six lane option provides a level of service with significantly less congestion in the peak period. With six lanes the Palmers Road Corridor will become the major north south route located between the OMR and the Western Ring Road.

5 PROJECT DESCRIPTION

5.1 Project Overview

The Project involves development of a major north-south arterial road in the west of Melbourne, between the Calder Freeway and Western Freeway.

In the short term, the project involves reserving a 16 km long and 40-60m wide corridor for the future development of the arterial road in the Melton and Brimbank planning schemes. This corresponds with and connects the corridors of existing local roads: Robinsons Road, Westwood Drive and Calder Park Drive.

The Project will ultimately involve construction of a six-lane divided road (i.e. three-lanes in each direction), with off-road shared bicycle and pedestrian facilities on both sides of the road. Two existing railway crossings would be removed, one at the Melbourne-Bendigo rail line crossing with Calder Park Drive and another at the Melbourne-Ballarat rail line with Robinsons Road. Two new bridges would be constructed over Kororoit Creek and it is also proposed to construct a raised interchange where the route connects with the Calder Freeway in the north.

The Project Area, for the purposes of the EES, encompasses the road corridor between the Western Freeway and Calder Freeway, as shown in Figure 5-1.

The upgrade of the Palmers Road Corridor has been identified as a long term Project to be implemented in stages, with the initial Kororoit Creek bridge and Calder Freeway interchange planned to occur in the short term. Complete development of the arterial road would potentially result in construction by 2046.

As ultimate development is not proposed until 2046, minor changes to the alignment may occur during the detailed design stage. However, the level of detail in the existing design is considered sufficient for an assessment of potential project impacts. In addition, the footprint of the Project is not expected to change due to the physical constraints in the corridor.

5.2 Staging

The staging of the Project is dependent on government priorities and available funding, therefore timing has not been determined. However, securing a Public Acquisition Overlay (PAO) in the short term across the land needed for the ultimate development of the corridor will provide certainty that road authorities (Council or VicRoads) are able to progress the works when further road capacity is needed.

It is envisaged that the Project would be developed in stages to respond to the incremental increase in transport demand. The staging and timing may comprise the project elements provided in Table 5-1. The actual staging and timing of these stages would depend on a range of factors including the pace of development, population growth in western Melbourne and availability of funding.

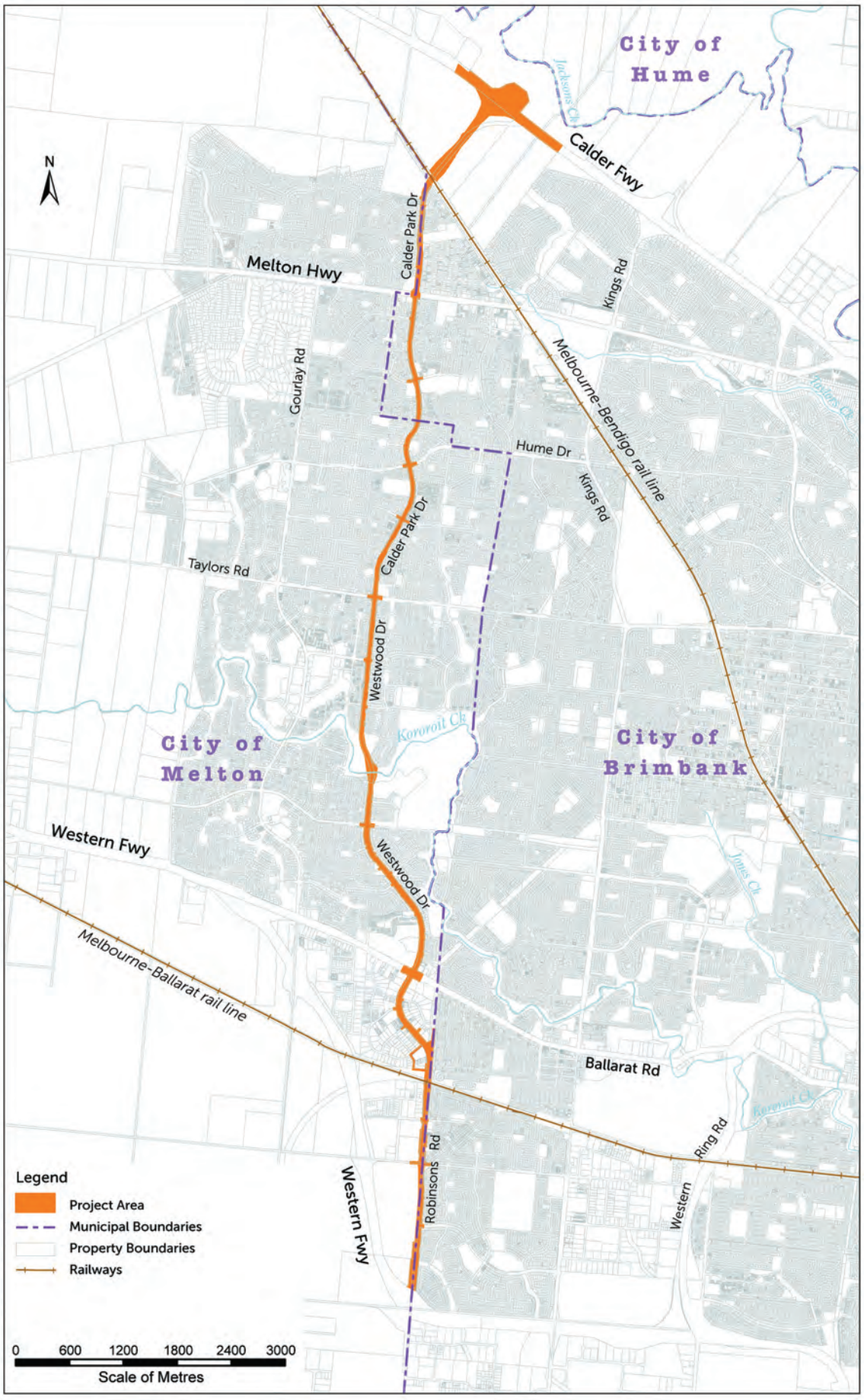


Figure 5-1 Proposed Palmers Road Corridor Western Freeway to Calder Freeway

Table 5-1 Potential Project Staging

Project Stage	Responsible Authority	Time period
Kororoit Creek Bridge Construction of 780m of two-lane road and the initial three-lane bridge over Kororoit Creek. This will create a fully connected two-lane corridor. Construction is likely to commence soon after planning approval is attained.	Melton City Council	Short term
Calder Freeway Interchange Development of the Calder Freeway grade separated interchange within the short term. A submission for funding will be made to Infrastructure Australia and the allocation of funding will be based on Commonwealth Government priorities.	VicRoads	Short term
Minor Upgrade Works Conduct of minor upgrade works along the corridor	Melton and Brimbank City Councils	Short and medium term
Lane Upgrade Upgrade of the existing two-lane carriageway to four-lanes	VicRoads and Melton and Brimbank City Councils	Medium to long term
Full Lane Upgrades Ultimate upgrade to a six-lane corridor.	VicRoads	Long term

5.3 Road Reserve Boundary

A footprint or Right of Way (ROW) has been defined for the Project, which is the potential area of direct impact for the ultimate upgrade.

The ROW includes the following areas:

- Existing and future road reserve;
- Intersections, medians and shared paths ;
- Service and access roads;
- Clear zones; and
- Construction buffers beyond the clear zone, which have been included to accommodate the potential need for widened batter slopes, provision of drainage and relocated services.

5.4 Route Alignment

Western Freeway to the Melbourne – Ballarat Rail Line

Key features:

- Route commencement under the Western Freeway;
- Upgraded signalised T-intersection at Windsor Boulevard;
- Upgraded signalised intersections at Foleys Road – Riding Boundary Road
- Orbis Drive – Hatchlands Drive; and
- Robinson Road underpass with Melbourne – Ballarat Rail Bridge (at grade).

Melbourne – Ballarat Rail Line to Kororoit Creek

Key features:

- Access treatments at Quinn Street and Fuller Road (south intersection);
- Signalised T-intersection at Waigani Avenue (south intersection);
- Signalised T-intersection at Vanessa Drive;
- Access treatment at Fuller Road (north intersection) and Waigani Avenue;
- Upgraded signalised intersection at Western Highway (Ballarat Road);
- Access treatments at Wenden Court, Elliot Court, Burnside shopping centre (south entry), Landy Court, Torowatta Place, Nicol Avenue, Rose Street and Billungah Place;
- Signalised T-intersection Burnside shopping centre (north entry)
- Signalised T-intersection at Kellys Avenue;
- Access treatments at Carinya Boulevard, Roycroft Avenue, Tarcoola Drive and Earlington Boulevard;
- Signalised intersection at Rockbank Middle Road; and
- Access treatments at Fairweather Drive, Lexington Dr and Fydler Avenue.

Kororoit Creek to Taylors Road

Key features:

- Construction of a bridge of approximately 70m over Kororoit Creek;
- Signalised T-intersection at Tenterfield Drive;
- Upgraded signalised intersection at Commercial Road-Inglewood Drive; and
- Signalised intersection at Taylors Road;

Taylors Road to Community Hub

Key features:

- Access treatment at Wells Avenue;
- Signalised intersections at George Street-Loddon Drive and Hume Drive; and
- Access treatments at Taylors Hill Boulevard, Contursi Drive and Allenby Road.

Community Hub to the Melbourne-Bendigo Rail Line

Key features:

- Signalised intersection at Community Hub;
- Access treatments at Meade Way and Catherine Drive;
- Upgraded signalised intersection at Melton Highway;
- Access treatments at Erskine Way, Glenbruar Drive (south intersection) and Manchester Drive (south intersection);
- Signalised intersection at Glenbruar Drive – Manchester Drive; and
- Elevated grade separation over Melbourne – Bendigo Rail Line.

Melbourne-Bendigo Rail Line to Calder Freeway Interchange

Key features:

- Signalised T-intersection into the Calder Park Motor Sports complex;
- Grade separated diamond interchange at Calder Park Drive - Calder Freeway; and
- Access treatments Thompson Road/Organ Pipes National Park

5.5 Design development

An initial design was developed and this underwent several alterations before the project design was used as the basis for impact assessment and development of mitigation measures and consultation activities with key government stakeholders, local councils and the public. The initial design incorporated the following design features that minimised impacts:

- There are cultural heritage sites within the Calder Park interchange project area. The impact on these sites has been minimised by positioning the interchange to avoid these areas where possible.
- The design of the rail grade separation of the Bendigo rail crossings has been designed with retaining walls on the south side to avoid residential areas and to reduce the impact on the Banchory Grove grasslands reserve.
- The Ballarat rail grade separation goes under the rail lines as this significantly reduces the impact on surrounding residential and commercial properties.

5.6 Refinements to the Proposed Alignment

The alignment has been refined throughout the detailed investigations conducted prior and during the EES assessment process. Significant changes made to the design include the Calder Freeway interchange with Calder Park Drive, traffic islands removed at the intersections of Community Hub Drive, Hume Drive and increased capacity into the Calder Park Motor Sports complex

Table 5-2 Design Changes that have occurred as a result of community consultation and further investigations

Location of Design Change	Design Change	Reason for the Design Change
Hume Drive and Calder Park Drive intersection	Removal of left-hand turn traffic island on the south/west corner of the intersection	The removal of this traffic island removes the impact on two residential buildings.
Intersection of Community Hub Drive and Calder Park Drive	Removal of three left-hand turn traffic islands at this intersection.	This intersection abuts Copperfield Secondary College and concerns were raised that the traffic islands would not be large enough to hold the number of pedestrians from the abutting school.
Calder Park Drive and Calder Freeway interchange	Roundabout replaced with traffic lights on the south side of Calder Freeway and further detail developed for access into the Calder Motor Sports complex.	The revised freeway interchange on the south side of the Calder Freeway provides increased traffic capacity, increased traffic control, is more compatible with the Calder Park Motorsports complex and proposed industrial park and has reduced land acquisition when compared to the previous design.
Intersection into Calder Park Motor sports complex from Calder Park Drive	Signalised T-intersection into the Calder Park Motor Sports Complex upgraded from 4 lanes to 6 lanes by adding an additional right turn lane out and an additional right turn lane in.	To add additional entering and exiting capacity to the Calder Park Motor Sports complex as a result of consultation and further specialist studies.
Intersection into Calder Park Motor sports complex from Calder Park Drive	Signalised T-intersection into the Calder Park Motor Sports Complex upgraded from 6 lanes to 7 lanes by adding an additional left turn lane out.	To add additional exiting capacity to the Calder Park Motor Sports complex as a result of consultation and further specialist studies.
Bendigo rail grade separation access track abutting Banchory Grove reserve	Reduce access track width from 8m to 5.5m abutting the grassland reserve Construct an access track to the fence boundary	Reduce area of acquisition of the grassland reserve. Protect the grassland reserve from invasive weeds.

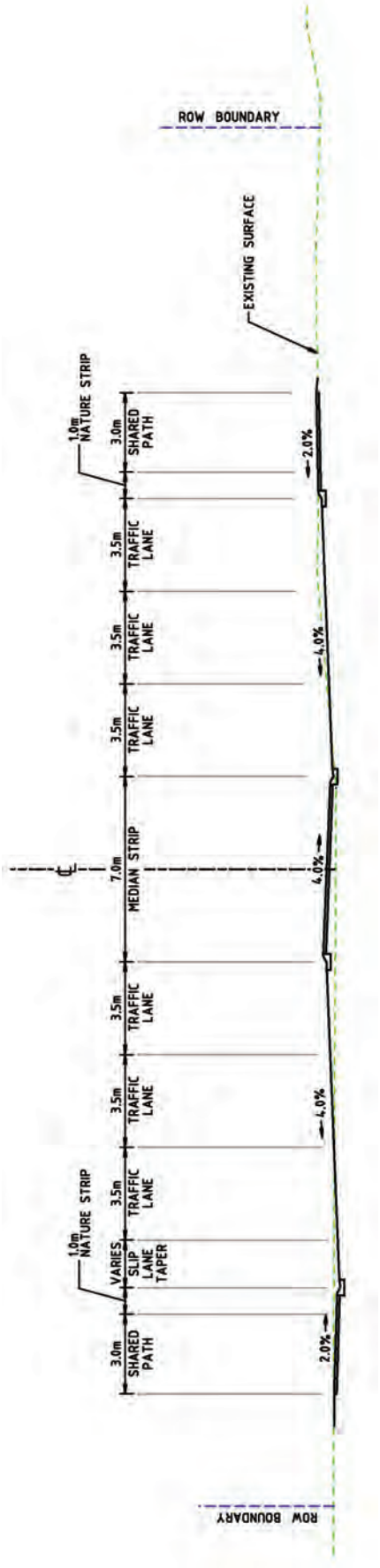


Figure 5-2 **Typical cross-section without service roads**

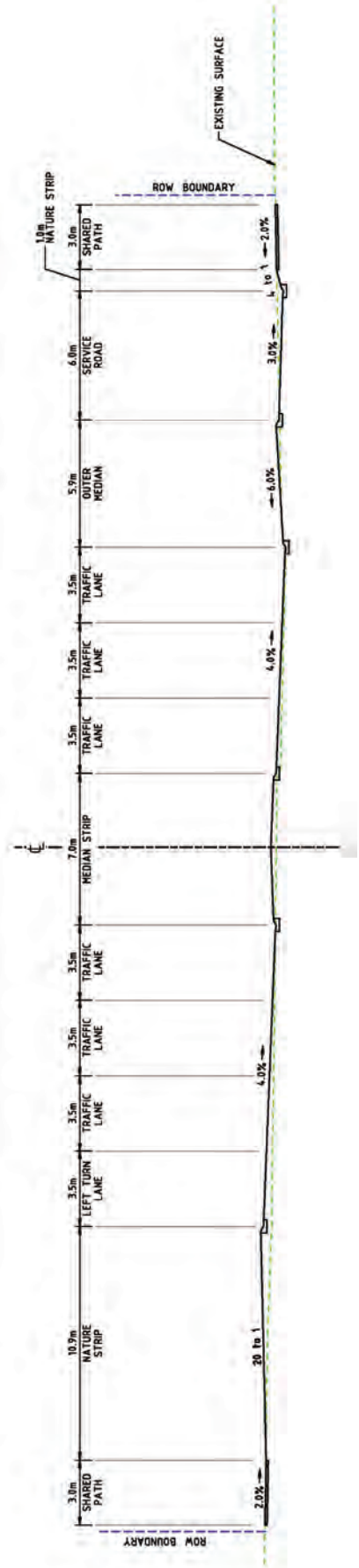


Figure 5-3 **Typical cross-section with service road**

5.7 Typical Cross-Sections

The upgrade would involve the ultimate construction of a six-lane divided road (i.e. three-lanes in each direction). Each lane would be 3.5m wide, with off-road shared 3m bicycle and pedestrian path on both sides of the road. The central median would typically be 7m.

The design of the upgrade varies along the length of the route depending on abutting land use and constraints. The varying cross sections provide for an off road shared use path and services lanes where properties are directly abutting the corridor to allow access to the upgraded road.

Typical cross-sections of the corridor are provided in Figure 5-2 and Figure 5-3 to illustrate the different configurations for the future upgrade of the corridor.

5.8 Design Guidelines and Key Design Parameters

In July 2010, VicRoads adopted the AustRoads Guide to Road Design series, as modified by VicRoads supplements. The design standards used for the Project are based on these standards.

Posted Speed Limits

The corridor has been designed to 80 kilometers per hour (km/h), and would have a posted (signed) speed limit of 80km/h.

Design for Vehicle Movements

Intersections and turning movements for the upgrade of the corridor have been designed in consideration of surrounding land uses to cater for vehicle types anticipated to use the new primary arterial road. The Calder Freeway and Western Freeway interchanges have been designed for 19 m semi-trailer turning movements. The design vehicle turning movements for other significant intersections are summarised in Table 5-3.

Road Network Access

The proposed corridor provides for safe property access to the road network in accordance with AustRoads guidelines Part 5, Category 2A and Category 2B.

Both category 2A and 2B provide a divided carriageway with a median separating the directions of travel. Generally there is no direct access to the major road except via intersecting major or minor roads, service roads exits/entries, or driveways constructed as intersections. Parking does not impede the flow of through traffic and parking should be provided off-street or on service roads.

Intersections that provide all turning movements are signalised intersections only. There are no uncontrolled cross intersections due to safety concerns. Other local road intersections that are uncontrolled are left in/left out arrangements.

Right turns are U-turns controlled by medians and median breaks. Access spacings are generally between 400m and 800m for sections categorized 2A and generally between 200m and 500m for sections categorized 2B.

Table 5-3 Turning movements design standard implemented

Intersection	Road Type	Land use	Design vehicle right turns	Concurrent right turns	Check Vehicle
Ballarat Rd - Western Highway	Yes		19m semi trailer	Yes	N/A
Riding Boundary Road - Foleys Road	Collector	Industrial/ Residential	19m semi trailer	Yes	N/A
Burnside Shopping Centre and Landy Court	Local	Commercial/ Residential	19m semi trailer using both turn lanes	N/A	N/A

Intersection	Road Type	Land use	Design vehicle right turns	Concurrent right turns	Check Vehicle
Commercial Road / Inglewood Drive	Yes	Commercial Road Commercial/Schools Inglewood Road Residential	Right turn for Commercial Road 12.5m truck on outside lane Car on inside lane 19m semi using both turn lanes Right turn for Inglewood Road Car into Inglewood	Yes	N/A 19m Semi
Taylors Road	Yes		19m semi trailer	Yes	N/A
Hume Drive	Collector	Residential	12.5m truck	Yes	19m Semi
Melton Highway	Yes		19m semi-trailer	Yes	N/A
Community Hub	Collector	Residential	12.5m truck	Yes	19m Semi
Orbis Drive – Hatchlands Drive	Collector	Residential / Industrial	19m semi-trailer	Yes	N/A
George Street - Loddon Drive	Collector	Residential	12.5m truck	Yes	N/A
Rockbank / Middle Road	Collector	Residential	19m semi	Yes	N/A

Gradelines and Clearances to Structures

The gradeline provides a measure of the vertical slope or grade of the road and is expressed as a percentage value of the height change compared to the horizontal distance travelled. To provide a safe and economic road configuration, the design grades should ideally not be steeper than 5% and not exceed 6%.

The carriageways for both the initial and future highway configurations have been developed to comply with sight distance requirements for 80km/h design speed and design grades of up to 5% and not exceeding 6%.

For the Kororoit Creek crossing the bridge structures would be designed to provide a minimum of 1m clearance between the 1 in 100 year flood level and the bridge soffits or underside of the bridge structures.

For the Bendigo grade separated railway crossing, the road passes over the rail lines and would provide 7.1m clearance to the rail tracks to cater for future rail height clearance needs.

For the Ballarat grade separated railway crossing, the road passes under the rail lines and would provide a mimimum 5.4m clearance for trucks.

Clear Zones

The clear zone either side of the traffic lanes is an area which is to be kept clear of hazards. The design allows for a clear zone of 6.1m or alternatively, would provide for guardrail or wire rope protection for hazards where practical within the clear zone.

5.9 Waterways

Two new bridges would be constructed at Kororoit Creek and operated in accordance with VicRoads Integrated Water Management Guidelines (VicRoads, 2011a). The road has been designed to be a minimum of 1m above the 1% Annual Exceedance Probability flood level.

5.10 Bicycle and Pedestrian Facilities

The Project has been designed with an off road shared path of 3.0m to allow for use by cyclists and pedestrians on both sides of the corridor. In some sections the shared path narrows to 2.5m due to constraints and is 4.0m wide on structures to allow for road furniture. The shared path will connect to the Organ Pipes National Park, Kororoit Creek Trail, the Wellness Trail and other existing and proposed shared paths alongside the corridor.

5.11 Traffic Signals and Lighting

The project proposes thirteen new signalised intersections in addition to the existing seven signalised intersections. Lighting would be provided at all signalised intersections.

5.12 Landscaping

A landscape concept plan has been developed that aims to reduce potential impacts on landscape character. Proposed mitigation measures include sensitive design of road elements such as under and over passes, retaining walls and surface finishes. Detailed landscape plans would be developed by an appropriately qualified person during the detailed design stage. These plans would take into consideration the landscape concept principles identified in Chapter 11 'Visual and Landscape and Values'.

5.13 Land Acquisition

Up to 21 properties would be affected by land acquisition. Land acquisition is generally limited to splays and the fronts of properties where the acquisition would not significantly impact on the ongoing use of the land. Two properties, one vacant residential property (entirely acquired) and one commercial property will be significantly impacted.

All land would be acquired in accordance with the processes set out in the *Land Acquisition and Compensation Act 1986* (Vic).

Any temporary construction acquisition and/or leases would be considered during pre-construction planning by the contractor(s).

5.14 Other Utilities

Recently planned utility infrastructure has been designed in consideration of the future road upgrade. Relocation and/or protection of other utilities such as electricity, gas and telecommunication services will be considered at a detailed level closer to construction.

5.15 Construction Considerations

Construction activities would be undertaken with the Contractor(s) Environmental Management System (EMS) and associated Contractor Environmental Management Plan (CEMP) which would incorporate all measures as described in Chapter 16 'Environmental Management Framework', and any other measures identified in the conditions of subsequent statutory approvals for the Project.

Working Hours

Construction work for the Project would be undertaken during the standard construction work hours as dictated in VicRoads specifications, which include:

- Monday to Friday: 7am or sunrise (whichever is the later) and 6pm or sunset (whichever is the earlier)
- Saturday: 8am to 2pm.

Construction outside the standard hours (e.g. evening and weekend work) may occur at certain stages to safely or more efficiently undertake certain tasks. If the contractor proposes to undertake construction works outside the standard hours, prior approval by the VicRoads superintendent would be required. A condition of any approvals would be that all relevant stakeholders and nearby residents are consulted.

Site Preparation, Pavement and Road Construction

The following would be undertaken for preparation of the site and construction of the pavement and road:

- project boundaries would be delineated with suitable fencing and signage;
- traffic management measures would be installed as required;

- contractor's site office and compound would be established, along with stockpile sites as required;
- erosion and sedimentation controls would progressively be installed as required for all relevant activities. Other additional environmental management measures would be installed as required. This would include fencing off and signage for the protection of sensitive areas;
- vegetation and tree stumps in the construction area outside specified and fenced protected areas would be removed and topsoil stripped. Topsoil would be stored on site, for later reuse, as well as protected with silt fencing and seeded to minimise erosion;
- utilities would be relocated or protected, as and when required;
- stormwater drainage works would be completed, including the construction of water sensitive road design measures. These may be consolidated with temporary sediment basins where practical;
- earthworks and pavement preparation would be carried out by graders and other equipment, including compaction of the resultant surface using equipment such as various types of rollers and compactors;
- cut material would be excavated to the necessary level, as and where required. Suitable excavated material would be recycled and incorporated in earthworks wherever possible. Unsuitable cut material would be transported and disposed of (on-site where possible);
- additional fill material would be imported as required for the permanent works to reach subgrade level. Material would be compacted and tested, and confirmed that it meets the specified requirements;
- verges would be constructed, batters completed, and roadside drainage elements constructed, as required. Kerbs and channels (where required) would be constructed throughout. Granular pavement materials would be imported, placed and compacted;
- asphalt pavement would be applied by pavers and rollers, or sprayed seal treatments as applicable;
- lighting, line markings, signs, and other road furniture (e.g. safety barriers and guide posts) would be installed where required; and
- the construction site would be progressively landscaped and re-vegetated, including reinstating and topping up of topsoil, seeding, planting trees and shrubs, installing weed mats and mulch.

Structural Works

Activities associated with construction of structures such as bridges, culverts and retaining walls may include:

- bored or driven piles to be installed for structural elements, as and when required. Some structures may also incorporate spread or pad footings;
- all footings works for the various structures would be completed including casting pile caps for major structures, pad footings for miscellaneous structures, or in the case of major culvert structures, foundation slabs;
- piers and abutments in-situ (although precast options may be viable) would be constructed up to underside of the deck or other superstructure elements. Structural fill and abutment works would be completed, including construction of approach slabs, while also pre-casting all bridge beams and crown units required, off site;
- bridge headstocks would be cast, precast beams placed, and deck constructed. Precast parapets and rails would be installed and kerb infill/deck connection constructed. A thin asphalt wearing course would be placed on completed bridge deck/superstructure, and line marking and associated infrastructure would be installed;
- for retaining walls, typically once a strip footing (or similar) is in place, wall units would be placed and structural fill in layers built up so as to tie all elements together. Once at the required level, handrails and other protective mechanisms would be installed;
- any gantries, cantilevers or other major sign supports or crown units (which have previously been manufactured off site) would be installed and connected together so that they are integral with the completed works;

- any off-structure bridge barriers required would be constructed, including footing details and precast barrier units. This would require materials to be brought on site and connected to each other, as well as any other wire rope safety barrier or guard fence to protect end terminals; and
- the site would be cleaned up and all surplus waste materials disposed of.

Construction Site Drainage

During construction, the Project would be designed to meet the objectives of the Best Practice Environmental Management Guidelines (CSIRO, 1999) and EPA Guidelines 275 and 480. Sediment control devices would be used to capture and treat any runoff from the site to prevent the discharge of sediment laden water into nearby drainage and waterways.

The quality of water in receiving waterways would be monitored to ensure there was no detrimental impact from site run-off. Non-potable water would be used where possible for construction purposes to reduce the requirement for potable water use.

Construction Traffic

Construction traffic and potential safety impacts would be managed through means such as implementing construction speed limits, providing appropriate construction signage for motorists on through roads and providing other necessary measures to manage safety and/or capacity at intersections during construction.

Detailed Traffic Management Plans (TMPs) would be prepared and would outline the arrangements to manage potential construction impacts.

Site Compounds

Site compounds would be used to stockpile materials, store plant and equipment and to provide site offices, parking and amenities for construction staff. Site compounds and construction laydown areas are likely to be located in close proximity to the section of road under construction, but the exact number, area and locations cannot be identified at this time.

The construction area was not developed with the intention to include the location of contractor site compounds, however there may be some areas within the Project Area that could accommodate them.

VicRoads would require that the contractor(s) identify suitable locations, preferably within the Project Area and obtain approval for these. If the contractor identified a suitable location outside the Project Area, it would need to ensure it met performance standards that resulted in no impacts to the environmental and social values identified in this EES and undertake appropriate consultation.

The contractor(s) EMP would be required to contain provisions to exclude the location of site compounds and laydown areas from sites that:

- contain remnant native vegetation;
- contain significant Ecological Vegetation Classes or known habitats for endangered species;
- contain Aboriginal or non-Aboriginal cultural heritage sites; and
- are within 30m of waterways

Utilities and Services

Service relocation and protection activities would be required from utility asset owners impacted by the Project. Relocation and/or protection of utility assets would be developed in consultation with asset owners prior to and during detailed design.

Rehabilitation

Upon completion of the construction works, the construction site would be landscaped and re-vegetated, including reinstating topsoil, seeding, planting trees and shrubs, installing weed mats and mulch, and installing any design elements, as required.

5.16 Operation and Maintenance

Operation and Maintenance

Key operational activities would be the on-going road maintenance consistent with current practices and standards. Assets to be maintained would include landscaping, stormwater drains, bridges, road pavement, signage, barriers and line marking.

Roadside Management

Roadside Management – A Balanced Approach (VicRoads, 2011) is a strategy that aims to provide clear and consistent objectives to manage roadside areas. It provides a balanced approach to management of sometimes complex and conflicting issues, in consultation with the local community to achieve the best balance between all factors, whilst ensuring efficient performance of the road network. It sets the primary direction for holistic and integrated roadside management.

The strategy provides a framework for the balanced consideration of the four key objectives of roadside management:

- enhance transport safety, efficiency and access;
- protect environmental and cultural heritage values;
- manage fire risk; and
- preserve and enhance roadside amenity.

It uses an asset management approach to balance the key objectives of roadside management and identify the most appropriate treatments to preserve roadside functions.

6 CONSULTATION

This chapter documents the consultation activities undertaken for the EES and PSA processes, and responds to relevant requirements set out in the EES Scoping Requirements for the Project, as follows:

> Public Consultation – In addition to the formal opportunities for public comment on the draft Scoping Requirements and the EES, informal consultation also plays an important role in the preparation of an EES. The proponent is responsible for both informing the public and engaging with stakeholders in order to identify and respond to their concerns in conjunction with the EES studies.
>
> Relevant stakeholders include potentially affected parties, the community and interested organisations and individuals, as well as pertinent government bodies.
>
> A stakeholder consultation plan is to be prepared and implemented by the proponent to ensure that the public is familiar with the EES investigations and that relevant stakeholders are consulted on pertinent issues.
>
> The plan should:
>
> - identify the relevant stakeholder groups
> - characterise the stakeholder groups in terms of their interests, concerns and consultation needs and potential to provide local knowledge
> - describe the consultation methods to be used and outline a schedule of consultation activities
> - outline how inputs from stakeholders will be recorded, considered and/or addressed in the preparation of the EES.

Information presented in the following sections draws on the following reports which have been prepared for the Project:

- Draft Consultation Plan: Palmers Road Corridor – Western Freeway to Calder Freeway (Robinsons Road, Westwood Drive and Calder Park Drive) (VicRoads, 2013)
- Palmers Road Corridor EES (Western Freeway to Calder Freeway) – Social Impact Assessment (AECOM, 2014e)

6.1 VicRoads Consultation Objectives

VicRoads is undertaking the EES and PSA consultation concurrently for the Project. VicRoads' consultation objectives for the Project as outlined in the VicRoads Draft Consultation Plan (August 2013) and on the DTPLI website are to:

- explain the EES and PSA processes to stakeholders and the community, including how they can be involved in the relevant process steps and their timing;
- provide stakeholder and community members with the opportunity to provide input into the identification of issues associated with the proposed arterial route;
- meet with directly affected land owners and explain the process of land acquisition;
- inform directly affected land owners and occupiers of the planning process and opportunities to make a submission;
- engage stakeholders in an educational and consultative process through information bulletins, public displays, stakeholder meetings, Technical Reference Group (TRG) meetings, land owner interviews and formal exhibition of documentation to identify issues and document received feedback;
- generate a broad understanding of the underlying rationale for the Project and provide confidence that there are significant community benefits associated with the completion of the Project;
- assure residents and businesses that suitable alternative access would be provided to their properties, where necessary;
- explain the technical elements of the EES including the arterial road design, transport modelling and environmental impact assessment findings;

- communicate with stakeholders and the broader community during preparation of the EES and PSA documentation (for example: feedback form, telephone contact) and explain how their feedback will be considered by VicRoads to improve the Project's outcomes or to refine the design; and
- explain opportunities for formal public comments during the EES process.

6.2 Relevant Stakeholders

The Project has a broad range of stakeholders with diverse interests and cultural backgrounds. As a result, the level of involvement in the consultation process is expected to be varied and the tools with which stakeholders will be consulted are different.

There is great diversity in languages in the western suburbs of Melbourne as well as values and interests, meaning that differing levels of technical information is needed depending on the stakeholder. Provision of information to stakeholder groups is required via various means. Languages other than English, which are prominent near the Palmers Road Corridor, are Vietnamese, Macedonian, Greek and Maltese. The presence of these non-English speaking communities prompted VicRoads to offer access to interpreters through the VicRoads Information Bulletins and the Project website.

A summary of the key stakeholders for the Project is provided in Table 6-1, with stakeholders grouped into the following categories:

- emergency services (5);
- government (State, Local and Federal);
- State government agencies (15);
- land owners and occupiers (approximately 1,300);
- media (4);
- road users (13);
- schools (6);
- special interest groups (15); and
- utility services (8).

Table 6-1 Key project stakeholders

Emergency services	
• Ambulance Services Victoria • Country Fire Authority - Region 14	• Metropolitan Fire Brigade • State Emergency Service • Victoria Police
Government	
Local Government	
• City of Brimbank	• City of Melton
State Government	
• State Minister for Roads and Road Safety	• Local members
Federal Government	
• Department of the Environment	

State Government agencies	
• Department of State Development, Business and Innovation • Department of Education and Early Childhood Development • Department of Justice • Department of Environment, Land, Water and Planning (Environment) • Department of Premier and Cabinet • Office of Aboriginal Affairs (OAAV) • Department of Environment, Land, Water and Planning (Planning)	• Department of Treasury and Finance • Environment Protection Authority • Heritage Victoria • Metropolitan Planning Authority (formerly GAA) • Department of Human Services Parks Victoria • Port Phillip and Westernport Catchment Management Authority • Public Transport Victoria • Regional Rail Link • VicTrack
Land owners and occupiers	
• Arcare Delbridge Nursing Home • Arcare Westwood Nursing Home • Baptist Church (Sydenham) • Brimbank Shopping Centre • Brookside Early Learning Centre • Burnside Shopping Centre • Burnside Retirement Village • Calder Park Raceway Pty Ltd • Dame Phyllis Frost Women's Prison • Delfin Lend Lease • Dennis Family Corporation • Derrimut Village Shopping Centre	• Land owners and occupiers directly or indirectly impacted • Masters Home Improvement • McDonalds Family Restaurant • Metropolitan Remand Centre • Residents and businesses along alignment • Taylors Hill Retirement Village • Taylors Hill Village Shopping Centre • Watergardens Shopping Centre • Watervale Shopping Centre • Caltex Australia Ltd
Media	
• Keilor /Taylors Lakes/Sydenham Star • St Albans/Deer Park/Caroline Springs Star	• Melton/Moorabool Leader • The Age
Road users	
• Bicycle Network Victoria • Greyhound Buses • Kastoria Bus Lines • Melbourne Bus Link • Public Transport Users Association • RACV • Silvertop Taxis	• Sita Bus Lines • Skybus • Victorian Taxi Association • West Suburban Taxis • Westrans Buses Sunshine • Yellow Cabs and Black Cabs
Schools	
• Catholic Education Office • Copperfield College Sydenham (junior and senior campuses) • Kororoit Creek Primary School	• Sydenham-Hillside Primary School • Taylors Hill Kindergarten • Taylors Hill Primary School

Special interest groups	
• Burnside Heights Recreation Reserve Committee of Management (c/-City of Melton) • Calder Park Action Group • Calder Highway Improvement Committee • Cambridge, Coburn and Watts Residents' Association • "Dalgook" Farm Complex (City of Melton) • Friends of Organ Pipes National Park • LeadWest (advocacy group) • Morton Homestead (Melton City Council)	• Pioneer Park Committee of Management (c/-City of Brimbank)Registered Aboriginal Party (Wurundjeri Tribe Land Cultural Heritage Council Inc for Project Area north of Calder Freeway) • Traditional Owners Groups (Bunurong Land Council Aboriginal Corporation and Boon Wurrung Foundation) • Sunshine Business Association • Sydenham Community Centre • Taylors Hill Youth and Community Centre – Melton City Council • Victorian Transport Association • YMCA – Taylors Hill
Utility services	
• AGL (electricity) • City West Water • Energy Safe Victoria • Jemena (electricity)Melbourne Water	• National Broadband Network Company Victoria • Powercor & CitiPower(electricity) • SP Ausnet (gas) Telstra

Source: VicRoads Draft Consultation Plan: Palmers Road Corridor – Western Freeway to Calder Freeway (Robinsons Road, Westwood Drive and Calder Park Drive) August 2013 & AECOM (2014e)

6.3 Consultation Strategy

The overall approach for this Project is to seek to identify and assess key stakeholder issues, and respond to these issues in a way that builds trust in, and the credibility of the EES and PSA processes and findings. The approach to consultation is critical for the timely and smooth delivery of the EES and PSA, as well as to provide a high level of community and stakeholder acceptance and support for the Project in the longer term. A four phase consultation strategy has been developed for the Project. The phases are as follows:

- Phase 1: Impact assessment and preparation of EES and PSA documentation;
- Phase 2: Formal exhibition of the EES and PSA;
- Phase 3: Public review of the EES and PSA; and
- Phase 4: EES assessment and PSA approval.

For each Phase, a number of consultation activities have been implemented or are planned. Further consultation which would occur during construction is discussed in Chapter 16 'Environmental Management Framework'.

6.4 Consultation Activities

6.4.1 Phase 1: Impact Assessment and Preparation of EES and PSA Documentation

Phase 1 included the following consultation and stakeholder activities:

- Four meetings were held in May 2013, July 2013, August 2013 and November 2014 with the TRG, to obtain input and guidance from government departments and the Brimbank and Melton Councils, regarding the adequacy of investigations and statutory requirements;
- Mailing lists were prepared for landowners, occupiers and stakeholders along the corridor in June 2013;
- Advertisements informing the community of the public information days were published in The Age, Keilor/Taylors Lakes/Sydenham Star, St Albans/Deer Park/Caroline Springs Star and the Melton/Moorabool Leader in June 2013;
- Information was provided on the VicRoads website to outline background to the Project and the EES and PSA processes;

- An information update (in the form of a brochure and feedback form) was sent to land owners and occupiers, stakeholders and any other interested parties in June 2013;
- Two community information days were held in June 2013 to provide an opportunity for the community, including those directly affected along the corridor, to ask questions, provide input to the EES and PSA processes and provide feedback on the route;
- Consultation with the Aboriginal Traditional Owners;
- Direct face-to-face meetings were held with key stakeholders and land owners;
- Comments derived from the consultation process and previous consultations were collated; and
- Internal workshop was held in July 2013 to discuss issues requiring detailed consideration.

6.4.2 Phase 2: Formal Exhibition of the EES and PSA

Phase 2 will include the following planned consultation and stakeholder activities:

- Notices in the Government Gazette, metropolitan and local newspapers informing of the opportunity for public comment during the EES and PSA exhibition period;
- Exhibition of EES and PSA documentation, as well as provision of electronic copies via VicRoads' website. PSA documentation will also be available on the Department of Environment, Land, Water and Planning (DELWP) website;
- Mail EES and PSA notices to land owners, tenants and stakeholders along the proposed corridor;
- Mail EES and PSA notices by registered post to property owners and tenants directly affected by the Planning Acquisition Overlay (PAO);
- Undertake a further community information day to provide information about the road design, results of technical studies, and EES and PSA documents; and
- Continue discussions with key stakeholders, land owners and businesses.

6.4.3 Phase 3: Public review of the EES and PSA

Phase 3 would include the following planned consultation and stakeholder activities:

- Liaison with Planning Panels Victoria regarding the venue and other arrangements for the Inquiry/Panel Hearing;
- Acknowledgement and analysis of public submissions on the EES and PSA; and
- Presentations at the Inquiry/Panel (including the opportunity for the community and stakeholders to present their views at the hearing).

6.4.4 Phase 4: EES assessment and PSA approval

During Phase 4, VicRoads and DELWP would publish the Minister's assessment of the Project's environmental effects (for example, the outcome of the EES) and decision on PSA process on their websites.

6.5 AECOM Consultation Activities

6.5.1 AECOM Consultation (2008)

As part of the research for the Social Impact Assessment for the Project, in 2008, AECOM undertook a number of community engagement activities to explore the views of various stakeholders relating to the Project. These activities included:

- Face-to-face interviews with a selection of stakeholders with an interest in the Project including local councils, government department, businesses and community organisations (refer to EES Technical Appendix F (AECOM, 2014e));
- Face-to-face interviews and phone interviews with land owners and businesses located along Westwood Drive (refer to EES Technical Appendix F (AECOM, 2014e)); and
- Several focus groups with representatives of local community organisations (including a residents association) which were attended by ten groups in total.

6.5.2 AECOM Consultation (2013)

To supplement the previous work, in 2013, AECOM undertook the following additional activities:

- Follow-up interviews with City of Melton and City of Brimbank;
- Survey of 500 households located within 250m of the Project Area – households received letters inviting residents to complete a survey online or participate in a scheduled face-to-face interview. Only seven surveys were completed online and a further four face-to-face interviews were conducted ; and
- 'Intercept surveys' at the Caroline Springs Shopping Centre where respondents were given a brief overview of the Project and asked to comment. The 29 responses to this consultation are summarised in EES Technical Appendix F (AECOM, 2014e).

6.5.3 Results of AECOM Consultation

Key themes raised through consultation included:

- Strong support for the corridor being developed, in particular the connection of the corridor through construction of the Kororoit Creek bridge;
- Recognition of the immediate need for the Project;
- Importance of maintaining access to community facilities such as Copperfeld College (Sydenham);
- Concerns with existing traffic conditions along the corridor, for example, limited access onto Calder Freeway;
- The need to protect native grasslands and fauna as much as possible during the development of the corridor; and
- Importance of maintaining access for land owners affected by acquisition, in particular businesses in Westwood Drive.

6.6 VicRoads Consultation Activities

6.6.1 VicRoads Consultation

In 2013 the following consultation activities were undertaken by VicRoads:

- Approximately 1,300 letters and brochures were sent to land owners/occupiers in or near the Palmers Road Corridor;
- Approximately 120 letters were sent to stakeholders (see Table 6-1);
- About 30 letters were sent to directly affected land owners/occupiers;
- Two public information days were held at Caroline Springs Library and Civic Centre which provided the community with the opportunity to comment on the Project. A total of 39 people attended the public information days; and
- A total of 23 written submissions and five phone calls were received in 2013 following an invitation from VicRoads to make a submission in relation to the Project.

6.6.2 Results of VicRoads Consultation

About 70 people who contacted VicRoads in 2013 raised the issues listed in Table 6-2. The majority of those who responded to VicRoads in 2013 requested further information on the Project. Very few people objected to the Project and some people supported the Project.

Key issues raised by the community throughout consultation have included:

- Impacts on amenity as a result of noise, pollution, construction dust and increased traffic;
- Impacts on access and pedestrian safety; and
- Concerns regarding the impact on the value of homes in the area.

Comments received by VicRoads were considered in modifying the Project design. Some examples of design changes which have occurred as a result of community and stakeholder consultation are as follows:

- realignment of Westwood Drive to avoid residential properties on the Arbour Estate development near Kororoit Creek;
- realignment of the proposed Westwood Drive near the Ballarat rail crossing to reduce the impact on residential and commercial properties;
- redesign of the Ballarat rail line overpass near Robinsons Road to an underpass, to reduce the impact on residential and commercial properties; and
- re-design of the Calder Park Drive/Hume Drive intersection to ensure that three residential properties located in Devonport Court and Taylors Hill are no longer affected by the Project.

Other design changes are outlined in Chapter 5 'Project Description'.

Table 6-2 Summary of issues raised with VicRoads in 2013

Issue	No. of responses
Noise, pollution, construct dust issues	20
Pedestrian safety issues	10
Negative effect on house prices	9
Traffic increase undesirable	6
Decline in residential Amenity	6
Access issues	5
No need since low traffic or other roads better	4
Compensation	3
Improve rail instead	1
Fauna (Kangaroo near Kororoit Creek)	1
Total	65

6.7 Conclusion

Consultation activities undertaken to date by AECOM and VicRoads have actively engaged the community and stakeholders. Further consultation activities will occur during formal exhibition of the EES and PSAs in order to ensure the community and stakeholders are kept up to date with progress on the Project. Additional opportunities for comment will be available to the community during public review by an Inquiry Panel convened by the Minister for Planning, to consider the EES and public submissions.

7 EES EVALUATION FRAMEWORK

7.1 Overview

The Palmers Road Corridor EES Evaluation Framework sets out the method used to assess and refine the Project. The key components of the framework are presented in Figure 7-1 and are described in the following sections.

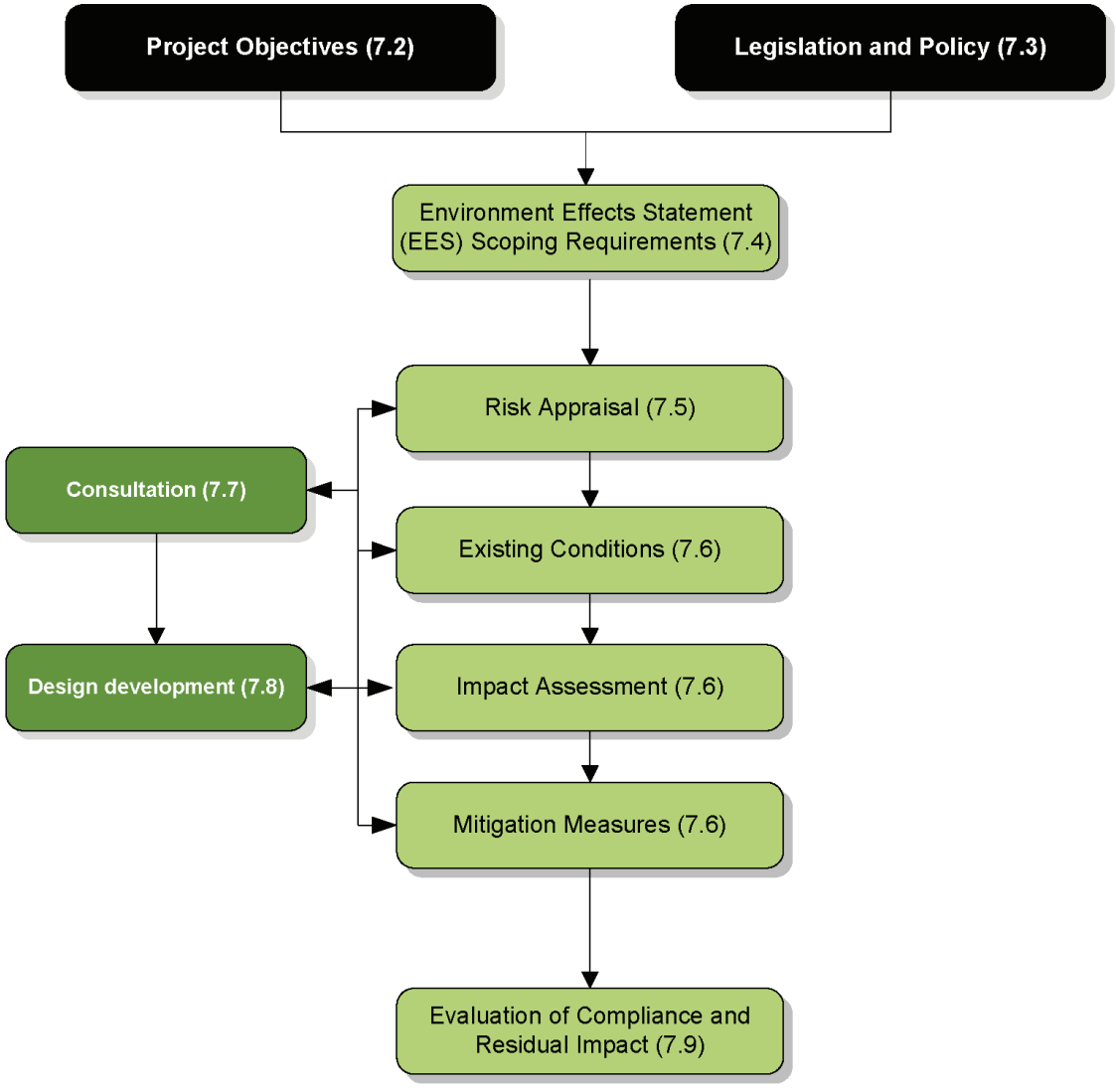


Figure 7-1 Palmers Road Corridor EES Evaluation Framework

7.2 Project Objectives

Prior to the EES, project objectives were developed around the aspects of road safety, access and mobility, transport efficiency and environment. With a focus on functional requirements, the project objectives are provided in Table 7-1.

Table 7-1 Project objectives

Aspect	Objective
Road Safety	Provide an ultimate facility that promotes the reduction of crashes
Access and Mobility	Provide an ultimate facility that caters for future growth Provide an ultimate facility that promotes bicycle and pedestrian travel
Transport Efficiency	Provide an ultimate facility that caters for predicted long term traffic volumes Provide an ultimate facility that caters for long term public transport needs Provide an ultimate facility that caters for commercial access to industrial and employment precincts
Environment	Minimise impact on the natural and built environment and retain significant conservation areas

The project objectives have been further developed with reference to the EES Scoping Requirements (Victorian Government, July 2013). The evaluation objectives are presented in Section 7.4.

7.3 Legislation and Policy

As outlined in Chapter 3 'Project Approvals' the Project will require a range of approvals under Victorian legislation including:

- approval of a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006*;
- a licence to remove protected flora and flora from public land under the *Flora and Fauna Guarantee Act 1988*;
- consent to disturb any historical archaeology sites and/or permits to carry out works to a heritage place under the *Heritage Act 1995*;
- amendments to the Brimbank and Melton Planning Schemes including reserving land for road purposes and approval to remove native vegetation under the *Planning and Environment Act 1987*;
- consent to undertake works near waterways under the *Water Act 1989*; and
- permits to remove trees containing habitat or any other fauna habitat areas or fauna salvage and translocation under the *Wildlife Act 1975*.

The relevant legislation, guidelines and policies are identified and discussed with regard to their implications for the Project. The EES documentation provides information on the potential effects and risks of the Project to inform the key statutory approvals.

7.4 EES Scoping Requirements

The Scoping Requirements which set out the specific matters to be investigated and documented in the EES were finalised in July 2013 following the consideration of public comments.

The draft evaluation objectives listed in the Scoping Requirements and presented in Table 7-2 provide a framework to guide an integrated assessment of environmental effects of the alignment.

The framing of the Project draft evaluation objectives reflects the key matters to be investigated for the EES, relevant legislation and policies, the objectives and principles of ecologically sustainable development and environmental protection.

Table 7-2 Draft Evaluation Objectives

Draft Evaluation Objective	Key Legislation
Road Safety and Capacity - To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	• *Planning & Environment Act 1987* • *Road Management Act 2004*
Amenity and Environmental Quality - To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	• *Environment Protection Act 1970* • *Planning & Environment Act 1987*
Social, Land Use and Infrastructure - To minimise adverse social and land use effects, including impacts on existing infrastructure.	• *Land Acquisition & Compensation Act 1986* • *Planning & Environment Act 1987*
Visual and Landscape Values - To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	• *National Parks Act 1975 (Commonwealth)* • *Planning & Environment Act 1987*
Biodiversity and Habitat - To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy	• *Environment Protection & Biodiversity Conservation Act 1999 (Commonwealth)* • *Environment Protection Act 1970* • *Flora & Fauna Guarantee Act 1988* • *Planning & Environment Act 1987* • *Wildlife Act 1975*
Catchment Values - To maintain the functions and values of surface water and floodplain environments.	• *Planning & Environment Act 1987* • *Water Act 1989*
Cultural Heritage - To avoid or minimise effects on Aboriginal and historic cultural heritage values.	• *Aboriginal Heritage Act 2006* • *Heritage Act 1995* • *Planning & Environment Act 1987*
Environmental Management Framework - To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.	• *Aboriginal Heritage Act 2006* • *Environment Protection Act 1970* • *Planning & Environment Act 1987*
Integrated and Sustainable Transport - Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.	• *Environment Effects Act 1978* • *Environment Protection Act 1970* • *Planning & Environment Act 1987* • *Transport Integration Act 2010*

7.5 Risk Appraisal

A risk appraisal was completed in early 2013 to identify potential impacts of the Project on the environment and to consolidate the priorities for the EES, having regard for the Minister's decision and subsequent discussions with DTPLI in 2013. The appraisal guided the level of effort and attention given to impact assessment issues.

The assessment used available information on existing conditions and past experience on similar projects to prioritise the risks into three categories:

- Category A (potential impact requires detailed investigation and assessment as part of the approvals process);
- Category B (potential impact requires moderate levels of investigation and targeted assessment as part of the approvals process); and
- Category C (potential impact requires minimal attention as part of the approvals process).

As set out in Table 7-3, the category for each potential impact was based on the following:

- Level of sensitivity;
- Potential scale and severity of impacts; and
- Capacity for management of potential impacts.

Table 7-3 Impact categories

Category	Level of sensitivity	Potential scale and severity of impacts	Capacity for management of potential impacts
A	High sensitivity, significant assets or values under threat.	High impact	Complex and detailed management measures required.
B	Moderate sensitivity, some significant assets or values may be affected.	Medium impact	Standard management measures are available that can be adopted with some tailoring.
C	Significant assets or values absent or probably avoidable.	Low impact	Standard management measures are available.

Categories were assigned on the basis of the highest impact category (i.e. either - level of sensitivity; potential scale or capacity for management of potential impacts). If a risk area triggers one category A rating and two category B ratings; it would be rated overall with an A rating.

The results of the risk appraisal, based on information available and the Project description at the time (early 2013), supported the Minister's decision to focus on five key matters (biodiversity, noise, social, landscape and cultural heritage). The results of the risk appraisal are summarised below.

The following matters were categorised as 'A' Risks (potential impact requires detailed investigation and assessment as part of the approvals process):

- Biodiversity; and
- Aboriginal cultural heritage (note: following further investigations this was upgraded from a 'B' Risk).

The following matters were categorised as 'B' Risks (potential impact requires moderate levels of investigation and targeted assessment as part of the approvals process):

- Historic cultural heritage (note: following further investigations this was upgraded from a 'C' Risk);
- Landscape and visual;
- Land use;
- Noise; and
- Social.

The following matters were categorised as 'C' Risks (potential impact requires minimal attention as part of the approvals process):

- Air quality;
- Geology and soils;
- Groundwater;
- Surface water; and
- Traffic.

7.6 Key Technical Investigations

A number of technical investigations were completed to satisfy the draft evaluation objectives in the Scoping Requirements (Victorian Government, July 2013). These technical reports included characterisation of existing conditions, assessment of potential impacts and proposed mitigation measures. Each of the technical specialists developed specific sub-objectives and assessment criteria, which was based on the EES evaluation objectives, and relevant legislation and policy guidelines.

Table 7-4 includes the various draft evaluation objectives and the relevant key technical investigations that have been used to inform the assessment.

Table 7-4 Draft evaluation objectives and key technical investigations

Draft Evaluation Objective	Key Technical Investigations
Road Safety and Capacity To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	• Access Management – Palmers Road Corridor EES (AECOM 2015c) • Transport Modelling – Palmers Road Corridor EES (AECOM 2015b)
Amenity and Environmental Quality To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	• Traffic Noise Assessment – Palmers Road Corridor EES (AECOM 2015d) • Air Quality Assessments – Palmers Road Corridor (Western Freeway to Calder Freeway) (VicRoads 2013)
Social, Land Use and Infrastructure To minimise adverse social and land use effects, including impacts on existing infrastructure.	• Social Impact Assessment – Palmers Road Corridor EES (AECOM 2014e) • Land Use Planning – Palmers Road Corridor EES (AECOM 2014f)
Visual and Landscape Values To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	Landscape and Visual Impact Assessment – Palmers Road Corridor EES (Spiire 2014)
Biodiversity and Habitat To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.	Flora and Fauna Assessment and Biodiversity Offset Analysis, Palmers Road Corridor: Western Freeway to Calder Freeway (Ecology and Heritage Partners 2014)

Draft Evaluation Objective	Key Technical Investigations
Catchment Values To maintain the functions and values of surface water and floodplain environments.	Surface Water Memorandum – Palmers Road Corridor EES (AECOM 2013)
Cultural Heritage To avoid or minimise effects on Aboriginal and historic cultural heritage values.	• Draft Cultural Heritage Management Plan (Number 12662) (Dr Vincent Clark & Associates 2014a) • Historic Archaeology and Cultural Heritage (Dr Vincent Clark & Associates 2014b)
Environmental Management Framework To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.	Chapter 16
Integrated and Sustainable Transport Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.	Chapter 15

7.7 Consultation

Consultation has played a key role in the EES Evaluation Framework. Information obtained through consultation activities has been integrated into the environmental impact assessment (existing conditions, impact assessment and mitigation measures) and subsequent revisions to the design.

Consultation with key stakeholders by VicRoads regarding the development of the Palmers Road Corridor commenced in 2008. The consultation activities conducted in 2013 specific to this EES have involved key stakeholders including local residents, Melton City Council, Brimbank City Council, Wurundjeri Tribe Land Cultural Heritage Council, Office of Aboriginal Affairs Victoria and DELWP. Further details of the consultation activities are provided in Chapter 6 'Consultation and the *Communications and Draft Consultation Plan – Palmers Road Corridor (Western Freeway to Calder Freeway)* (VicRoads, 2013).

7.8 Design Development

Design development is a key part of the Evaluation Framework. The Project has been designed to minimise environmental impacts and mitigation measures would be implemented during construction and operation to further minimise residual impacts.

An initial design was developed and this underwent several modifications before the project design was used as the basis for impact assessment and development of mitigation measures and consultation activities with key government stakeholders, local councils and the public.

The alignment has then been further refined throughout the detailed investigations conducted prior and during the EES assessment process. Further information on the design modifications is outlined in Chapter 5 'Project Description'.

The corridor is largely protected and only very limited additional areas of land would require property acquisition. The consultation activities prior and during the EES process have influenced the design of the Project including changes to the alignment footprint to avoid new residences and consideration of revised pedestrian crossings near schools. The Project would have limited impact on private properties and amenity.

7.9 Evaluation of Compliance and Residual Impact

An evaluation of compliance and residual impact assessment was undertaken in response to the relevant draft evaluation objectives from the EES Scoping Requirements. This assessment is presented within Chapters 8 to 14 along with a discussion of measures proposed to minimise and mitigate potential impacts.

The management measures included in the Environmental Management Framework (EMF) for the Project have primarily arisen from the technical studies carried out for the EES, relevant best practice guidelines and discussion with regulatory authorities. The residual impact assessment is based on the pre and post mitigation outlined in the relevant specialist reports.

The evaluation of compliance against key legislation and policy, and residual impact rating guide for key areas investigated in this EES are provided in Tables 7-5 to 7-11.

The overall rating for the Project (Very Poor to Very Well) under each relevant draft evaluation objective is the combination of the following assessments:

- Performance or impact assessment (dependent on evaluation criterion);
- Level of policy compliance (major policy non-compliance to strong level of policy compliance); and
- Standard of practice – including mitigation measures (very poor to best practice).

Table 7-5 Evaluation of compliance and residual impact rating guide – Road Safety and Capacity

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Road Safety and Capacity To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	Access arrangements and connectivity Road safety Traffic volumes and congestion Travel times	Planning and Environment Act 1987 Road Management Act 2004 Guide to Traffic Management Part 5: Road Management (Austroads, 2014) Victoria's Road Safety Strategy – 2013 – 2022 (Victorian Government 2013) SmartRoads (VicRoads 2011)	Major improvement in transport network capacity, connectivity and safety Strong policy compliance Best practice (incl. mitigation measures)	Moderate improvement in transport network capacity, connectivity and safety Good policy compliance Improved practice (incl. mitigation measures)	Minor improvement in transport network capacity, connectivity and safety Partial policy compliance Standard practice (incl. mitigation measures)	Negligible improvement in transport network capacity, connectivity and safety Policy non-compliance Poor practice (incl. mitigation measures)	Reduced transport network capacity, connectivity and safety Major policy non-compliance Very poor practice (incl. mitigation measures)

Table 7-6 Evaluation of compliance and residual impact rating guide – Amenity and Environmental Quality

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Amenity and Environmental Quality To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	Extent of changes in noise levels at properties Number of receptor locations where air quality standards are exceeded	Environment Protection Act 1970 Planning and Environment Act 1987 VicRoads Traffic Noise Reduction Policy (VicRoads 2005 Environmental Guidelines for Major Construction Sites (EPA 1996) SEPP Air Quality Management (EPA 2001)	Applicable air and noise standards met for nearby residents and land uses Strong policy compliance Best practice (incl. mitigation measures)	Minor exceedances of air and noise standards for small number of nearby residents and land uses Good policy compliance Improved practice (incl. mitigation measures)	Minor exceedances of air and noise standards for a large number of nearby residents and land uses Partial policy compliance Standard practice (incl. mitigation measures)	Major exceedances for a small number of nearby residents and land uses Policy non-compliance Poor practice (incl. mitigation measures	Major exceedances for a large number of nearby residents and land uses Major policy non-compliance Very poor practice (incl. mitigation measures)

Table 7-7 Evaluation of compliance and residual impact rating guide – Social, Land Use and Infrastructure

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Social, Land Use and Infrastructure To minimise adverse social and land use effects, including impacts on existing infrastructure.	Road safety and capacity Amenity and environmental quality Social, land use and Infrastructure Visual and landscape values Integrated and sustainable transport Consistency with State and Local Planning Policy Framework Consistency with other local planning documents Site specific impacts	Land Acquisition and Compensation Act 1986 Planning and Environment Act 1987 Plan Melbourne (Victorian Government 2014) Melton East Strategy Plan (GHD 1997) Brimbank Integrated Transport Strategy (City of Brimbank 2007 Growth Corridor Plans – Managing Melbourne Growth 2012 (GAA 2012)	Negligible adverse social and land use effects Strong policy compliance Best practice (incl. mitigation measures)	Minor adverse social and land use effects. Good policy compliance Improved practice (incl. mitigation measures)	Moderate adverse social and land use effects Partial policy compliance Standard practice (incl. mitigation measures)	Moderate - Major adverse social and land use effects Policy non-compliance Poor practice (incl. mitigation measures	Major adverse social and land use effects Major policy non-compliance Very poor practice (incl. mitigation measures)

Table 7-8 Evaluation of compliance and residual impact rating guide – Visual and Landscape Values

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Visual and Landscape Values To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park (OPNP) and minimise visual effects on open space areas.	Protect the visual amenity, recreational and natural landscape values of the Organ Pipes National Park Protect the visual amenity, cultural heritage and natural landscape values of the volcanic plains Protect the visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridors. Protect the visual amenity and recreational values of the open space reserves. Enhance the existing networks that provide cycling and walking accessibility and connectivity.	National Parks Act 1975 Planning and Environment Act 1987 State Planning Policy Framework in Planning Schemes Local Planning Policy Framework in Planning Schemes	Negligible adverse effects to visual and landscape values of the OPNP and open space areas Strong policy compliance Best practice (incl. mitigation measures)	Minor adverse effects to visual and landscape values of the OPNP and open space areas Good policy compliance Improved practice (incl. mitigation measures)	Moderate adverse effects to visual and landscape values of the OPNP and open space areas Partial policy compliance Standard practice (incl. mitigation measures)	Moderate to major adverse effects to visual and landscape values of the OPNP and open space areas Policy non-compliance Poor practice (incl. mitigation measures)	Major adverse effects to visual and landscape values of the OPNP and open space areas Major policy non-compliance Very poor practice (incl. mitigation measures)

Table 7-9 Evaluation of compliance and residual impact rating guide – Biodiversity and Habitat

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Biodiversity and Habitat To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.	Potential impact on matters of national environmental significance Potential impact on species of state significance Potential impacts on native vegetation communities Potential impacts to sites of significance	Environment Protection and Biodiversity Conservation Act 1999 Planning and Environment Act 1987 Environment Protection Act 1970 Flora and Fauna Guarantee Act 1988 Wildlife Act 1975 Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI, 2013) Environmental Guidelines for Major Construction Sites (EPA, 1996)	Negligible adverse effects on native vegetation and listed flora and fauna species and ecological communities Strong policy compliance ('No net loss' achievable) Best practice (incl. mitigation measures)	Minor adverse effects on native vegetation and listed flora and fauna species and ecological communities Good policy compliance ('No net loss' achievable) Improved practice (incl. mitigation measures)	Moderate adverse effects on native vegetation and listed flora and fauna species and ecological communities Partial policy compliance Standard practice (incl. mitigation measures)	Moderate to major adverse effects on native vegetation and listed flora and fauna species and ecological communities Policy non-compliance ('No net loss' unachievable) Poor practice (incl. mitigation measures)	Major adverse effects on native vegetation and listed flora and fauna species and ecological communities Major policy non-compliance ('No net loss' unachievable) Very poor practice (incl. mitigation measures)

Table 7-10 Evaluation of compliance and residual impact rating guide – Catchment Values

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Catchment Values To maintain the functions and values of surface water and floodplain environments.	Extent of increased flooding risk Extent of increased risk to water quality	Planning and Environment Act 1987 Water Act 1989 SEPP Waters of Victoria (EPA 2013) VicRoads Environmental Risk Management Guidelines (VicRoads, 2012) Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO, 1999) Environmental Guidelines for Major Construction Sites (EPA, 1996) Integrated Water Management Guidelines (VicRoads, 2013)	Negligible change to functions and values of surface water and floodplain environments Strong policy compliance Best practice (incl. mitigation measures	Minor change to functions and values of surface water and floodplain environments Good policy compliance Improved practice (incl. mitigation measures)	Moderate change to functions and values of surface water and floodplain environments. Partial policy compliance Standard practice (incl. mitigation measures)	Moderate to major change to functions and values of surface water and floodplain environments Policy non-compliance Poor practice (incl. mitigation measures)	Major change to functions and values of surface water and floodplain environments Major policy non-compliance Very poor practice (incl. mitigation measures)

Table 7-11 Evaluation of compliance and residual impact rating guide – Cultural Heritage

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Cultural Heritage To avoid or minimise effects on Aboriginal and historic cultural heritage values.	Impacts to sites of Aboriginal cultural heritage Impacts to sites of historical heritage	Aboriginal Heritage Act 2006 Heritage Act 1995 Planning and Environment Act 1987 Aboriginal Heritage Regulations 2007 Heritage Overlays in Planning Schemes	Negligible effect to heritage artefacts (values affected of low significance) Strong policy compliance Best practice (incl. mitigation measures	Disturbance or partial removal of a small number of heritage artefacts (values affected of low-moderate significance) Good policy compliance Improved practice (incl. mitigation measures)	Complete removal of one or more heritage artefacts confined to a small number of locations (values affected of moderate significance) Partial policy compliance Standard practice (incl. mitigation measures)	Complete removal of many heritage artefacts across many locations (values affected of moderate to high significance) Policy non-compliance Poor practice (incl. mitigation measures)	Widespread removal of heritage artefacts across the region (values affected of high significance) Major policy non-compliance Very poor practice (incl. mitigation measures)

8 ROAD SAFETY AND CAPACITY

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.2 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective - *To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.*

Key issues

- Exacerbation of congestion on the existing road network in the absence of an arterial route.
- Inefficient linkages with the road network exacerbate congestion at key nodes.
- Disruption to pedestrian movements, bicycle connectivity, public transport, motor vehicle traffic during the project construction.

Priorities for characterising the existing environment

- Characterise current traffic conditions within the existing road network in the project area.
- Provide modelling projections of road network traffic flows in the absence of the project.

Design and mitigation measures

- Potential design solutions to optimise linkages with the existing road network and maintain or enhance pedestrian and bicycle access at junctions of the operating project.

Assessment of likely effects

- Assess the effects of the project on the transport network (including in terms of road traffic volumes and travel time outcomes) and accessibility and safety for users (vehicles, pedestrians and cyclists).

Approach to manage performance

- Briefly describe principles or approach to management of traffic conditions during the project's construction, including as part of the Environmental Management Framework (EMF) (see Chapter 16 of this EES).

Information presented through the following sections draws on the following technical specialist reports, which have been prepared to document the potential impacts of the Project:

- Palmers Road Corridor Western Freeway to Calder Freeway Transport Modelling Report (AECOM 2015b)
- Palmers Road Corridor EES: Access Management (Western Freeway to Calder Freeway) (AECOM 2015c).

8.1 Legislative and Policy Context

Key legislation relevant to the Project from a road safety and capacity perspective are the

- *Road Management Act 2004* (Vic)
- *Planning and Environment Act 1987*

These are discussed in Chapter 3 'Project Approvals'.

In addition, two key strategies guide VicRoads' development program: Smart Roads and *Victoria's Road Safety Strategy* 2013-2022, which are discussed further below.

There are two guidelines that are relevant in the consideration of road safety and capacity for the Project, namely the Austroads Guide to Traffic Management and the VicRoads' Bus Stop Guidelines. These are discussed further below.

8.1.1 VicRoads SmartRoads Guidelines 2011

SmartRoads aims to provide a balance between competing interests for road space and managing congestion and safety on key arterial roads, while supporting the development of a sustainable transport system into the future. The policy gives priority to different transport modes depending on the time of day, or priorities routes for particular modes. In relation to the proposed Project, where a route is designed as a preferred traffic route, the priority and available capacity is designed to efficiently move traffic and facilitate network access.

8.1.2 Victoria's Road Safety Strategy 2013-2022

Victoria's Road Safety Strategy 2013-2022 has the objective of reducing Victoria's road toll by 30% to below 200 deaths per year and reducing all serious injuries by 30%. These targets have been set in the context of increasing population growth and increasing economic growth, which results in increased transport movements.

8.1.3 Austroads

The *Austroads Guide to Traffic Management* provides traffic management guidance, with *Part 5: Road Management* (Table 2.1) outlining access management tools appropriate to specific road categories. AECOM (2015c) explains that Category 2 is considered the most relevant category to consider for any future works to the Palmers Road Corridor, given the land use, purpose of the road and that the Palmers Road Corridor has the capacity to accommodate a category 2A and 2B arterial which accommodates higher traffic volumes with less congestion. For Category 2A and Category 2B roads, the access management tools are summarised in Table 8-1.

Table 8-1 Access Management Tools for Category 2A and 2B roads

Item	Access Management Tool	Austroads criteria	
		Category 2A	Category 2B
1	Speed limit	80 km/h and above	70-80 km/h
2	Cross section	Divided carriageway with a median separating directions of travel	
3	Intersections	Spacing between 400m and 800m	Spacing between 200m and 500m
4	Turning movements	Right turns and U-turns are controlled by medians and median breaks	
5		Desirable design standards including deceleration/ acceleration lanes, consistent with higher speed and higher quality traffic operation	Desirable with consideration of minimum design standards, consistent with intermediate speed and moderate traffic service
6	Site access	Generally no direct access to a major road except via intersecting major or minor roads, service road exits/entries, or driveways constructed as intersections.	
7	Parking	Parking should not impede the flow of through traffic. Parking be provided off-street or on service roads. Clearway will be considered to restrict on-street parking.	

(Source: Austroads, 2014)

8.1.4 VicRoads Bus Stop Guidelines

VicRoads' Bus Stop Guidelines (2006) sets out design considerations in terms of space requirements, signage, shelter, lighting and ground surface coverings that are of importance to pedestrians. In terms of incorporating bus stops into road designs, the guidelines set out design requirements for the siting and configuration of stops for low and high usage situations in different speed environments. For example, in an 80km/h zone, the use of indented bus bays should be limited to locations where there are one or two lanes in the direction the bus is travelling (i.e. a two or four lane road). Kerbside stops are preferred on 6 lane roads which have an 80km/h speed limit.

8.2 Existing Conditions

8.2.1 Traffic Existing Conditions

Figure 8-1 shows the modelled 2046 daily two way traffic volume for the base case (existing conditions) for Palmers Road Corridor between Western Freeway and Calder Freeway. While Figure 8-2 shows the 2046 AM peak volume capacity ratio (VCR) for the base case scenario. Congested conditions can be considered to be where VCRs are greater than 0.8. This is the point where it is likely that flow will break down causing stop-start conditions and traffic queuing.

Under the base case two lane scenario with no bridge at Kororoit Creek on the Palmers Road Corridor in 2046, the traffic volumes are relatively low when compared to the alternative north south routes of Kings Road and Caroline Springs and Gourlay Road. The Palmers Road Corridor carries approximately half the traffic of these other two adjacent north south roads.

The plot of the volume capacity ratios in Figure 8-2 for the AM peak show congested conditions along large sections of the Palmers Road corridor and adjacent north routes.

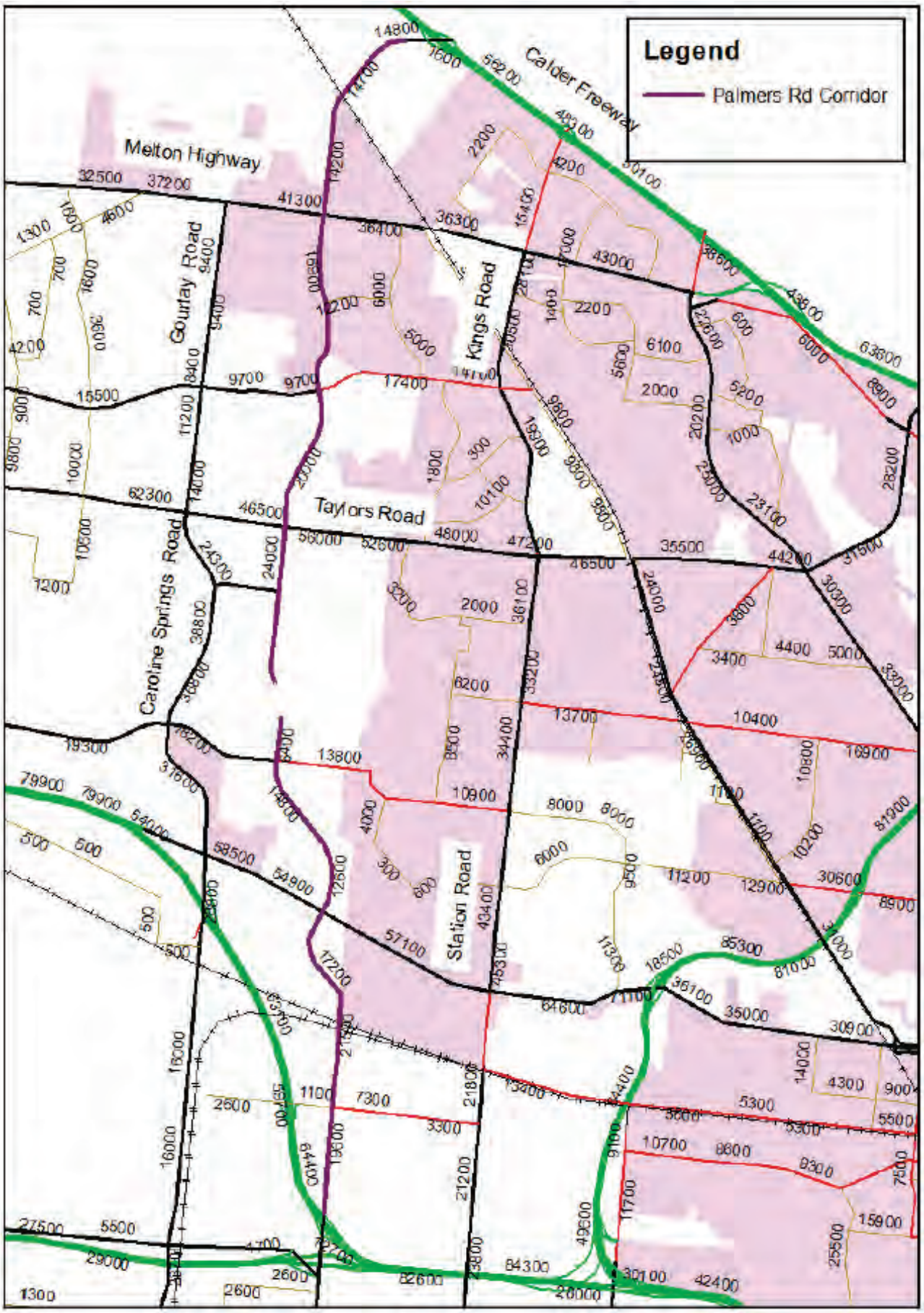


Figure 8-1 **2046 Daily two way volumes – Base case - Palmers Road Corridor between Western Freeway and Calder Freeway**

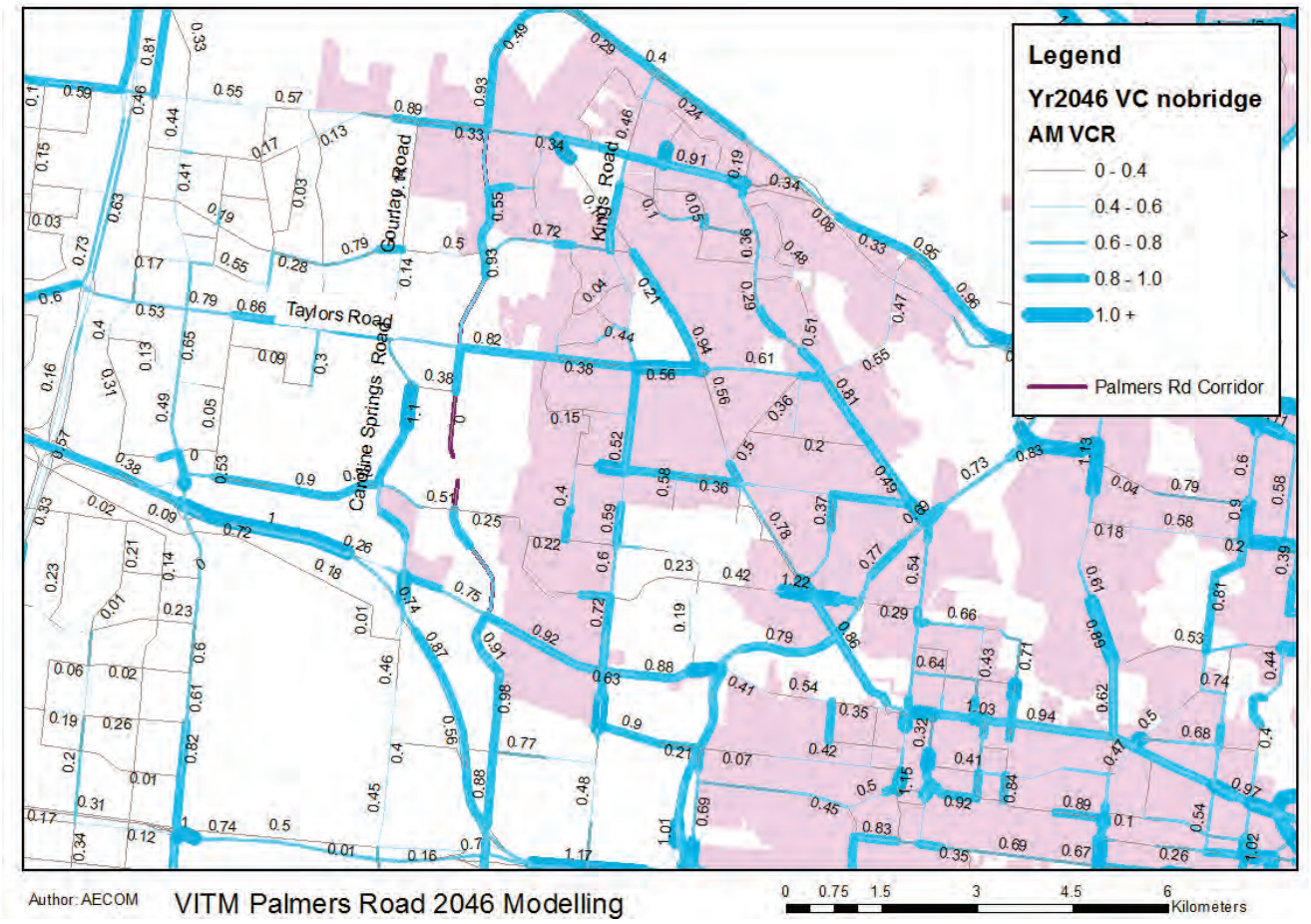


Figure 8-2 Base case scenario 2046 AM peak – Volume-capacity ratio

8.2.2 Existing Conditions Access

The Palmers Road Corridor, between the Western Freeway and Calder Freeway, is currently a single undivided carriageway with one traffic lane in each direction. A number of intersections, access and service lanes, public transport usage and bicycle facilities are present, a summary of which is provided in Table 8-2 to Table 8-6. This summary presents the Palmers Road Corridor in five sections, from south to north, as follows:

- Western Freeway to Foleys Road;
- Foleys Road to Western Highway;
- Western Highway to Taylors Road;
- Taylors Road to Melton Highway; and
- Melton Highway to Calder Freeway.

Table 8-2 Existing access and intersection arrangements for the Palmers Road Corridor (Western Freeway Foleys Road)

Feature	Western Freeway to Foleys Road
Corridor operates as:	Arterial road
Signalised intersections	• Western Freeway • Windsor Boulevard • Foleys Road / Riding Boundary Road
Un-signalised intersections	Nil
Roundabouts	Nil
Direct access	Nil
Service lanes	Nil
Public transport	Buses operate along this section. No stops are provided
Bicycle facilities	• Principal bicycle network • No provision of on/off-road facilities
Pedestrian facilities	• At signalised intersections
Railway level crossings	Nil

Table 8-3 Existing access and intersection arrangements for the Palmers Road Corridor (Foleys Road to Western Highway)

Feature	Foleys Road to Western Highway
Corridor operates as:	Arterial road
Signalised intersections	• Orbis Drive / Hatchlands Drive • Western Highway
Un-signalised intersections	• Quinn Street • Waigani Avenue • Vanessa Drive • Fuller Road
Roundabouts	Nil
Direct access	• Direct access for commercial properties between Quinn Street and Western Highway • Direct access for residential properties between the railway line and Quinn Street
Service lanes	One-way service lane between Foleys Road and Orbis Drive/ Hatchlands Drive
Public transport	Nil
Bicycle facilities	• Principal bicycle network • No provision of on/off-road facilities
Pedestrian facilities	• At signalised intersections
Railway level crossings	Melbourne-Ballarat Railway Line

Table 8-4 Existing access and intersection arrangements for the Palmers Road Corridor (Western Highway to Taylors Road)

Feature	Western Highway to Taylors Road
Corridor operates as:	Non-continuous local road, with Kororoit Creek Bridge not yet constructed
Signalised intersections	• Commercial Road / Inglewood Drive
Un-signalised intersections	• Elliot Court • Torowatta Place • Nicol Avenue • Rose Street • Billungah Place • Kelly Avenue • Carinya Boulevard • Roycroft Avenue • Tarcoola Drive • Earlington Boulevard • Fairweather Drive • Burnside Boulevard • Fydler Avenue • Waterview Road
Roundabouts	• Wenden Court • Landy Court / Burnside Shopping Centre • Rockbank Middle Road • Tenterfield Drive • Taylors Road
Direct access	Residential properties south of Kororoit Creek, to the east of the Corridor
Service lanes	One-way service lane between Nicol Avenue and Fydler Avenue (west side)
Public transport	Buses operate along this section. Six bus stops are provided on each side between Western Highway and Rockbank Middle Road
Bicycle facilities	• Principal bicycle network • On-road cycle path (south of Kororoit Creek) between Rockbank Middle Road and Western Highway • Off-road shared path (north of Kororoit Creek)
Pedestrian facilities	• Signalised crossing at Burnside Shopping Centre between Elliott Court and Landy Court • At signalised intersections and roundabouts • Pedestrian refuge at Nicol Avenue
Railway level crossings	Nil

Table 8-5 Existing access and intersection arrangements for the Palmers Road Corridor (Taylors Road to Melton Highway)

Feature	Taylors Road to Melton Highway
Corridor operates as:	Secondary arterial road
Signalised intersections	Melton Highway
Un-signalised intersections	• Wells Avenue • Taylors Hill Boulevard • Contursi Drive • Allenby Road • Meade Way • Catherine Drive
Roundabouts	• Loddon Drive • Hume Drive • Community Hub
Direct access	• Commercial properties located between Taylors Road and Wells Avenue • Sydenham Baptist Church
Service lanes	One-way service lane between Melton Highway and Pioneer Park (east side)
Public transport	Buses operate along this section. Several stops are provided on both sides between Hume Drive and Melton Highway.
Bicycle facilities	• Principal bicycle network • Existing off-road shared path
Pedestrian facilities	• At signalised intersections and roundabouts
Railway level crossings	Nil

Table 8-6 Existing access and intersection arrangements for the Palmers Road Corridor (Melton Highway to Calder Freeway)

Feature	Melton Highway to Calder Freeway
Corridor operates as:	Secondary arterial road
Signalised intersections	Nil
Un-signalised intersections	• Erskine Way • Glenbruar Drive (southern end) • Manchester Drive (southern end) • Victoria Road • Calder Freeway
Roundabouts	• Glenbruar Drive (northern end) / Manchester Drive (northern end)
Direct access	Calder Park Raceway
Service lanes	Nil
Public transport	Buses operate between Melton Hwy and Glenbruar Drive, but no stops are provided
Bicycle facilities	• Principal bicycle network • Existing off-road shared path between Glenbruar Drive and Melton Highway
Pedestrian facilities	• At roundabouts
Railway level crossings	Melbourne-Bendigo / Sunbury Railway Line

In summary, the non-continuous Palmers Road Corridor currently contains:

- Sections that are designated arterial, secondary arterial and local road;
- Seven signalised and 38 un-signalised intersections, including nine roundabouts;
- Pedestrian facilities, including both signalised and un-signalised crossings;
- Two railway crossings at road level;
- Facilities that form part of the Principal Bicycle Network, including both on and off road paths and
- Bus routes and stops.

8.3 Assessment of Likely Effects and Design and Mitigation Responses

This section outlines the potential effects on road safety and capacity of the Project. Measures to avoid or minimise significant effects on road safety and capacity are proposed where applicable. An evaluation of compliance and residual impact was completed in response to the relevant draft evaluation objective from the EES Scoping Requirements.

As defined in Chapter 7, the evaluation of compliance and residual impact rating guide for road safety and capacity investigated in this EES is provided in Table 8-7. The outcome of this assessment is provided in Section 8.5.

Table 8-7 Evaluation of compliance and residual impact rating guide – Road Safety and Capacity

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Road Safety and Capacity To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.	Traffic modelling: • Traffic volumes and congestion • Travel times Access • Access arrangements and connectivity • Road safety	Planning and Environment Act 1987 Road Management Act 2004 Guide to Traffic Management Part 5: Road Management (Austroads 2014) Victoria's Road Safety Strategy 2013-2022 (Victorian Government 2013) SmartRoads (VicRoads 2011)	Major improvement in transport network capacity, connectivity and safety Strong policy compliance Best practice (incl. mitigation measures)	Moderate improvement in transport network capacity, connectivity and safety Good policy compliance Improved practice (incl. mitigation measures)	Minor improvement in transport network capacity, connectivity and safety Partial policy compliance Standard practice (incl. mitigation measures)	Negligible improvement in transport network capacity, connectivity and safety Policy non-compliance Poor practice (incl. mitigation measures)	Reduced transport network capacity, connectivity and safety Major policy non-compliance Very poor practice (incl. mitigation measures)

8.3.1 Traffic Volumes and Congestion

Traffic modelling was undertaken by AECOM (2015b) for a base case and three scenarios in the future year of 2046. DTPLI's Victorian Integrated Transport Model (VITM) was applied, taking into account the future development throughout the western growth area and validated against traffic counts undertaken in 2011.

The four modelled scenarios listed below, reflect different configurations of the Palmers Road Corridor in 2046:

- Two lanes (one lane each way) with no bridge (the base case, or 'no project');
- Two lanes (one lane each way) with bridge;
- Four lanes (two lanes each way); and
- Six lanes (three lanes each way).

The congestion levels were calculated, based on the length of corridor experiencing traffic volumes at 80% of capacity or greater during peak periods. The percentage of peak direction travel in congestion conditions are summarised in Table 8-8. The no bridge base case is not listed here as this section of the road is currently incomplete and carries very little local traffic.

Table 8-8 Percentage of peak direction travel in congested conditions (Volume Capacity Ratio> 0.8) 2046:

Configuration	Congested travel
Two lanes	68%
Four lanes	55%
Six lanes	20%

The congested travel information in Table 8-8 represents the proportion of the Palmers Road Corridor at which the Volume Capacity Ratio exceeds 80%, the threshold at which a road is considered congested.

Upgrading the road from two lanes to four lanes improves the network performance and allows for an increase in traffic volumes on the road. Upgrading from four- to six lanes provides a further increase in network performance while allowing even greater volumes of traffic. Analysis of travel in the modelled AM peak in 2046 indicates that even at four lanes, the Palmers Road Corridor is operating over capacity, with more than half of the corridor experiencing traffic levels at or above 80% of capacity. Figure 8-3 to Figure 8-5 show this visually, presenting the modelled VCRs along the Palmers Road Corridor and the surrounding network for the base-case and the two, four and six lane scenarios. These figures demonstrate the regional traffic benefits of constructing the Kororoit Creek bridge and providing six lanes along the Corridor. Figure 8-3 to Figure 8-5, suggests that the levels of congestion forecast for the narrower configurations are a disincentive to use the corridor. A higher capacity in the Palmers Road Corridor (ultimately six lanes) would significantly improve the performance of the regional road network and facilitate further strategic north-south movements. Reduced levels of congestion and higher levels of service, best achieved in the six lane scenario, will attract traffic from adjacent corridors, as shown in Figure 8-6, which is important given the public transport demands within those adjacent corridors. The Palmers Road Corridor would become the major north-south route situated between the Western Ring Road and the proposed OMR.

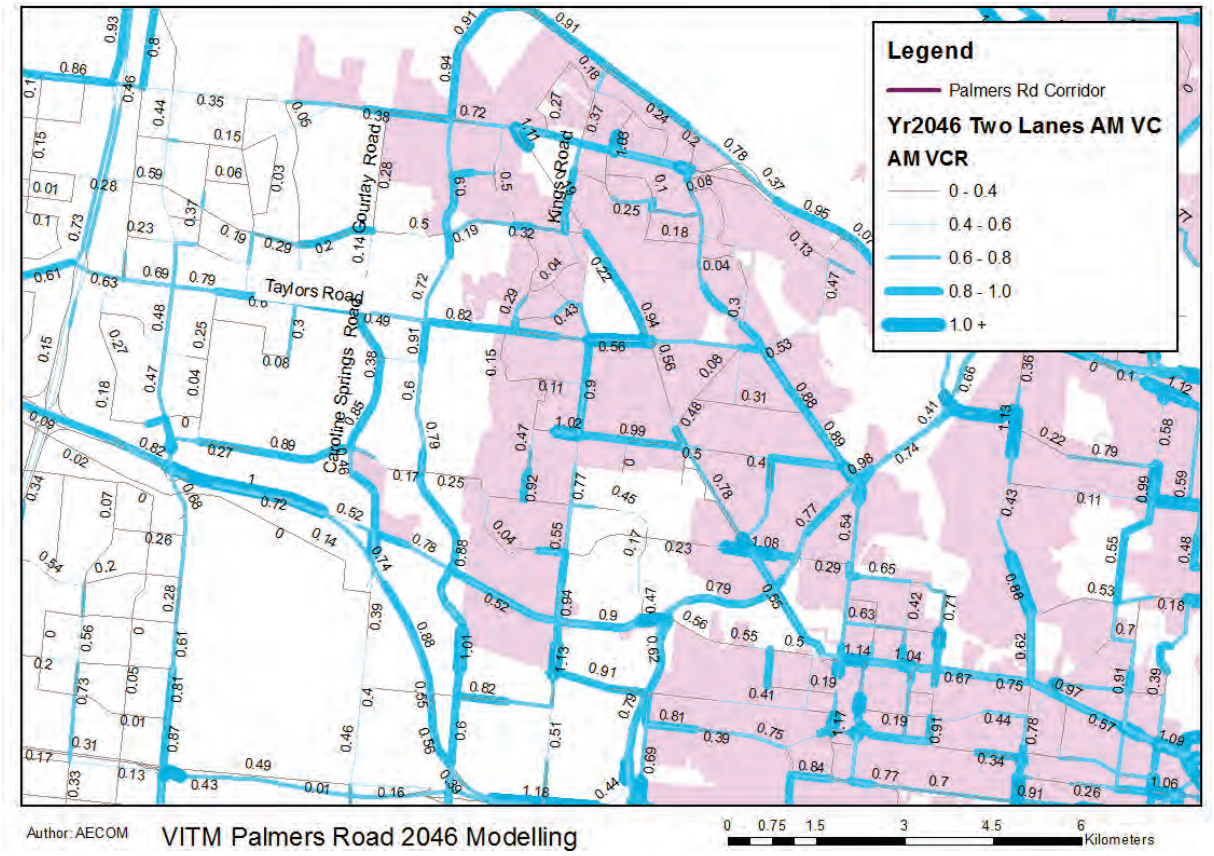


Figure 8-3 **Two lane scenario 2046 AM peak – Volume-capacity ratio**

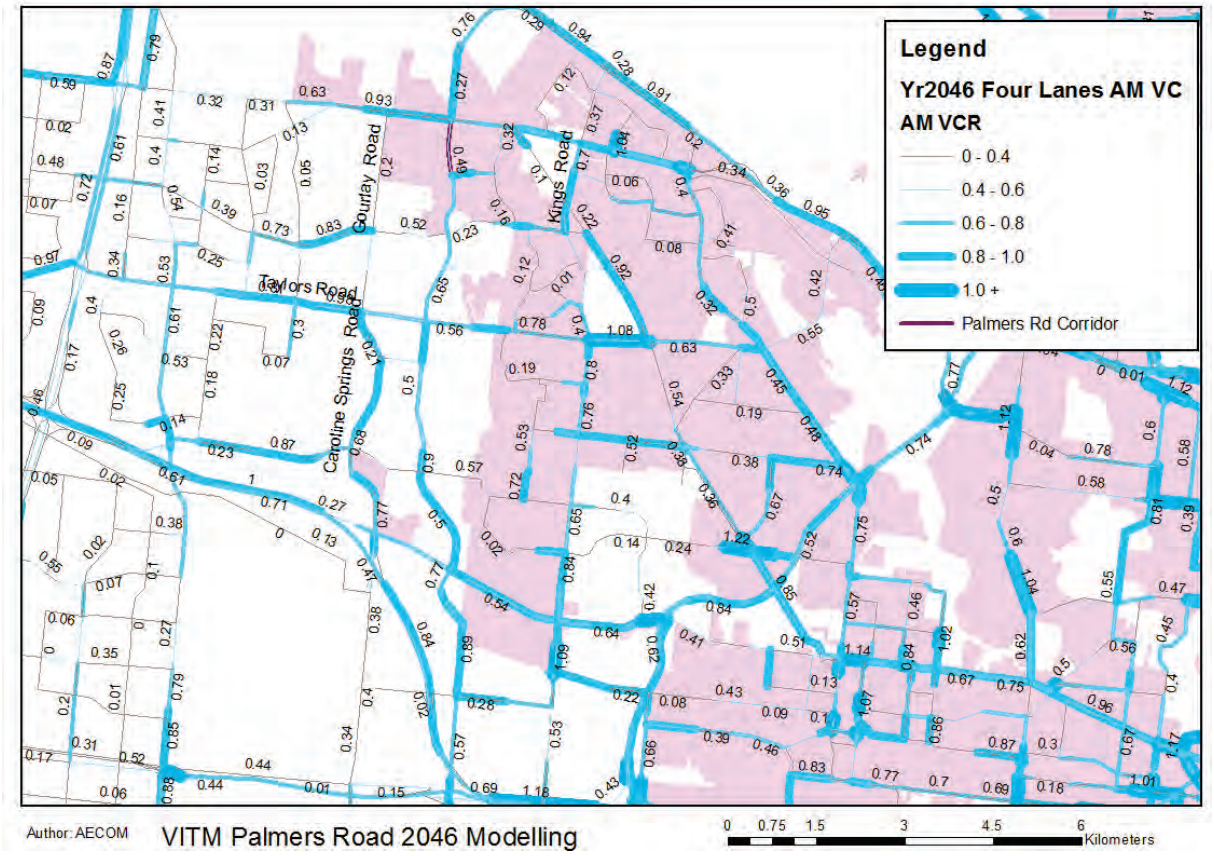


Figure 8-4 **Four lane 2046 AM Peak – Volume Capacity Ratio**

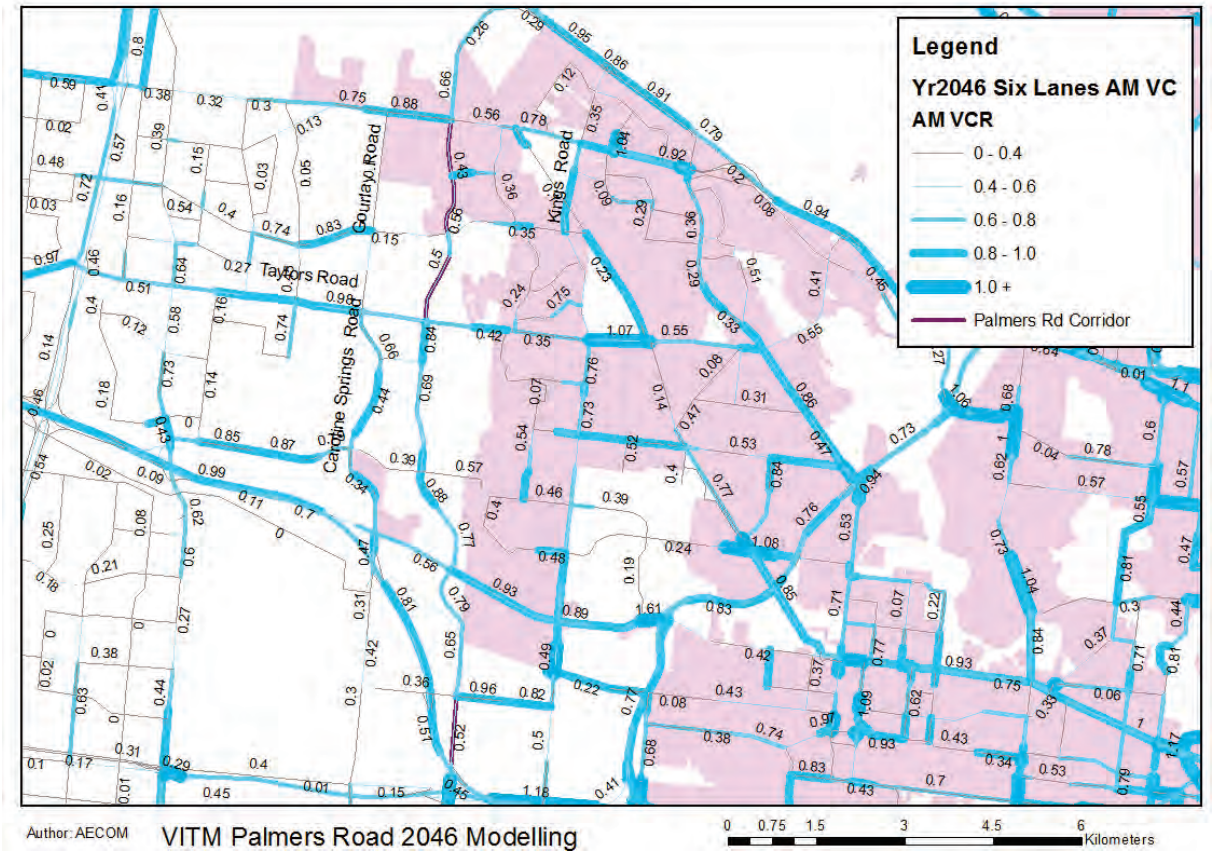


Figure 8-5 Six Lane 2046 AM Period – Volume Capacity Ratio

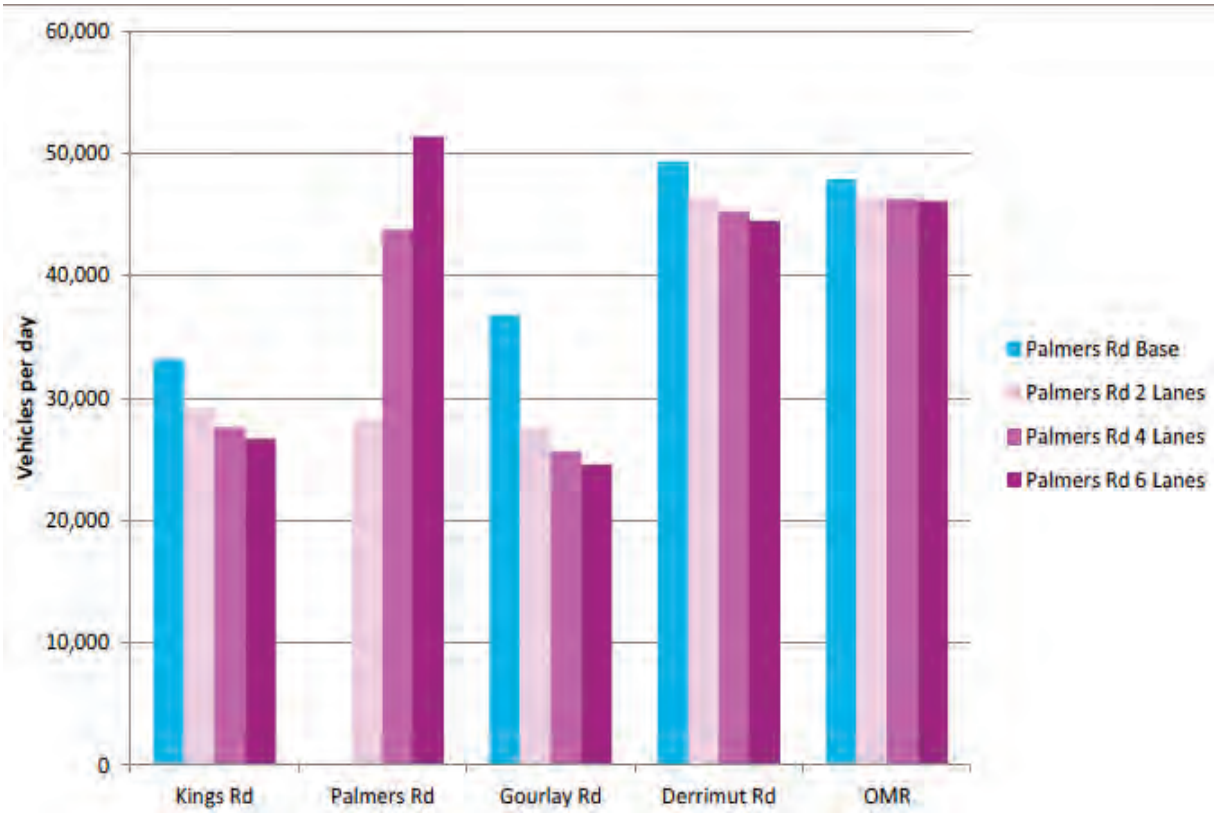


Figure 8-6 Change in traffic volumes on the Palmers Road and adjacent corridors (in 2046)

Figure 8-7 shows the modelled difference in traffic volumes between the two lanes and base case scenarios in 2046, highlighting an expected increase in traffic volumes along the Palmers Road Corridor, and a decrease on adjacent north-south corridors. This demonstrates that the completion of the Kororoit Creek bridge will enable the Palmers Road Corridor to operate as a more efficient arterial road.

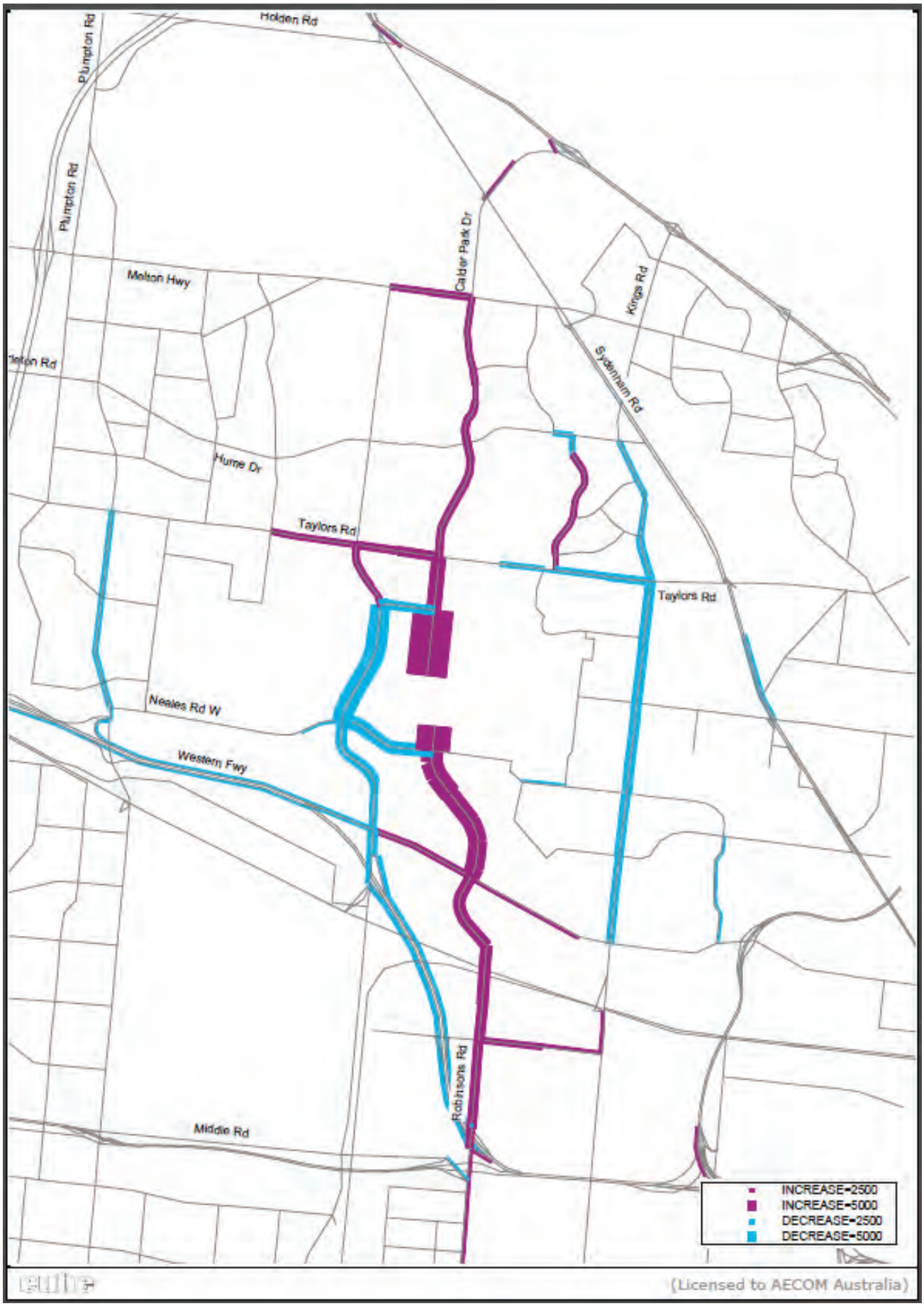


Figure 8-7 Difference between two lane scenario and Base Case

The modelling indicates that traffic increases on the Palmers Road Corridor when the Kororoit Creek bridge is complete. It also indicates that traffic on the surrounding network will reduce when it commences acting as an arterial.

Table 8-9 Modelled daily volumes with and without the Kororoit Creek Bridge (two lanes in 2011 and 2046)

Location	2011		2046	
	no bridge	with bridge	no bridge	with bridge
Palmers Road Corridor				
• Westwood Drive south of Ballarat Road	5,900	6,600	17,100	20,600
• Westwood Drive north of Ballarat Road	5,100	6,300	12,600	19,500
• Westwood Drive south of Rockbank Middle Road	6,300	5,800	14,800	22,600
• Westwood Drive south of Commercial Road (bridge)	0	4,600	0	19,000
• Calder Park Drive south of Taylors Road	0	4,600	24,000	28,200
• Calder Park Drive north of Taylors Road	2,100	3,800	20,000	21,000
Selected surrounding roads				
• Ballarat Road east of Westwood Drive	42,500	42,300	61,300	59,700
• Ballarat Road west of Westwood Drive	40,500	40,000	54,900	53,500
• Taylors Road east of Calder Park Drive	14,400	15,000	56,000	54,200
• Taylors Road west of Calder Park Drive	13,600	13,300	46,500	48,000

The different 2046 modelled traffic volumes for the existing conditions (base case), 2 lane, 4 lane and 6 lane scenarios is shown in Figure 8-8. The difference in 2046 modelled traffic volumes for the six lane scenario relative to the two-lane scenario is shown in Figure 8-9. These figures highlight how, with increasing capacity, the Palmers Road Corridor operates as a primary arterial with increasing efficiency and therefore attracts more traffic. Figure 8-9 also demonstrates that with increased capacity along the Palmers Road Corridor, improvements in traffic conditions across the broader region will occur.

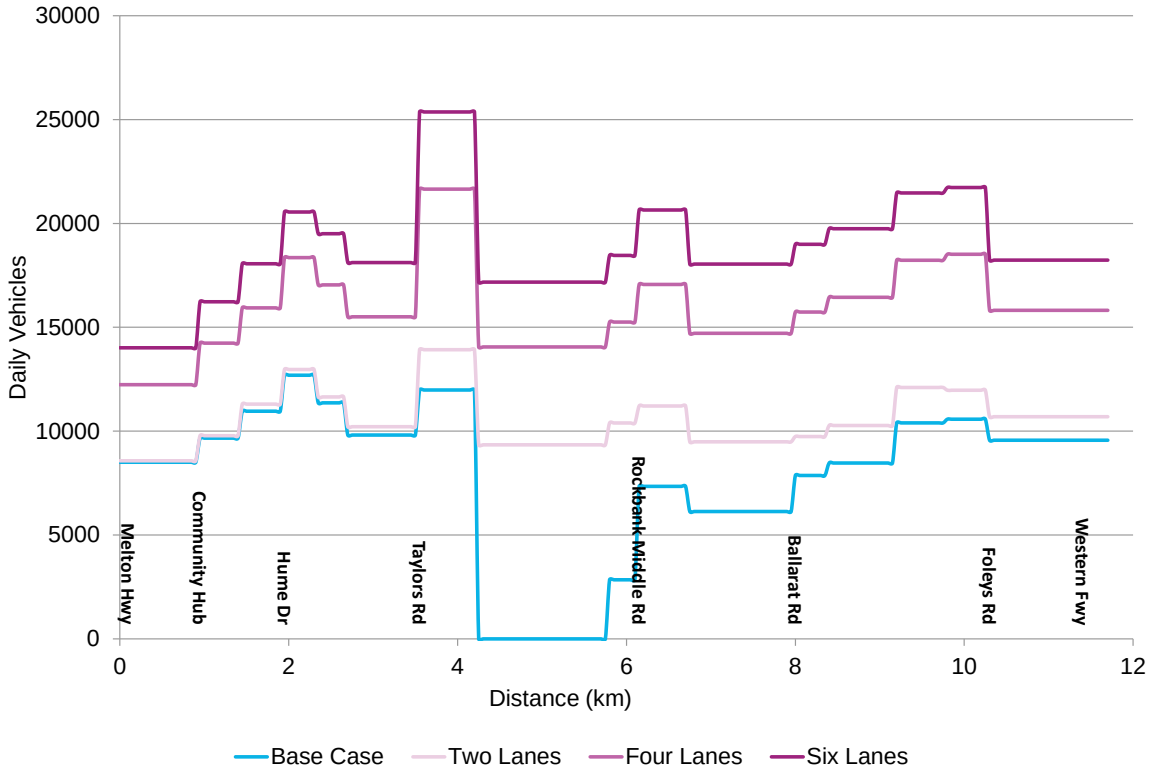


Figure 8-8 **Palmers Road Corridor Southbound 2046 Daily volumes for Base Case (two lanes), Four Lane and Six Lane scenarios**

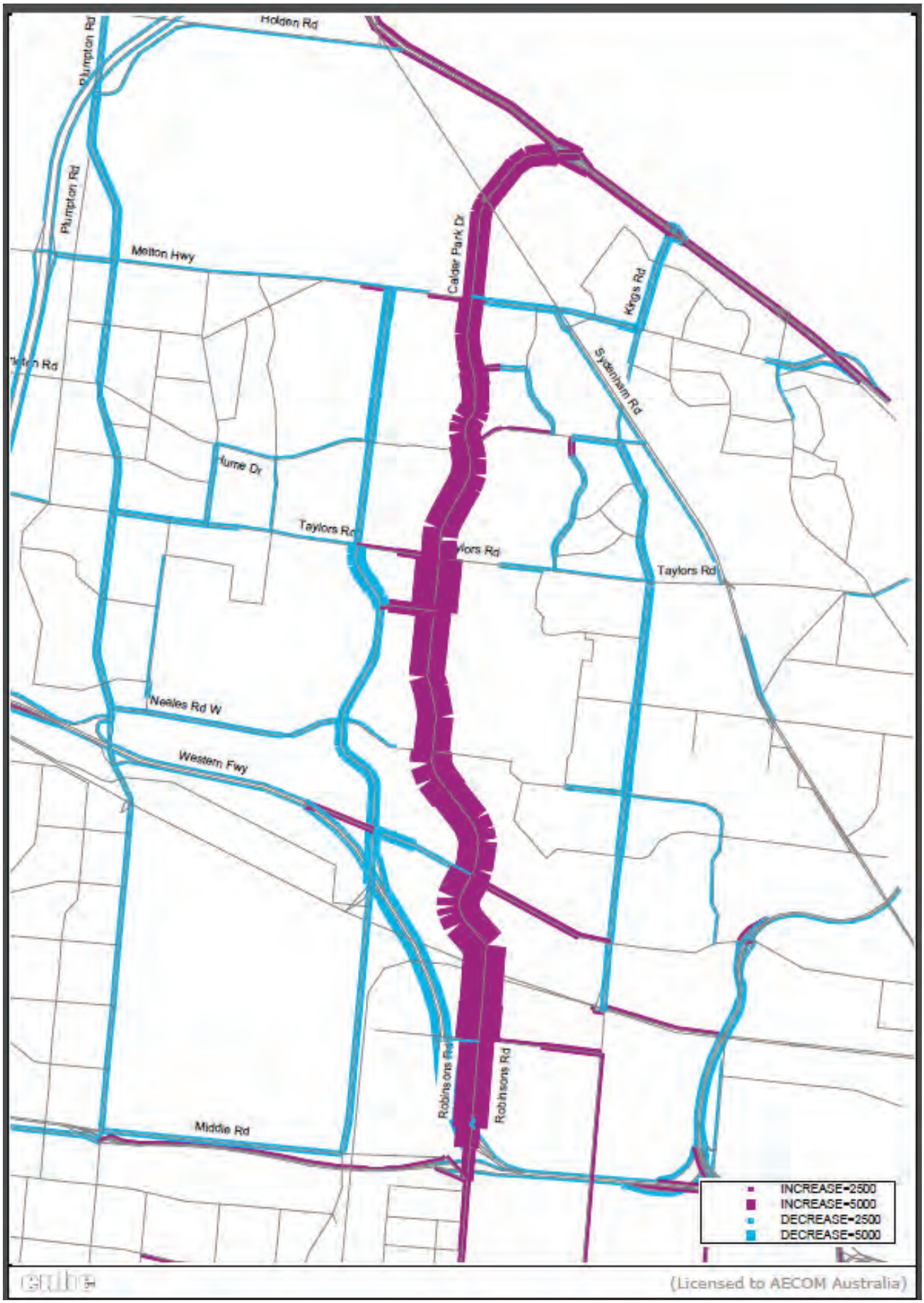


Figure 8-9 Modelled difference in 2046 traffic volumes between six lane scenario and two lane scenario

8.3.2 Travel Times

The higher levels of service realised by a six lane scenario along the length of the corridor (as discussed above), also results in improved modelled travel times. Travel times improve not only within the Palmers Road Corridor, but also on adjacent north-south corridors, further emphasising how a six lane corridor would attract traffic from adjacent corridors and improve the overall efficiency of vehicular movements in the area.

Predicted travel times are summarised in the following tables, which set out travel times within the Palmers Road Corridor and adjacent corridors under each of the base case, two, four, and six lane 2046 scenarios. Travel times were modelled for the AM peak in both the northbound (Table 8-10) and southbound (Table 8-11) directions between the Western Highway and Melton Highway. While each of the routes are a similar distance, they are not equal. The comparison for each should be made against the base case for the same route rather than against alternative roads.

The biggest improvements in travel time are observed in Table 8-11. This compares the southbound direction, as this is the peak AM traffic flow. The results indicate that reducing congestion on the major parallel routes improves the level of service of these routes. As some of these routes are principal public transport routes, such as Gourlay Road, the improved levels of service provide better opportunities for bus priority measures.

Table 8-10 Comparison of travel times (mins) with different upgrade configurations: northbound - Western Hwy to Melton Hwy 2046

Corridor	Palmers Road (base case, two lanes, no bridge)	Palmers Road (two lanes)	Palmers Road Four Lanes	Palmers Road Six Lanes
Palmers Road Corridor	-	14.6	12.2	11.5
Station Road – Kings Road	18.3	18.2	17.5	17.3
Gourlay Road	17.2	16.4	15.9	15.9
Derrimut Road	11.8	11.8	11.7	11.7
OMR	7.2	7.2	7.2	7.2

Table 8-11 Comparison of travel times (mins) with different upgrade configurations: southbound - Western Hwy to Melton Hwy 2046

Corridor	Palmers Road (base case, two lanes, no bridge)	Palmers Road (two lanes)	Palmers Road Four Lanes	Palmers Road Six Lanes
Palmers Road Corridor	-	18.4	14.4	12.7
Station Road – Kings Road	20.9	20.7	19.0	18.6
Gourlay Road	20.3	19.2	17.8	17.0
Derrimut Road	13.4	13.3	13.0	12.9
OMR	7.3	7.3	7.2	7.2

8.3.3 Traffic Assessment

The six lane scenario traffic assessment results in a rating of 'Very Well' against the draft evaluation objective 'Travel Times, traffic volumes and congestion', as this scenario results in the lowest travel time and a lower level of congestion whilst easing traffic volumes on the surrounding road network. The four lane scenario rates 'Well' as it would experience higher levels of congestion and longer travel times. The two lane connected scenario is rated "Neutral", while the base case is "Very Poor". The assessment is summarised in Table 8-12.

Table 8-12 Traffic Assessment against EES Objective (traffic volumes and travel times)

Scenario	Traffic Assessment against EES objective (traffic volumes and travel times)
Base Case	**Poor**
Two lane	**Neutral**
Four Lane	**Well**
Six Lane	**Very Well**

8.3.4 Access Arrangements and Connectivity

The improvements that are proposed to the existing access arrangements would enable the upgraded Palmers Road Corridor to be designed in accordance with Austroads Guidelines for Category 2A or 2B roads, depending on the features of each section of the corridor. The corridor has been planned in an existing road reserve that has been developed along most sections of the corridor. Therefore to account for the existing development and available road reservation the proposal allows for Category 2A road in some sections of the corridor and Category 2B road in other sections.

The proposed access improvements in the Palmers Road Corridor are summarised in Table 8-13.

Table 8-13 Summary of proposed improvements to the existing access arrangements in the Palmers Road Corridor

Section of the corridor	Proposed access arrangements
Western Freeway to Foleys Road	This section of the corridor would be designed as a Category 2A road, given the intersection spacing is generally 700m to 800m. Key access features are: • Retention of the three existing signalised intersections, • Restricting other connections to the corridor to retain spacing between intersections
Foleys Road to Western Highway	This section of the corridor would be designed as a Category 2A/2B road, given the intersection spacing is generally greater than 400m . Key access features are: • Retention of the one-way service lanes and signalised intersections • Installation of signals at the Waigani Avenue and Vanessa Drive intersections • Changing of all other intersections to left-in/left-out arrangements, except Quinn Street, which would be closed and all access would subsequently occur via Deer Street • Incorporation of a one-way service lane for the commercial properties along Westwood Drive • Provision of U-turn bays at mid-block locations if required (not at signalised intersections). The locations to be determined closer to construction. • 163 Robinsons, 5 and 7-9 Westwood Drive will have access restoration via Fuller Road • Grade separation of the Melbourne-Ballarat Rail crossing.

Section of the corridor	Proposed access arrangements
Western Highway to Taylors Road	This section of the corridor would be designed as a Category 2B road, as the number of municipal roads requiring access. Key access features are: • Provision of one-way service lane on both sides that runs parallel to Westwood Drive, which would provide access to/from this corridor • Retention of the existing signalised intersection at Westwood Drive and Western Highway intersection • Conversion of the existing roundabouts to signalised intersections at Landy Court / Burnside Shopping Centre car park, Rockbank Middle Road and Taylors Road • Provision of signalised intersections at Kellys Avenue, Tenterfield Drive and Commercial Road / Inglewood Drive • Provision of U-turn bays at mid-block locations if required (not at signalised intersections). The locations to be determined closer to construction. • Limit other municipal roads which provide access to this corridor to left-in / left-out arrangements.
Taylors Road to Melton Highway	This section of the corridor would be designed as a Category 2A road given the intersection spacing is typically greater than 400m. Key access features are: • Retention of the existing signalised intersection at Calder Park Drive and Melton Highway intersection • Conversion of the existing roundabouts to signalised intersections at Loddon Drive / George Street, Hume Drive, and Community Hub • Limit other municipal roads that provide access to this corridor to left-in / left-out arrangements • Provision of U-turn bays at mid-block locations if required (not at signalised intersections). The locations to be determined closer to construction. • Prevention of other connections to the corridor.
Melton Highway to Calder Freeway	This section of the corridor would be designed as a Category 2A road given the intersection spacing is typically greater than 400m. Key access features are: • Retention of the existing signalised intersection at Calder Park Drive and Melton Highway intersection • Installation of signals at the Glenbruar Drive / Manchester Drive intersection • Limit other municipal roads that provide access to this corridor to left-in / left-out arrangements • Grade separation of the Melbourne-Bendigo Rail crossing • Grade separation of the Calder Freeway interchange.

8.3.5 Public Transport

Public transport would continue to be catered for where designated within the existing scenario, with on-road bus stops, particularly the section between Rockbank Middle Road and Western Highway, which is designated as a “Bus Priority Route” within the VicRoads’ SmartRoads scheme.

The details and locations for bus stops will be determined in conjunction with Public Transport Victoria at the detailed design stage when the future public transport needs can be more clearly understood. The design will allow for new kerbside bus stops and refer to relevant AustRoads and VicRoads guidance, as discussed in Section 8.1.4.

8.3.6 Pedestrians

Shared footpaths will be provided on both sides of the Palmers Road Corridor with dedicated controlled facilities at all signalised intersections. The need for additional crossing facilities away from the signalised intersections will be assessed and considered during the detailed design stage when local attractors/destinations can be better confirmed at that time. All crossings will cater for the vision and mobility impaired.

8.3.7 Bicycles

The Palmers Road Corridor will provide off-road shared use paths for pedestrians and cyclists on both sides of the corridor. Connections between the north-south route, current and proposed east-west routes, and other bicycle corridors will be considered. This will include to/from the Wellness Trail, Ravenhall Nature Conservation Reserve, East-West shared path (parallel to the Melbourne –Ballarat Railway Line), Kororoit Creek Trail, and Organ Pipes National Park.

8.3.8 Summary of Access Implications during Construction

There will be some disruption to pedestrian movements, bicycle connectivity, public transport and motor vehicle traffic during the project construction phase. The presence of construction sites immediately adjacent to the existing road will require a higher level of driver awareness. Implications for resident and local business access in the area will be considered closer to the construction phase. During the detailed design phase, a construction staging plan and methodology will be developed, with a view to minimising disruption as far as practicable.

The level of impact to access arrangements will be dependent on the sequencing and duration of construction activities, and which activities are occurring in a particular area. The types of impacts may include:

- Movement of construction vehicles both along the corridor and other roads. The type and number of construction vehicles will depend on the detailed design and the type of activities underway, for example earthworks or haulage of materials to the site. A Traffic Management Plan will be developed by contractors in consultation with relevant stakeholders to minimise the potential impacts of construction traffic.
- Temporary road closures may affect vehicle, pedestrian and cyclist routes, including access along the corridor and onto it from the surrounding street network. Public transport and emergency services along and across the corridor may potentially also be affected. However, emergency service access will be retained. Construction works may require detours and increase travel times. Ultimately, travel times for all users are expected to improve following the upgrade works.
- Reduction in speed limits resulting in slightly longer travel times to and from user destinations.

There may also be some disruption to the rail network and the Calder Freeway, during construction of the grade separations. Mitigation is likely to include some night works, potentially with the inclusion of rail replacement buses as currently occurs during weekend occupations across the network.

Impacts will be managed through measures outlined in the Environmental Management Framework (see Chapter 16), and communicated through the local area prior to the commencement of new construction phases.

Overall, the access arrangements set out above align with policy and legislation listed in Table 8-7. The arrangements are therefore consistent with and provide support to the overall planning and operation framework for the road network in the west of Melbourne.

8.3.9 Road Safety

Improved road safety is one of the key objectives of the Project. The upgraded Palmers Road Corridor will predominately be a Category 2A road that will ensure that the arterial corridor operates at increased levels of safety and efficiency. There are a number of factors that contribute to road safety for all users of the road reserve including vehicles, cyclists and pedestrians, which are largely underpinned by the cross section design of the corridor and the access management arrangements to be implemented.

The proposed cross-section, shown in Chapter 5 ‘Project Description’, shows:

- Dual three lane carriageways, divided by a central median with intersection improvements designed to maximise safety outcomes.
- Shared off-road cycle/footpath to be constructed in the verges on both sides of the corridor, and connect into other off-road shared trails in the area. In some locations cycle paths may be provided on-road (requiring consideration when designing intersections).

The existing access and intersection arrangements of each section of the Palmers Road Corridor are identified in Table 8-2 to Table 8-6. Once the route is connected along Westwood Drive over Kororoit Creek, the whole route would commence to function as an arterial road. The crash history is therefore likely to change once the route starts to perform a different function when traffic volumes increase and increase conflict between all modes of transport.

Separation of opposing traffic directions, construction of grade separations at railway crossings and the Calder Freeway, and installation of dedicated paths for bicycles and pedestrians with signalised crossings, maximises the safety (and transport efficiency) outcomes for the Palmers Road Corridor. Further safety benefits would be realised through limiting access and minimising interactions with local and through traffic.

A shared cycle/footpath would be provided. Pedestrian fences may also be installed in locations to direct pedestrians to formal signalised crossings, as additional crossings away from intersections are not currently proposed, but will be considered in response to future demand.

In accordance with the Austroads Guidelines (summarised in Table 8-1), the majority of the upgraded road will be assigned as 'Category 2A' with one section of 'Category 2B' as identified in Table 8-13.

8.3.10 Access Assessment

The base case scenario access assessment results in a rating of 'poor' against the draft evaluation criteria 'accessibility and safety for users (vehicles, pedestrians and cyclists)' where most of the existing conditions is non-compliance to the policy, and results in mostly negative impacts. When Kororoit Creek Bridge is proposed under the two lane scenario, the rating for the proposal shows improvement and compliance to the policy. Therefore the proposal is rated neutral under two traffic lanes scenario. For the four traffic lanes scenario and six traffic lanes scenario there is further progressive improvement rating and well and very well. The assessment is summarised in Table 8-14.

Table 8-14 Access Assessment against EES objective accessibility and safety for users

Scenario	Access Assessment against EES objective accessibility and safety for users (vehicles, pedestrians and cyclists)
Base Case	**Poor**
Two lane	**Neutral**
Four Lane	**Well**
Six Lane	**Very Well**

8.4 Overall Road Safety and Capacity Assessment

At six lanes, the Palmers Road Corridor would achieve the following outcomes.

- Provide sufficient capacity to attract traffic away from adjacent corridors, which are designed under SmartRoads as Public Transport routes. This would reduce congestion, improve efficiency and reliability of services along adjacent corridors, which would encourage higher usage and a mode shift towards public transport;
- Improve journey time, reliability and safety through the removal of the two level crossings, one for the Melbourne-Ballarat line and one for the Melbourne-Bendigo line;
- Achieve high levels of safety for all users of the corridor with separated carriageways, dedicated off road cycle/pedestrian paths and controlled crossing facilities at all signalised intersections; and
- Surrounding residences will experience more efficient access to the wider transport network.

The evaluation objective for road safety and capacity is *'to improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes'.*

The assessment of the development scenarios for the Palmers Road Corridor against this objective is shown in Table 8-15. The overall performance of each scenario in relation to the two specialist reports which considered access arrangements and connectivity; road safety; traffic volumes and congestion; and travel times, from which an overall rating for each scenario was calculated.

Table 8-15 Assessment against 'Road Safety and Capacity' EES Evaluation Objective

Scenario	Overall assessment against EES Evaluation Objective 'Road Safety and Capacity'
Base Case	**Poor**
Two lane	**Neutral**
Four lane	**Well**
Six lane	**Very Well**

8.5 Conclusion

The project demonstrates a strong level of compliance with planning policy and Austroads Guidelines, while maintaining appropriate access into the local road and street network. Traffic modelling indicates that introducing the bridge over Korroit Creek will increase traffic on the Palmers Road Corridor, as it completes the corridor to provide a north-south arterial that will draw traffic from the surrounding road network and improve traffic flow along the corridor itself and in the surrounding road network.

Upgrading the road from two lanes to four lanes improves the network performance and allows for an increase in traffic volumes on the road. Upgrading from four- to six lanes provides a further increase in network performance while allowing even greater volumes of traffic.

The evaluation objective for road safety and capacity is *'to improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes'.*

Overall, the six lane scenario results in a rating of 'Very Well' against the draft evaluation criteria. The four lane scenario rates 'Well'. The two lane connected scenario is rated "Neutral", while the base case is rated as "Poor".

9 AMENITY AND ENVIRONMENTAL QUALITY

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.3 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – *To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.*

Key issues

- The potential for increases in noise levels from the project's operation to significantly affect amenity in adjacent residential and parkland areas.
- The potential for increased vehicle traffic to adversely affect local air quality, relative to State Environmental Protection Policy.

Priorities for characterising the existing environment

- Characterise the existing noise setting in the adjacent established residential areas, and at other sensitive urban receptors.

Design and mitigation measures

- Identify potential and proposed design responses and/or other mitigation measures to avoid, reduce and/or manage any significant noise effects for sensitive receptors during project operation, in the context of applicable planning policy and VicRoads Traffic Noise Reduction Policy 2005.

Assessment of likely effects

- Assess likely noise increases at sensitive receptors along the road corridor during its operation, both with and in the absence of the proposed mitigation measures.

Approach to manage performance

- Measures to manage other potential effects on amenity and environmental quality, including dust from the project construction, should also be addressed in the EES, including as part of the EMF.

Information presented in the following sections draws on the following technical specialist reports and other input which has been prepared to document the potential impacts of the Project:

- Palmers Road Corridor EES (Western Freeway to Calder Freeway) Traffic Noise Assessment (AECOM, 2015d)
- Air Quality Assessments – Palmers Road Corridor (Western Freeway, Ravenhall to Calder Freeway, Calder Park) Memorandum (VicRoads, 2013)

9.1 Legislative and Policy Context

9.1.1 Operational Noise

VicRoads has a Traffic Noise Reduction Policy (VicRoads, 2005) that is used for the treatment of traffic noise from new, upgraded and existing roads and freeways. Under the Policy, application is required where:

- Arterial roads and freeways are built on new alignments; and/or
- Existing arterial roads or freeways are widened by two or more lanes and buildings previously protected from traffic noise are exposed by removal of buildings required for widening.

In these cases, noise attenuation will be provided when noise levels exceed defined thresholds, as follows:

- Category A – For residential dwellings, aged persons home, hospitals, motels, caravan parks and other buildings of a residential nature, the noise level will be 63 dB(A) L10,18hr measured between 6 am and midnight;
- Category B – For schools, kindergartens libraries and other noise-sensitive community buildings the noise level objective will be 63 dB(A) L10,12hr measured between 6 am and 6 pm;
- Where the noise level adjacent to Category A and B buildings prior to road improvements is less than 50 dB(A), consideration will be given to limiting the noise level increase to 12 dB(A).

9.1.2 Characteristics of Noise

There are some basic noise characteristics that apply to traffic noise and can be used to give a better understanding of the characteristics of road traffic noise. Some common noise characteristics are:

- a doubling or halving of the energy or sound pressure level of a noise source will result in a change of 3 dB(A);
- a 3 dB(A) change in a highly variable noise source such as an arterial road noise is not noticeable;
- a change of 5 dB(A) is clearly audible and noticeable;
- a change of 10 dB(A) is very noticeable and is regarded as a doubling or halving of the apparent loudness of the noise source. A change of 10 dB(A) also represents a tenfold increase or a tenth of the energy of a noise source. The change in traffic volume from 10,000 to 100,000 vehicles per day results in an increase of 10 dB(A); and
- a doubling or halving the distance between a line source of noise (typically a road) and a receptor will change the noise level by 3 dB(A); for a point source the change will be 6 dB(A).

9.1.3 Construction Noise

The EPA Environmental Guidelines for Major Construction Sites (Publication No. 480) and the VicRoads Noise Guideline – Construction and Maintenance Works 2007 are used to guide construction noise management for major road projects such as the Palmers Road Corridor project.

9.1.4 Air Quality

There are two State based air quality policies that apply to the management of air quality in Victoria; namely the State Environment Protection Policy (Air Quality Management) (SEPP (AQM)) and the SEPP (Ambient Air Quality) (SEPP (AAQ)). The SEPP (AQM) establishes the framework for managing emissions into the air environment in Victoria from all sources of pollutants, to enable achievement of the air quality objectives outlined in SEPP (AAQ). The management framework and program for protection of the air environment contained in SEPP (AQM) addresses the management of particular sources such as motor vehicles and local air quality impacts including air toxics, odorous pollutants, greenhouse gases and ozone depleting substances.

The SEPP (AQM) specifies that the air quality impacts of a new or upgraded transport corridor (including roads) be assessed using an approved regulatory near-road air quality model.

To assess road projects (new road projects or modifications to existing roads) that have the potential to cause adverse air quality impacts, VicRoads (in consultation with EPA Victoria) has developed an Air Quality Screening Tool (AQST). The AQST is used to assess compliance against the SEPP (AQM) using a worst case approach. The screening tool is used by VicRoads to determine if more comprehensive near-road air pollutant modelling is required.

9.2 Existing Conditions

9.2.1 Noise

Traffic noise measurements were undertaken by AECOM in 2013 and 2014 at seven locations to determine the existing noise levels along the Palmers Road Corridor. These measurements supplement those previously undertaken at four locations in 2008 and 2009. Measurements were taken in Hillside, Sydenham, Taylors Hill, Burnside Heights, Burnside, Deer Park and Derrimut. Table 9-1 shows the average measured existing noise levels at the ten locations in the Palmers Road Corridor.

Table 9-1 Summary of measured noise levels (north to south along the corridor)

Address	Traffic noise levels dB(A) $L_{A10\ (18\ hour)}$		
	Measured average noise level, excluding weekends	Measured average noise level, excluding adverse weather	Measured average noise level, excluding weekends and adverse weather
38 Kanmore Crescent, Hillside (2013)	61	61	61
72 Dundee Way, Sydenham (2013)	57	58	58
11 Padula Court, Hillside (2008)	65	-	-
21 Callista Circuit, Taylors Hill (2009)	59	59	59
7 Catani Court, Burnside Heights (2013)	59	59	59
141 Arbour Boulevard, Burnside (2014)	49	49	49
163 Arbour Boulevard, Burnside (2014)	48	48	47
311 Westwood Drive, Burnside (2008)	45	-	-
311 Westwood Drive, Burnside (2014)	57#	57	54
170 Robinsons Road, Deer Park (2008)	58	-	-
29 Grosvenor Crescent, Derrimut (2013)	67	67	67

No results were recorded at locations denoted by '-', due to adverse weather conditions throughout the September and October 2008 noise measurement period.
The 2014 measurements at this location were affected by local construction activities in the residential development to the east of Westwood Drive.

The measured noise levels indicate that the range of average current traffic noise is between 44 and 67 dB(A) $L_{A\ (18\ hour)}$ at the measurement locations. The 2008 noise measurements at 311 Westwood Drive are lower in comparison due to the low traffic volume on this road. The highest measured noise levels of 67 dB(A) $L_{A(18\ hour)}$ were at Grosvenor Crescent Derrimut, which is close to Robinsons Road.

9.2.2 Air Quality

The major land uses in the Palmers Road Corridor are residential, public use and business. There is currently no air quality monitoring stations within the Palmers Road Corridor. In the absence of local air quality monitoring data, a worst case scenario using default background concentrations supplied by the EPA in 2013 have been used for the Air Quality Screening Tool assessment.

9.3 Assessment of Likely Effects

This section outlines the results of the assessment of the potential noise and air quality effects on adjacent environments as a consequence of the Project. In accordance with the Scoping Requirements only the potential effects during operation have been investigated. An evaluation of compliance and residual impact assessment was completed in response to the relevant draft evaluation objective from the Scoping Requirements (Victorian Government, July 2013).

As defined in Chapter 7 'Evaluation Framework' the evaluation of compliance and residual impact rating guide for amenity and environmental quality in this EES is provided in Table 9-2. The outcome of this assessment is provided in Section 9.4.

Table 9-2 Evaluation of compliance and residual impact rating guide – Amenity and Environmental Quality

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Amenity and Environmental Quality To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable.	Extent of changes in noise levels at properties Number of receptor locations where air quality standards are exceeded	Environment Protection Act 1970 Planning and Environment Act 1987 Traffic Noise Reduction Policy (VicRoads 2005) Environmental Guidelines for Major Construction Sites (EPA 1996) SEPP Air Quality Management (EPA 2001)	Applicable air and noise standards met for nearby residents and land uses Strong policy compliance Best practice	Minor exceedances of air and noise standards for small number of nearby residents and land uses Good policy compliance Improved practice	Minor exceedances of air and noise standards for a large number of nearby residents and land uses Partial policy compliance Standard practice	Major exceedances for a small number of nearby residents and land uses Policy non-compliance Poor practice	Major exceedances for a large number of nearby residents and land uses Major policy non-compliance Very poor practice

9.3.1 Noise During Operation

The potential effect of the Project's operation, discussed in this section, is increased noise as a result of increased traffic volumes.

9.3.1.1 Noise Modelled and Scenarios Assessed

Modelling undertaken provides an estimate of the traffic noise impact (change in noise levels) on surrounding noise sensitive buildings within the corridor. Three scenarios have been assessed based on modelled traffic volumes:

- Scenario1 - The potential increase in traffic noise on 44 noise sensitive properties along the missing Westwood Drive Connection (Kororoit Creek) from the existing conditions to the upgraded 2 lane road in 2015.
- Scenario 2- The potential increase in traffic noise on 752 noise sensitive properties along the corridor from the existing conditions (without Westwood Drive connection) to the upgraded 6 lane road in 2046.
- Scenario 3- The potential increase in traffic noise on 752 noise sensitive properties along the corridor from the upgraded 2 lane road (with Westwood Drive connection) to the 6 lane upgraded road in 2046.

Table 9-3 shows the predicted change in traffic noise levels at the noise measurement locations. The modelled traffic noise levels are rounded to the nearest whole decibel. This table also shows the relevant averaged measured traffic noise levels and four modelling scenarios (including a potential interim stage with four lanes).

Table 9-3 Modelled traffic noise levels – 2,4 and 6 lanes in 2046, relative to current measured noise levels

Location	Traffic noise levels dB(A) $L_{A10\ (18\ hour)}$				
	Measured average noise level, excluding weekends	Modelled existing traffic noise levels, 2013 (without Kororoit Creek bridge)	Modelled future traffic noise levels with existing road, two-lane, 2046 (with Kororoit Creek bridge)	Modelled future traffic noise levels with the upgraded corridor, four-lane, 2046	Modelled future traffic noise levels with the upgraded corridor, six-lane, 2046
38 Kanmore Crescent, Hillside	61	60	61	64	65
72 Dundee Way, Sydenham	57	57	59	63	63
11 Padula Court, Hillside	65	63	64	65	65
21 Callista Circuit, Taylors Hill	59	61	64	64	65
7 Catani Court, Burnside Heights	59	57	64	69	70
141 Arbour Boulevard, Burnside	49	-	51	56	60
163 Arbour Boulevard, Burnside	48	-	56	60	60
311 Westwood Drive, Burnside	45,57*	52	65	67	68
170 Robinsons Road, Deer Park	58	57	61	63	64
28 Grosvenor Crescent, Derrimut	67	66	67	67	69

Notes:
*The second set of noise measurements at 311 Westwood Drive were adversely effected by prevailing weather conditions and residential construction activities to the east of Westwood Drive.
Modelling of the existing noise levels in Arbour Boulevard was not undertaken as the existing traffic volumes using this road are unknown and relatively low.

The modelling indicates that the extent of increased traffic noise levels will vary across the Project Area with the upgrade of the Palmers Road Corridor from its current configuration with no bridge, to a full six-lane arterial.

9.3.1.2 Application of VicRoads Traffic Noise Reduction Policy

The affected residential properties in the Kororoit Creek area were all subdivided and constructed after 29 July 1999. The Palmers Road Corridor was identified and set aside in the 1997 Melton East Strategy Plan (MESP) which set out the land use and transport network through the Caroline Springs-Hillside-Sydenham area. All development in the area since has been required to consider the key principles of the MESP, which has included designing subdivisions and locating activity centres away from the Palmers Road Corridor to enable its development ultimately as a six lane arterial. The planning controls applicable to each property are identified within the Contracts of Sale, and therefore the MESP has been public information and available to the developers and purchasers since the relevant Melton Development Plan Overlay Schedule 1 was implemented on 29 July 1999.

As the Palmers Road Corridor was identified and set aside before the residential development consistent with the noise policy, then the objectives of the VicRoads Traffic Noise Reduction Policy will not apply to the Kororoit Creek areas.

Furthermore, the construction of the missing Westwood Drive connection is a continuation of the existing sequence of land development that has occurred throughout the corridor. Therefore the final section of the Palmers Road Corridor to be constructed as a local road (2 lanes) should be treated no differently in relation to traffic noise than any other section of the corridor. A different approach or treatment would be inequitable.

The duplication of the existing Calder Park Drive does not qualify for noise attenuation treatment because the upgrade of the existing road does not require the removal of buildings to facilitate the addition of a new carriageway. Noise levels at the most exposed residences would be less than 63 dB(A) $L_{A(18\ hour}$. Therefore the addition of an overpass and connecting ramps at the Palmers Road Corridor interchange with the Calder Freeway does not qualify under the VicRoads Traffic Noise Reduction Policy. Noise attenuation will not be provided at this interchange.

The remaining sections of the Palmers Road Corridor do not qualify for noise attenuation under the VicRoads Traffic Noise Reduction Policy as there has been an existing road within the Palmers Road Corridor and there are no buildings previously protected from traffic noise that are to be exposed by the removal of buildings for the upgrade of the corridor.

9.3.1.3 Scenario 1

The completion of the Westwood Drive connection (2 lanes) will introduce traffic noise to residences near the proposed bridge location as this connection will connect two existing local major roads. Approximately half of the residences assessed are predicted to experience an increase in noise levels of at least 15dB(A).

Table 9-4 shows the range of modelled traffic noise level increases at the affected 44 residences nearby to the proposed Westwood Drive bridge location.

Table 9-4 Modelled noise level at 2015 changes (within Westwood Drive connection area) due to completion of Westwood Drive

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings
+1 to +3	0
+4 to +6	3
+7 to +9	5
+10 to +12	4
+13 to +15	8
>+15	24

The modelled traffic noise levels are rounded to the nearest decibel.

There will be significant increases in the noise levels due to the construction of the Westwood Drive connection. The large increases are mostly due to the low existing noise levels in the area as there are no significant sources of noise. Due to the scale of change at the 24 worst affected residences being greater than 15dB(A)$L_{A10(18\ hour)}$ this impact is rated 'Very Poor'. The VicRoads Traffic Noise Reduction Policy showed that noise attenuation criteria do not apply to these areas (as discussed in section 9.3.1.2) of the corridor and that noise attenuation measures will not be incorporated into the upgrade.

9.3.1.4 Scenario 2

Table 9-5 shows potential increase in traffic noise levels throughout the Corridor from the existing noise levels (without the Kororoit Creek bridge and Westwood Drive connection) to the year 2046 with a six-lane road with the Westwood Drive connection.

Table 9-5 Modelled noise level changes (from existing to 2046 six-lane)

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings
0	2
+1 to +3	185
+4 to +6	327
+7 to +9	129
+10 to +12	35
+13 to +15	26
+16 to +18	17
+18 to >+20	31

The modelled traffic noise levels are rounded to the nearest decibel.

It is noted that most modelled residences in the corridor will have noise level increases of between 1 to 9 dB(A).These increases are mostly due to the increase in traffic volumes and the construction of a second carriageway.

There are also a significant number which will experience an increase of 10 dB(A) or more; these residences are generally located in the missing Westwood Drive connection area which as discussed have low existing traffic noise levels. The VicRoads Traffic Noise Reduction Policy showed that noise attenuation criteria do not apply to these areas (as discussed in section 9.3.1.2) of the corridor and that noise attenuation measures will not be incorporated in the upgrade.

The resultant noise levels will be compliant with the VicRoads Traffic Noise Reduction Policy, however due to the scale of change at a number of residences this impact is rated 'Poor'.

9.3.1.5 Scenario 3

Table 9-6 shows the potential increase in traffic noise on 752 noise sensitive properties along the corridor from the upgraded 2 lane road (with Westwood Drive connection) to the 6 lane upgraded road in 2046.

Table 9-6 Modelled noise level changes (two-lanes to six-lanes in 2046)

Traffic noise level change dB(A) $L_{A10\ (18\ hour)}$	Number of noise sensitive buildings
-1 to 0	29
+1 to +3	499
+4 to +6	186
+7 to +9	38

The modelled traffic noise levels are rounded to the nearest decibel.

The traffic noise level change at 29 residences of -1 to 0 dB(A) with the upgrade of the road from two-lanes (one carriageway) to six-lanes (two carriageways) is a result of some of the traffic being moved further away from these residences. The change in noise levels of -1 to 0 dB(A) would not be perceptible.

At the majority of residences (499) the traffic noise level is predicted to increase by +1 to +3 dB(A). The increase is mostly due to an increase in traffic volumes when the road is upgraded from one carriageway to two carriageways as well as an increase in posted speed. At some locations, there will be a small additional increase due to the duplicated carriageway of the upgraded road being closer to the residences compared to the location of the existing carriageway. The range +1 to +3 dB(A) represents a change in noise levels from inaudible (+1 dB(A)) to a change in noise levels that would be just perceptible (+3 dB(A)).

The traffic noise increase of +4 to +6 dB(A) at 186 residences is mostly due to the forecast increase in traffic volume and the increase in the posted traffic speed with the upgrade of the corridor. There will be an increase of up to 2 dB(A) due to the location of the duplicated carriageway bringing traffic closer to some residences. The range of +4 to +6 dB(A) represents a change in noise levels that would be noticeable.

The traffic noise level increase in the range of +7 to +9 dB(A) at 38 residences is due to the increase in traffic volumes, posted speed and the additional carriageway. The additional carriageway located closer to the residences could increase noise levels by up to 2 to 4 dB(A). The range +7 to +9 dB(A) is the highest change in predicted traffic noise levels, and this amount of change would be perceived as a doubling of the noise level. The VicRoads Traffic Noise Reduction Policy showed that noise attenuation criteria do not apply to these areas of the corridor and that noise attenuation measures will not be incorporated in the upgrade.

9.3.1.6 Calder Freeway Interchange

Currently there are no noise sensitive buildings near the proposed intersection of the Calder Park Drive and Calder Freeway; the closest residence is in Thompsons Road near Organ Pipes Road, approximately 500m from the centre of the proposed interchange. Other near-by residences include 10 Power Place, Taylors Lakes (approximately 900m from the closest point of the realigned Calder Park Drive) and 15 Nottingham Way, Sydenham (approximately 700m from the divergence of the new Calder Park Drive alignment).

The traffic noise impacts of the proposed new interchange were modelled at the residence in Thompsons Road for both the existing road alignment with 2046 traffic volumes and the 6-lane upgraded road/interchange with 2046 traffic volumes; the largest increase is 1 dB(A). Noise levels at the most exposed residences would be less than 63 dB(A) $L_{A(18\ hour}$. Therefore the addition of an overpass and connecting ramps at the Palmers Road Corridor interchange with the Calder Freeway does not qualify under the VicRoads Traffic Noise Reduction Policy and Traffic noise attenuation will not be provided at this interchange.

9.3.2 Staging

The corridor will be developed in stages over time, as demand increases and funding is made available. Consequently, the predicted noise increases will also increase over a considerable period of time to 2046.

9.3.3 Parkland Areas

A number of parkland areas are located near the Palmers Road Corridor including the Organ Pipes National Park, Banchory Grove Nature Conservation Reserve, Ravenhall Nature Conservation Reserve, Kororoit Creek Reserve and several other small parks along the alignment such as Pioneer Park. The Banchory and Ravenhall Nature Conservation Reserves however, do not encourage public access. Kororoit Creek Reserve and other small parks along the alignment are designed for short term use. There will be an insignificant (<1 dB(A)) increase in noise levels in the Organ Pipes National Park with the construction of the Calder Freeway interchange. Therefore noise impacts during operation are expected to be minor for all nearby parkland areas.

9.3.4 Noise During Construction

Transient noise from construction activities in the vicinity of residences in the corridor will be of several months duration. At some locations the noise impacts will be of a few months duration, other locations where more intensive activities are required (bridge over Bendigo railway line) will be a longer period. Construction noise emissions have not been modelled as construction noise limits are determined in the EPA guidelines. Noise impacts will be required to comply with these guidelines and management procedures will be set out within the Contractor Environment Management Plan (CEMP). This is therefore rated ‘Well’.

9.3.5 Summary Noise Impact Assessment

The traffic noise assessment is summarised in Table 9-7. Upgrading the corridor from 2 lanes to 6 lanes has a relatively small impact on most of the residences within the corridor. This scenario is rated as ‘neutral’ because there is a small increase in noise levels at most of the residences. This scenario is the most appropriate assessment, as it takes into consideration the equity issues that construction of the missing connection of Westwood Drive as a local road should not be treated any differently to other sections of the Palmers Road Corridor.

Table 9-7 Traffic Noise evaluation

Assessment Criteria	Scenario	Rating
Extent of changes in noise levels at properties	From existing to 2046 six-lane conditions	**Poor**
	Upgrade of two-lane road (connected) to six-lane road in 2046 (entire corridor) **This scenario has been identified as the most appropriate for the assessment of operational noise**	**Neutral**
	Westwood Drive Kororoit Creek Connection in 2015 (44 properties within connection area)	**Very Poor**
	Construction of roads	**Well**

9.3.6 Air quality

The VicRoads AQST was used to assess two 'worst case' locations within the Palmers Road Corridor. The AQST has been developed in consultation with the EPA Victoria to assess road projects for compliance against the SEPP (AQM). The assessed locations are as follows:

- Calder Park Drive near Taylors Road: this is the highest trafficked section of road along the Palmers Road Corridor
- Robinsons Road under the Ballarat rail line: the only section of road located within a cutting along the Palmers Road Corridor.

The AQST assessed nitrogen dioxide and PM_{10} from the suite of vehicle exhaust contaminants, as these two contaminants are the most likely to exceed criteria detailed in the SEPP (AQM). Compliance with these two contaminants should ensure that the other air pollutants due to motor vehicles are less than the SEPP (AQM) Intervention Levels. The background contaminant concentrations have been built into the AQST.

There is currently no air quality monitoring stations present within the Palmers Road Corridor. In the absence of local air quality monitoring data, a worst case scenario using default background concentrations supplied by the EPA Victoria in 2013 have been used. Background concentrations for nitrogen dioxide and PM_{10} were determined to be 28 and 36 $\mu g/m^3$ respectively (VicRoads, 2013).

A summary of the results from the AQST assessment undertaken by VicRoads is provided in Table 9-8. For the purposes of this assessment, the ultimate traffic volumes for 2046 have been used.

Table 9-8 Predicted contaminant levels for two locations, for four and six lane configurations in 2046.

Indicator	Scenario	Predicted concentration (1 hr period)	SEPP (AQM) criteria ($\mu g/m^3$)
Calder Park Drive (near Taylors Road)			
Nitrogen dioxide	2046: four lane (2016 AQST)	106	263
	2046: six lane (2021 AQST)	91	
PM_{10}	2046: four lane (2016 AQST)	45	60
	2046: six lane (2021 AQST)	46	
Robinsons Road (under the Ballarat rail line)			
Nitrogen dioxide	2046: four lane (2016 AQST)	256	263
	2046: six lane (2021 AQST)	209	
PM_{10}	2046: four lane (2016 AQST)	53	60
	2046: six lane (2021 AQST)	55	

The assessment indicated that the predicted concentrations of nitrogen dioxide and PM_{10} for both the modelled scenarios are well within the criteria specified in SEPP (AQM). As a result, no further detailed air quality impact assessment was required for the Palmers Road Corridor between the Western Freeway and the Calder Freeway (VicRoads, 2013).

9.4 Conclusion

The affected residential properties in the Kororoit Creek area were all subdivided and constructed after 29 July 1999. This was after the Palmers Road Corridor was identified and set aside in the 1997 MESP. All development in the area since has been required to consider the key principles of the MESP. The planning controls applicable to each property are identified within the Contracts of Sale, and therefore the MESP has been public information and available to the developers and purchasers since the relevant Melton Development Plan Overlay Schedule 1 was implemented on 29 July 1999.

As the Palmers Road Corridor was identified and set aside before the residential development consistent with the noise policy, then the objectives of the VicRoads Traffic Noise Reduction Policy will not apply to the Kororoit Creek areas.

The completion of Westwood Drive in the short term would introduce traffic noise to residences near the proposed bridge location. Approximately half (24) of the residences within the connection area are predicted to experience an increase in noise levels of at least 15dB(A). While this is a significant increase in noise levels these increases are not unexpected due to the low level of existing noise. The construction of the missing Westwood Drive connection (2 lanes) is a continuation of the existing sequence of land development that has occurred throughout the corridor. The final section of the Palmers Road Corridor to be constructed as a local road should be treated no differently in relation to traffic noise than any other section of the corridor. A different approach or treatment would be inequitable and not consistent with the VicRoads Traffic Noise Reduction Policy. Therefore the most appropriate scenario to access operational noise is upgrading the corridor from a 2 lane road (with Westwood Drive connection) to the 6 lane upgraded road in 2046.

The duplication of the existing Calder Park Drive does not qualify for noise attenuation treatment because the upgrade of the existing road does not require the removal of buildings to facilitate the addition of a new carriageway.

The remaining sections of the Palmers Road Corridor do not qualify for noise attenuation under the VicRoads Traffic Noise Reduction Policy as there has been an existing road within the Palmers Road Corridor and there are no buildings previously protected from traffic noise that are to be exposed by the removal of buildings for the upgrade of the corridor.

The increase in noise would be incremental as the bridge is constructed followed by staged upgrades to the ultimate six-lane configuration. Noise impacts from construction activities will be required to comply with EPA guidelines and management measures will be set out within the CEMP.

The Project meets the criteria detailed in the SEPP (AQM), which establishes a framework for air quality management in Victoria. The results of the assessment of two worst case locations within the Palmers Road Corridor using the VicRoads AQST showed that the predicted concentrations for nitrogen dioxide and PM_{10} were below the criteria for the 2046 four and six-lane worst case scenarios.

Based on the evaluation undertaken using the scenario of upgrading the corridor from a 2 lane road to the 6 lane upgraded road in 2046, which was identified as the most appropriate for operation noise assessment, the project has been rated ‘Neutral’ for operational noise and ‘Well’ for construction noise. The project meets the requirements of the air quality screening tool and therefore there is no need to undertake a detailed air impact assessment.

10 SOCIAL, LAND USE AND INFRASTRUCTURE

10.1 EES Evaluation Objectives and Scope

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.4 of the EES Scoping Requirements for the Project, which are as follows.

Draft Evaluation Objective – *To minimise adverse social and land use effects, including impacts on existing infrastructure.*

Key issue

- The potential for dislocation and diminished social wellbeing due to severance causing reduced access to social networks or community facilities.

Priorities for characterising the existing environment

- Describe the demographic and social character of residential communities in the vicinity of the project, as well as local movement patterns and any places with particular community, recreational or cultural significance.
- Identify any existing infrastructure, land use plans or related objectives for land within, adjacent to or affected by the project, including the Organ Pipes National Park and Kororoit Creek environs.

Design and mitigation measures

- Identify potential and proposed design responses and measures to minimise adverse social and land use effects.

Assessment of likely effects

- Assess the potential effects on communities living near the project, in terms of potential dislocation, severance or reduction in access to social networks, community facilities and valued places.
- Evaluate the consistency of the project with the policies and provisions of the Melton and Brimbank Planning Schemes and other relevant land use planning strategies.

Approach to manage performance

- Describe any further measures that are proposed to enhance social outcomes for residents living in the vicinity of the project, including as part of the EMF in the context of the project's expected long-term implementation timeframe.

Information presented in the following sections draws on the following specialist reports prepared to document the potential impacts of the Project:

- AECOM (2014e), Palmers Road Corridor EES (Western Freeway to Calder Freeway) – *Social Impact Assessment*
- AECOM (2014f), Palmers Road Corridor (Western Freeway to Calder Freeway) – *Land Use Planning Report*

10.2 Study Area

The proposed alignment for the Project is located in the City of Brimbank and City of Melton. For the purposes of the social and land use assessments, the Study Area comprises the area approximately within 500m of the Project Area (refer to Figure 10-1).

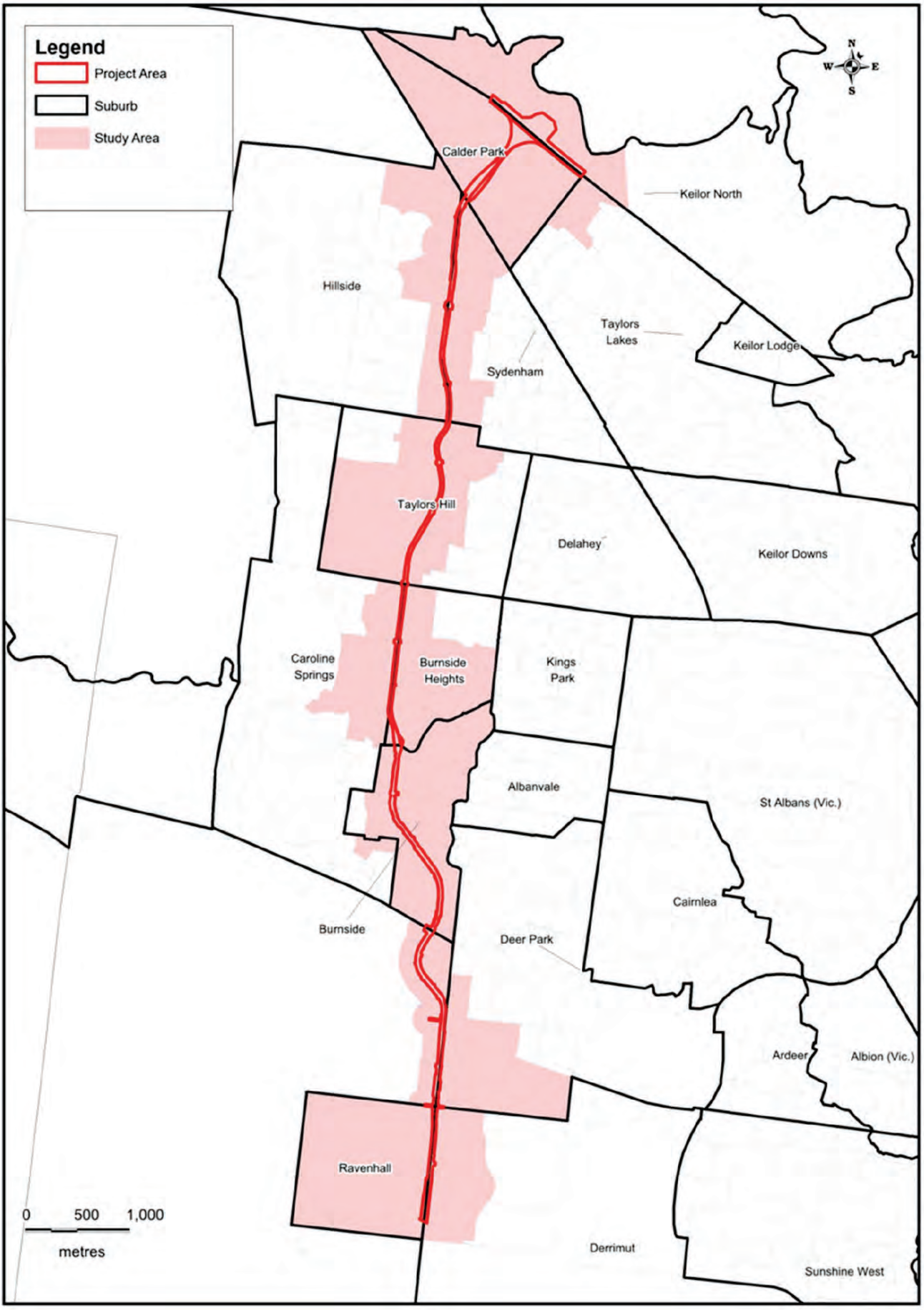


Figure 10-1 Study area

10.3 Existing Conditions

10.3.1 Social

Population Characteristics

Urban development in the Cities of Melton and Brimbank continue to progress at a rapid rate. Both municipalities are within the top ten fastest growing municipalities in Australia. In the seven years from 2006 to 2013, the population of the Cities of Brimbank and Melton increased from 256,000 to 318,000. Population grew by nearly 9,000 per year from 2006 to 2013.

The population located either side of the road alignment comprises a high proportion of young families with children. This reflects the presence of a number of relatively new residential developments providing housing targeted at the needs of younger families. Detached dwellings are the predominant housing form in the Study Area, as is the case for other areas in the Cities of Brimbank and Melton.

The majority of residents in the Study Area travel to work in a private vehicle, either as the driver or a passenger. Smaller but still significant proportions of residents travel by truck, motorbike, bus or taxi, all of which are modes that rely on the road network. As evident more broadly within both municipalities, car ownership in the study area is very high.

A relatively large proportion of residents living in the Study Area were born overseas and/or speak a language other than English.

Community Facilities

There is an array of community facilities within the Study Area as shown in Figure 10-2. Whilst many of these are within designated shopping centres and community hubs, there are many that are dispersed across the landscape and some interface with the proposed alignment.

Community facilities that interface with the alignment include shopping centres, retirement villages, childcare centres, a community centre, an aged care service, kindergartens, a maternal and childcare health centre, and a primary school. The wider area includes these and other facilities including a regional library and secondary schools. Community facilities interfacing with the alignment are:

- Copperfield College and Sydenham Hillside Primary School;
- Baptist Church;Burnside Shopping Centre;
- Melton Youth and Community Hub;
- Taylors Hill Retirement Village; and
- Westwood Aged Care Service.

Dispersed along the alignment are a number of small parks that are connected by a network of local paths to surrounding residential areas, regional parks and community centres. The wider area includes these and other facilities including a regional library and secondary schools.

Places of Interest

The Study Area includes a variety of places of interest and public open space. Many of these areas are connected to local community facilities by a network of formal (and informal) pedestrian/cycle paths. These places include:

- Organ Pipes National Park north of the Calder Freeway;
- Calder Park Motor Sports Complex south of the Calder Freeway;
- Banchory Grove Nature Conservation Reserve ;
- Dalgook Homestead;
- Pioneer Park;
- Lake Caroline;
- Kororoit Creek; and
- Ravenhall Nature Conservation Reserve.

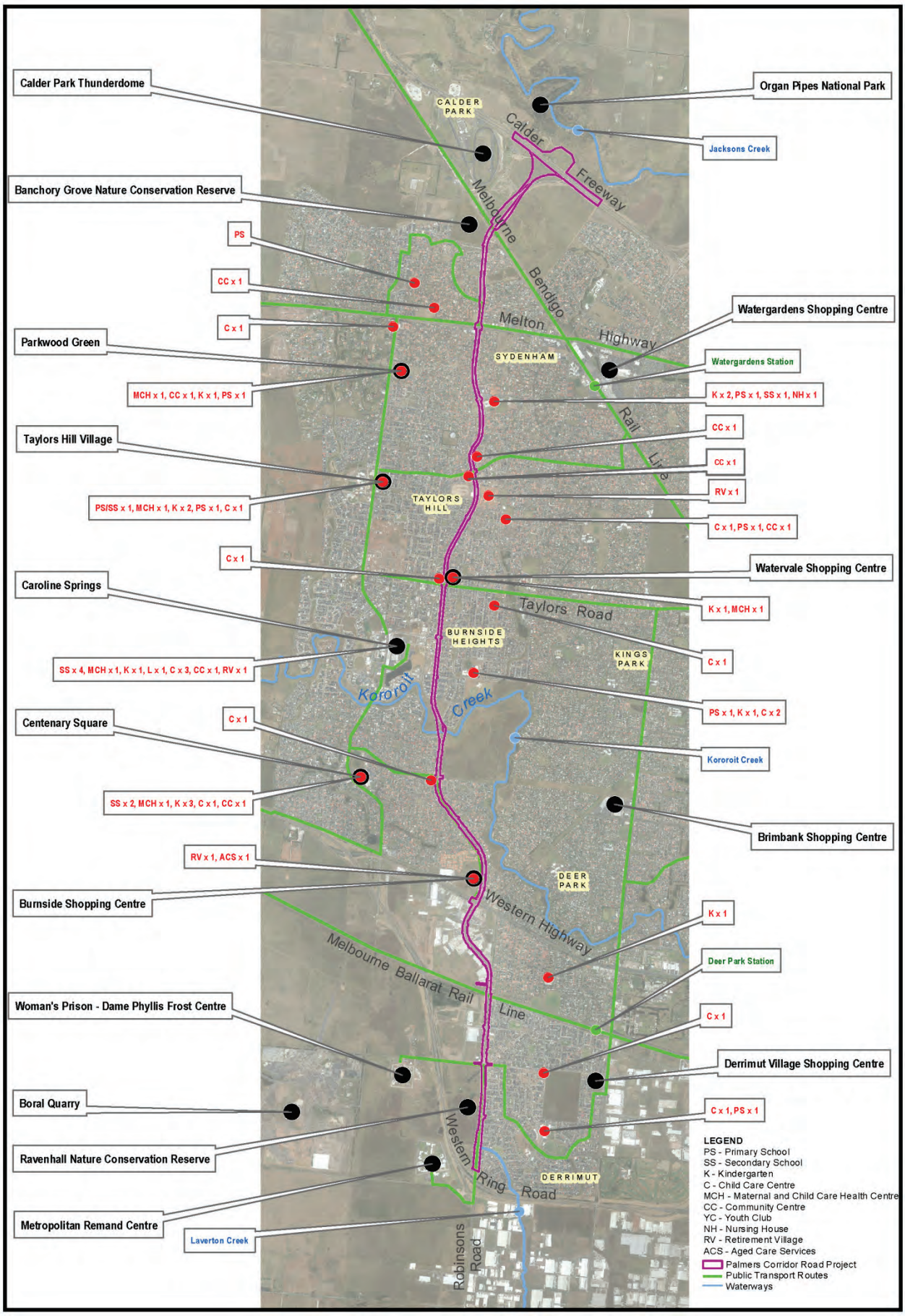


Figure 10-2 Community facilities, places of interest and public transport

10.3.2 Land Use

The three main land uses adjoining and near the Project Area are residential, commercial and industrial. Figure 10-3 shows the existing land use zonings in the Melton and Brimbank Planning Schemes. There are two Principal Activity Centres and two Major Activity Centres located within the Study Area. These are as follows:

- Watergardens Principal Activity Centre (also referred to as the Sydenham Regional Activity Centre);
- Sunshine Principal Activity Centre;
- Caroline Springs Major Activity Centre; and

Deer Park Central Major Activity Centre. Smaller shopping centres abutting the Project include Watervale Shopping Centre off Calder Park Drive and Burnside Shopping Centre off Westwood Drive. Nearby there are other small shopping centres such as Brimbank Shopping Centre, Derrimut Village, Centenary Square and Taylors Hill Village.

There are several industrial areas near the Study Area. The largest of these is the Western Industrial Precinct that stretches from the intersection of Western Highway and Westwood Drive, Deer Park to the intersection of Palmers Road and Sayers Road, Truganina.

The Project would provide a key north south road link that connects these residential areas with the commercial and industrial employment destinations, especially the proposed industrial areas at the northern and southern end of the Project. The Calder Freeway and Western Freeway are major road links to central Melbourne and Regional Victoria.

The Calder Freeway is a major road link servicing Melbourne Airport via the Western Ring Road and Tullamarine Freeway. Melbourne Airport Environs Overlay and Environmental Significance Overlays limit development in the northern section of the Project (refer to Figure 10-4). A Development Plan Overlay includes reference to the Melton East Strategy Plan (GHD 1997) (MESP) which is also shown in Figure 10-4.

10.3.3 Infrastructure

Community facilities have been developed with the knowledge that a major arterial road would be constructed in the area (as detailed in the MESP). The community is connected by a network of roads, pedestrian/cycling paths, open space corridors and public transport corridors. These connections provide for the movement of people and goods within the local area. Higher order east-west roads are well provided for, including the Calder Freeway, Melton Highway, Taylors Road, Ballarat Road and Western Freeway. In comparison, higher order north-south roads are less developed due to the incomplete state of north-south transport connections. Traffic seeking to move along the Palmers Road Corridor must detour via Caroline Springs Boulevard, as this road provides the only crossing over Kororoit Creek within the local area.

In the sections of the alignment that pass through existing residential areas, dwellings typically back onto the alignment. This feature of the study area reflects the deliberate strategic planning intent (as set out in MESP) to minimise future amenity and safety impacts associated with the eventual use of the corridor for a six lane arterial road. Pedestrian crossing points that link areas to the east and west are limited to roundabouts at the major east-west roads, and at the end of a number of open courts (where a road is a dead-end to vehicle traffic but pedestrians are able to walk through).

Public transport routes are shown in Figure 10-2. The Melbourne-Bendigo and Melbourne-Ballarat rail lines are also included as well as the existing bus routes.

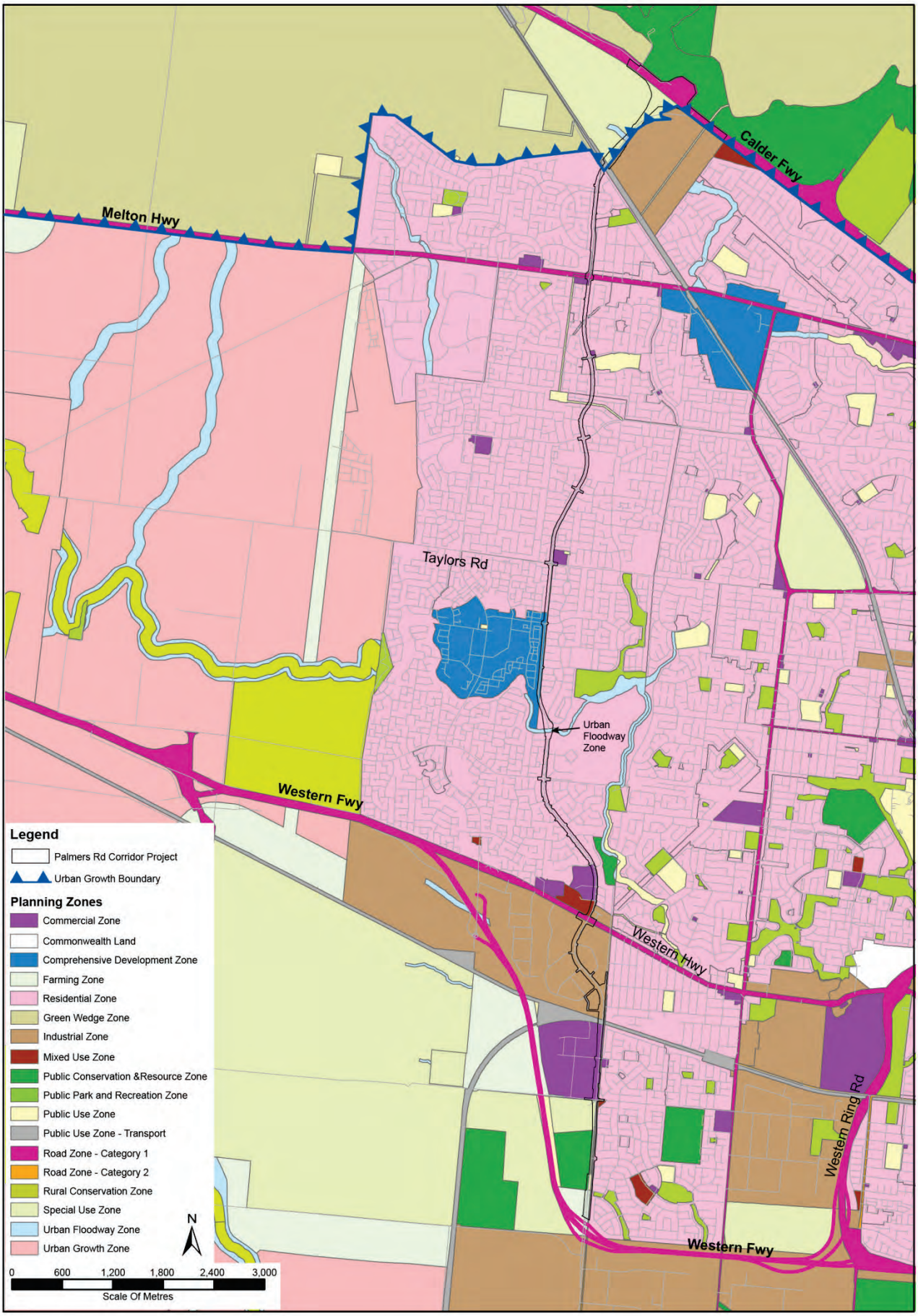


Figure 10-3 Zones in the Brimbank and Melton Planning Schemes near the Project

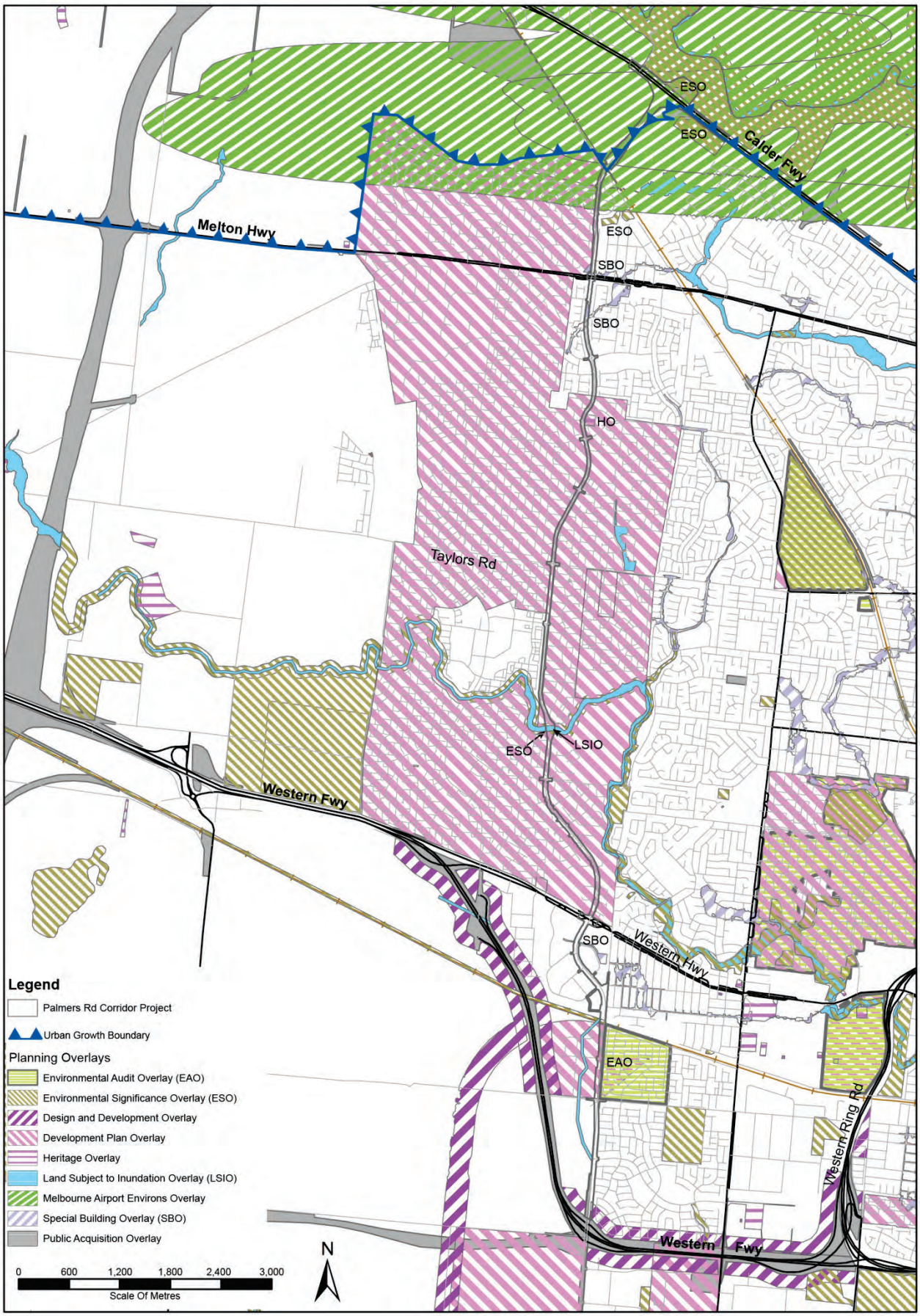


Figure 10-4 Overlays in the Brimbank and Melton Planning Schemes near the Project

10.4 Future Conditions

10.4.1 Social

Residential communities within the Study Area are well-established. In general, there is limited potential for additional dwellings near the Project. Private dwellings are located in most sections of the alignment with the exception of an area east of Westwood Drive (south of Kororoit Creek), where land will be developed for residential land uses in the near future. Land is strategically identified for non-residential purposes at both ends of the Project. The remaining land is either used or planned for commercial, industrial and public open space. This includes an undeveloped pocket of land north of the Melbourne – Ballarat rail line that will be developed for industry in the long-term and an area south-west of Ballarat Road where industry is being incrementally established.

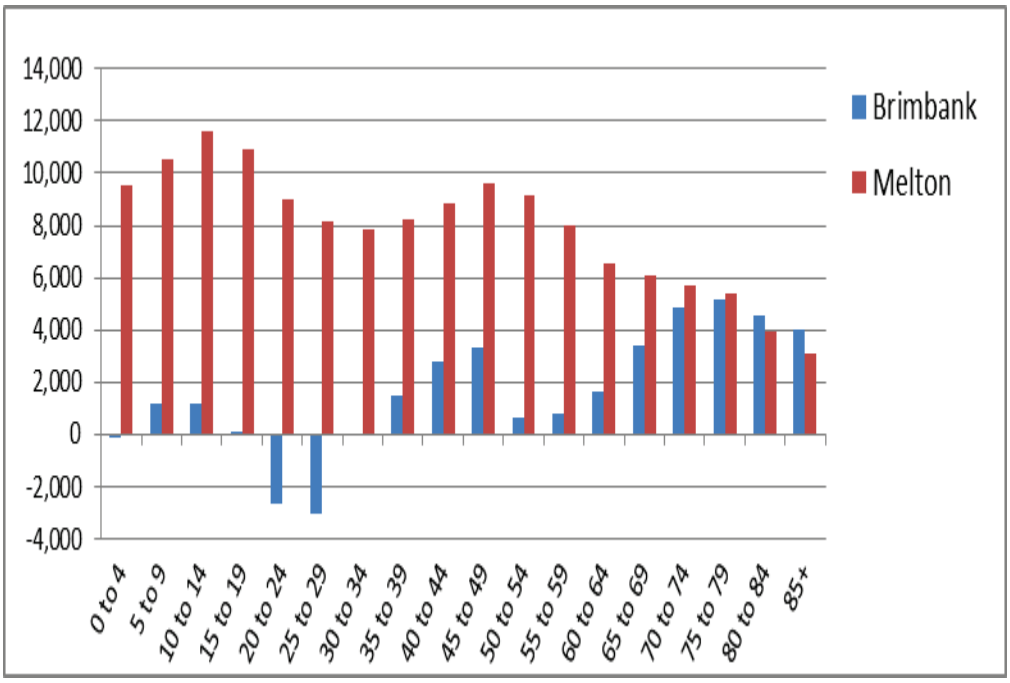
The population in the City of Melton is projected to more than double from 123,000 in 2013 to 255,000 in 2031. The population in the City of Brimbank is projected to increase from 195,000 in 2013 to 220,000 in 2031 (refer Table 10-1). For the combined municipalities the rate of population growth will be nearly 9,000 per year between 2013 to 2031. This is similar to the population increase per year from 2006 to 2013 (refer to Table 10-1). The City of Melton is planning for an ultimate population of 400,000 beyond 2031.

Table 10-1 Population Growth – Brimbank and Melton LGAs to 2031

Year	Melton	Brimbank	Total
2006	80,911	174,746	255,657
2011	112,643	191,496	304,139
2013	*122,909*	195,469	318,378
2016	138,003	200,185	338,188
2021	168,195	207,429	375,624
2026	208,570	215,022	423,592
2031	254,899	220,331	475,230
Growth Per Annum 2006-2013	6,000	2,960	8,960
Growth Per Annum 2013-2031	7,333	1,381	8,714
Growth 2006-2013	41,998	20,723	62,721
Growth 2013-2031	131,990	24,862	156,852

Source: ABS 2008; VIF (2014) and AECOM (2014e)

Victoria in Future (2014) projections indicate that in the City of Melton, population growth will continue across all age groups due to continued development of new residential areas within the City. The pattern of population growth in the City of Brimbank will be different however, with growth being concentrated in older age groups. The number of people aged 20-29 is expected to decline in Brimbank (refer Figure 10-5).



Source: VIF 2014 and AECOM (2014f)

Figure 10-5 Population Growth Profile for the Cities of Brimbank and Melton (2011 to 2031)

10.4.2 Land Use

The MESP provides a clear long term vision for the development of Robinsons Road, Westwood Drive and Calder Park Drive as a primary arterial route extending from the Western Highway to the Melbourne - Bendigo rail line. It has been planned since 1997 to provide a six lane north-south connection with controlled access points to adjacent urban areas. Figure 10-6 is an extracted plan of future neighbourhoods from the MESP.

Development over time has seen the implementation of the MESP and the realisation of its strategic principles. While the Palmers Road Corridor has not yet been fully developed, the 40-60m wide corridor with limited direct residential access required by the MESP has been protected for that purpose. Where direct access does currently exist, the planned road reserve is sufficiently wide enough to facilitate the implementation of a limited access arterial route. Key community infrastructure such as schools and activity centres have been planned and developed to be accessible from the secondary arterials. This will ensure that the designated primary arterial road can be developed and used as intended within the broader regional context.

The MESP was adopted by the Shire of Melton (now the City of Melton) in 1999 as the primary strategic land use plan for area. It included provision for Robinsons Road, Westwood Drive and Calder Park Drive to be a 40-60m reservation. The MESP is referenced in the Melton Planning Scheme in the Development Plan Overlay (Schedules 1, 5 and 13). As a consequence, subdivisions and neighbourhoods have been designed to make provision for a six lane arterial road. The MESP has underpinned the development of the area and this has been strategically reinforced in future plans and strategies such as the Caroline Springs Town Centre Comprehensive Development Plan, Western Growth Corridor Plan and Plan Melbourne.

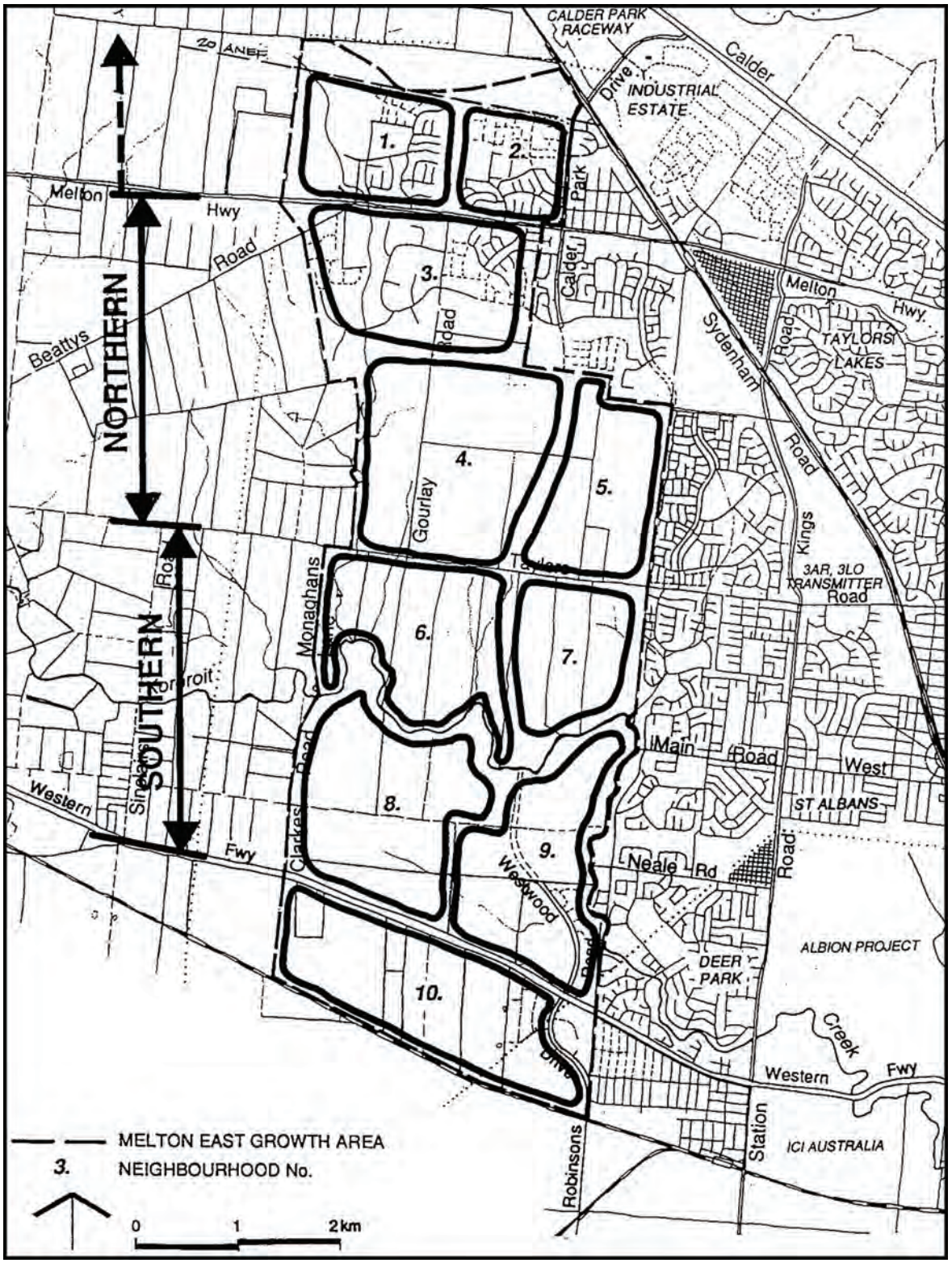


Figure 10-6 Neighbourhoods in Melton East Strategy Plan (GHD, 1997)

10.5 Assessment of Likely Effects

This section outlines the findings and results of the assessment of potential social, land use and infrastructure effects of the Project. An evaluation of compliance and residual impact assessment was completed in response to the relevant draft evaluation objectives from the EES Scoping Requirements.

The evaluation of compliance and residual impact rating guide for social, land use and infrastructure used in this EES is provided in Table 10-2.

Table 10-2 Evaluation of compliance and residual impact rating guide – Social, Land Use and Infrastructure

Evaluation objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Social, Land Use and Infrastructure To minimise adverse social and land use effects, including impacts on existing infrastructure.	Road safety and capacity Amenity and environmental quality Social, land use and infrastructure Visual and landscape values Integrated and sustainable transport Consistency with State Planning Policy Framework Consistency with Local Planning Policy Framework Consistency with other local planning documents (State and Local) Site specific impacts	Land Acquisition & Compensation Act 1986 Planning and Environment Act 1987 Plan Melbourne (Victorian Government 2014) Melton East Strategy Plan (GHD 1997) Brimbank Integrated Transport Strategy (City of Brimbank 2007) Growth Corridor Plans (Victorian Government, 2012)	Negligible social and land use effects	Minor social and land use effects	Moderate social and land use effects	Moderate - Major social and land use effects	Major social and land use effects
			Best practice (incl. mitigation measures)	Improved practice (incl. mitigation measures)	Standard practice (incl. mitigation measures)	Poor practice (incl. mitigation measures	Very poor practice (incl. mitigation measures)
			Strong policy compliance	Good policy compliance	Partial policy compliance	Policy non-compliance	Major policy non-compliance

10.5.1 Social Impact Assessment

The draft evaluation criteria for the Project in relation to the social characteristics (refer EES Scoping Requirements, July 2013) are as follows:

- road safety and capacity;
- amenity and environmental quality;
- social, land use and infrastructure;
- visual and landscape values, and
- integrated and sustainable transport.

Road Safety and Capacity

The Social Impact Assessment Report (AECOM, 2014e) noted it can be expected that the Project will have substantial benefits in terms of reduced traffic congestion and improved road safety.

The Project will improve north-south road connectivity between residential areas north of and south of Kororoit Creek to employment areas. It will also shift traffic off roads such as Caroline Springs Boulevard onto a major arterial that has been designed to meet the needs of cross regional traffic. Local amenity and safety of these roads, along which are located a number of community facilities (including schools), would improve.

The Project will provide for grade separated intersections with the Calder Freeway, the Melbourne-Bendigo Rail Corridor and the Melbourne-Ballarat Rail Corridor, improving safety and efficiency outcomes for road and rail transport users.

The Project will provide an off-road shared pedestrian and cycling path along its full length, providing for non-motorised modes of travel vastly improving pedestrian and cycling access north-south along the route. Pedestrian safety will be increased when roundabouts at the intersections of the corridor and a number of east-west roads traversing the alignment are replaced with signalised intersections.

The Social Impact Assessment Report (AECOM, 2014e) assessed the proposed upgrade as performing 'Very Well' against the road safety and capacity evaluation criterion from a social impact perspective. The reasons for this are summarised in Table 10-3.

Amenity and Environmental Quality

Based on the Traffic Noise Impact Assessment (AECOM, 2015b), traffic noise is expected to increase in close proximity to the alignment. The noise modelling undertaken indicates that there would be declining acoustic amenity for some residences abutting the alignment. The majority of dwellings assessed would experience an increase in noise levels, with residences adjoining Westwood Drive experiencing higher increases.

The construction of the Kororoit Creek bridge would result in arterial use of the road and a noticeable increase in noise levels, after which incremental increases would be expected as the road is progressively upgraded. An assessment using the VicRoads Air Quality Screening Tool (VicRoads 2013) was undertaken to determine the potential impacts on air quality as a result of increased traffic along the corridor. The assessment indicated that the impact on air quality is within the requirements of the State Environment Protection Policy (Air Quality Management).

Further information on the noise and air quality impacts as a result of the Project is included in Chapter 9 'Amenity and Environmental Quality'.

In the Social Impact Assessment Report, AECOM (2014e) assessed the proposed upgrade as performing 'Neutral' against the amenity and environmental quality evaluation criterion from a social impact perspective. The reasons for this are summarised in Table 10-3.

Social, Land Use and Infrastructure

The long term planning for the area has ensured that land is available to support the Project and has therefore greatly minimised the need for property acquisition. As a result, no residential dwellings would be acquired as part of the Project. However, acquisition of some small parts of vacant residential land is required. No commercial buildings will be acquired. However, some businesses along Westwood Drive would be affected by property acquisition. This would be concentrated along the western side of Westwood Drive and affect land owned by businesses such as a petrol station, warehouses, a pool store and a truck driver

education centre. Land is also required from the Calder Park Motor Sports Complex (situated on the western side of Calder Park Drive) and vacant industrial land (situated on the eastern side of Calder Park Drive).

North-south connectivity in the Study area would be substantially improved for motorists, cyclists and pedestrians when the Kororoit Creek Bridge is developed. Pedestrian safety would be increased when existing roundabouts are replaced with signalised crossing points, encouraging east-west and north-south pedestrian movements. These changes would increase access and mobility for residents of the study area. The use of open courts and other less and informal opportunities for east west pedestrian and cyclist movements across the corridor would become impractical over time as traffic volumes increase or when the road is widened.

In the Social Impact Assessment Report, AECOM (2014e) assessed the proposed upgrade as performing 'Well' against the social, land use and infrastructure evaluation criterion from a social impact perspective. The reasons for this are summarised in Table 10-3.

Visual and Landscape Values

The Social Impact Assessment Report (AECOM, 2014e) noted that the majority of the proposed road is at grade, which minimises visual impacts. Exceptions are grade separation over the Melbourne - Bendigo rail corridor, Calder Freeway interchange, Kororoit Creek Bridges. Some nearby residential properties will have views of these structures. Elevated structures such as bridges are common in an urban setting and the planning intent to build the structures has been clear for many years.

The Calder Freeway interchange will have a potential distant visual impact on the Organ Pipes National Park (situated on the northern side of Calder Freeway). Landscaping can be provided to screen the proposed Calder Freeway interchange.

In the Social Impact Assessment Report, AECOM (2014e) assessed the proposed upgrade as performing 'Well' against the visual and landscape evaluation criterion from a social impact perspective. The reasons for this are summarised in Table 10-3.

Integrated and Sustainable Transport

The Social Impact Assessment Report (AECOM, 2014e) noted that the Project would improve traffic flow, reduce congestion, re-direct traffic from valued community areas and improve road safety. There would be some reduction in acoustic amenity for properties adjacent to the alignment, and a reduction in east-west pedestrian connectivity.

In the Social Impact Assessment Report, AECOM (2014e) assessed the proposed upgrade as performing 'Very Well' against the integrated and sustainable transport criterion. The reasons for this are summarised in Table 10-3.

Summary of Social Impact Assessment

The assessment of likely effects and the ratings for the evaluation criteria for Social Impact are summarised in Table 10-3and outlined in more detail in the EES Technical Appendix F.

In the Social Impact Assessment Report AECOM (2014e), it was concluded that the Project will provide for improved traffic flow and road safety, with localised amenity impacts on adjacent properties resulting from increased traffic. This will result in a net community benefit and is consistent with the long standing strategic plans for the region. It was concluded that the Project rates "Well" against the social objectives.

10.5.2 Land Use Impact Assessment

The land use planning criteria for the Project developed to evaluate the level of performance were:

- consistency with State Planning Policy Framework;
- consistency with Local Planning Policy Framework;
- consistency with other local planning documents; and
- site specific impacts.

Table 10-3 Summary of Social Impacts

Evaluation Criteria	Assessment Summary	Rating
Road Safety and capacity - To improve the road based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes	A north-south arterial route would have sufficient capacity to accommodate projected traffic flows for the foreseeable future. A shared off-road pedestrian and cycling path is proposed along the entire length of the corridor.	**Very Well**
Amenity and Environmental quality - To minimise adverse noise and other amenity effects on nearby residents and land uses to the extent practicable	Noise levels are predicted to increase near the proposed Project. Development has occurred with the knowledge of the future road upgrade. Traffic will be re-directed from roads such as Caroline Springs Boulevard, potentially improving acoustic amenity in these locations.	**Neutral**
Social, land use and infrastructure - To minimise adverse social and land-use effects, including impacts on existing infrastructure	Long term planning has ensured that land is available to support the Project, and has greatly minimised the need for property acquisition. No residential dwellings would be acquired. Acquisition of some small parts of vacant residential land is required. Some commercial businesses along Westwood Drive are affected by property acquisition. The frequency of opportunities for east-west pedestrian movement would be reduced. Pedestrian safety would be improved at some existing crossing points with the installation of traffic lights.	**Well**
Visual and landscape values - To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas	The majority of the proposed road is at grade with the exception of the overpass over the Melbourne - Bendigo Rail corridor, Calder Freeway interchange and the Kororoit Creek Bridges. There is a potential distant visual impact on the Organ Pipes National Park. Landscaping can be provided to screen the proposed Calder Freeway interchange.	**Well**
Integrated and sustainable transport - Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term	The Project would improve traffic flow, reduce congestion, re-direct traffic from valued community areas and improve road safety. There would be some reduction in acoustic amenity for properties adjacent to the alignment, and a reduction in east-west pedestrian connectivity.	**Very Well**
Overall Rating Social		**Well**

Consistency with State Planning Policy Framework (SPPF)

State plans and strategies such as Plan Melbourne (Victorian Government, 2014) and the Growth Corridor Plans – Managing Melbourne's Growth (GAA, 2012) seek to provide a co-ordinated approach to developing efficient, sustainable and safe transport infrastructure in Melbourne. More details of these policies and how they relate to the Project are provided in Chapter 2 'Project Rationale'.

The Land Use Planning Report, AECOM (2014f) assessed the proposed upgrade as performing 'Very Well' against compliance with the State Planning Policy Framework along the corridor. The justification for this performance rating are summarised in Table 10-4.

Consistency with Local Planning Policy Framework

The upgrade of Palmers Road Corridor would be consistent with the City of Melton's Local Planning Policy Framework (LPPF) by providing more efficient and safer movements for road users, (refer to Clauses 21 and 22.07 of the Melton Planning Scheme). This would improve regional and local connectivity and allow for a choice of transport options for members of the local community. Existing open space assets would not be detrimentally impacted by the upgrade.

The upgrade of the Palmers Road Corridor would provide a much needed road link between the Calder Freeway and the Princes Freeway, providing improved road efficiency and safety into and out of the City of Brimbank. The upgrade of Palmers Road Corridor would be consistent with the City of Brimbank's LPPF (refer to Clauses 21 and 22 of the Brimbank Planning Scheme).

The Land Use Report, AECOM (2014f) assessed the proposed upgrade as performing 'Very Well' in terms of its consistency with the local planning requirements along the Palmers Road Corridor. The justification for this performance rating are summarised in Table 10-4.

Consistency with Other Local Planning Documents

The Project is supported by the MESP adopted by Melton Council in 1997. The MESP is specifically referred to in the Melton Planning Scheme, (Schedule 1 to Development Plan Overlay 1 in Clause 43.04-01). The MESP includes the widening of Calder Park Drive, Westwood Drive and Robinsons Road from two lanes to six lanes and road bridges over Kororoit Creek. The alignment within the MESP clearly shows the crossing of Kororoit Creek and the upgrade of Westwood Drive.

In relation to the City of Brimbank, relevant local planning documents to the Project include the Brimbank Integrated Transport Strategy (2007), Brimbank Activity Centres Strategy (2008), Brimbank Cycling and Walking Strategy (2012) and Brimbank Industrial Land Strategy (2012). The Project is supportive of the strategic and policy directives contained in the LPPF of the Brimbank Planning Scheme.

Within the context of these local planning documents the key outcomes of the Project would be:

- improved north – south transport linkages connecting communities and activities in Melbourne's west;
- the provision of shared pedestrian/cycle paths on both sides of the upgraded road with ability to link in with the principal bicycle network; and
- support for future industrial and employment generating land uses near Calder Park and Robinsons Road.

AECOM (2014f) assessed the proposed upgrade as performing 'Very Well' for consistency with other local planning documents. The justification for this performance rating are summarised in Table 10-4.

Site Specific Impacts

Vacant industrial land (situated on the eastern side of Calder Park Drive). A small area of the Banchory Grove Nature Conservation Reserve and Pioneer Park will be acquired due to the proposed grade separation of the Melbourne-Bendigo rail crossing.

There will be minor changes to road access during the construction phase and abutting areas would likely be impacted by noise and dust as a result of construction traffic and activities. Amenity impacts associated with the ongoing use of the road once completed are expected to be minimal.

Table 10-4 Summary of land use impacts

Evaluation Criteria	Assessment Summary	Rating
Consistency with State Planning Policy Framework (SPPF)	The upgrade of Palmers Road Corridor will provide much needed improvements to the important north-south transport link in the outer-suburban growth areas. The design and assessment of the proposed corridor has considered the impacts and integration of the development with the existing conditions, including urban settlement, environment, amenity, built environment, heritage and infrastructure. The proposed corridor is consistent with State plans and strategies, including Growth Area Framework Plans (2006), Growth Corridor Plans (2012), Precinct Structure Plans and Plan Melbourne (2014).	Very well

Evaluation Criteria	Assessment Summary	Rating
Consistency with Local Planning Policy Framework (LPPF)	*Melton* The Palmers Road Corridor is consistent with and supportive of the desired planning outcomes sought by the LPPF. The MESP provides a clear vision for the development of Robinsons Road, Westwood Drive and Calder Park Drive as a primary arterial route providing a north-south connection with controlled access points to adjacent urban areas. *Brimbank* The Palmers Road Corridor is supportive of the City of Brimbank LPPF, specifically the need to improve linkages between the northern and southern parts of the municipality, particularly in the western sector of Brimbank.	**Very well**
Consistency with other local planning documents	*Melton* The proposed corridor is consistent with local plans and strategies including the Sydenham Transit City Master Plan and MESP. *Brimbank* The Project supports the Brimbank Integrated Transport Strategy (2007), Brimbank Activity Centres Strategy (2008), Brimbank Cycling and Walking Strategy (2012) and Brimbank Industrial Land Strategy (2012). Other Outer Western Suburbs Transport Strategy (2001), Western Melbourne Transport Strategy 2012-2030.	**Very well**
Site specific impacts	No residential dwellings would be acquired for the Project. The majority of the properties are not affected by the proposed PAO. Some land acquisition impacts would occur including at Calder Park Motor Sports Complex, Banchory Grove Nature Conservation Reserve, residential lots, industrial sites and businesses.	**Neutral**
Overall rating Land Use Planning		**Very well**

AECOM (2014f) assessed the proposed upgrade as performing "Neutral" for overall site specific impacts. For the section between the Western Highway and the Western Freeway, the rating was deemed to be 'Poor' given the impacts to operational businesses due to acquisition. The justification for this performance rating are summarised in Table 10-4.

Summary of Land Use Impact Assessment

The assessment of likely effects and the ratings for the evaluation criteria for land Use are summarised in Table 10-4 and outlined in more detail in the EES Technical Appendix G.

The Land Use Report AECOM (2014f) concluded that the Project is consistent with State and local planning policy, which seek to ensure that transport corridors integrate land use planning, urban design, and transport planning. This report demonstrates that the proposed PAO is consistent with State and local planning policies, which seek the integrated delivery of urban growth and transport infrastructure.

Overall, it was also concluded that the Project would have minor impacts due to the following:

- No residential or commercial buildings are proposed to be acquired;
- The majority of affected land is undeveloped with no access driveways or buildings directly impacted upon; and
- Where the land has been developed, buildings have been appropriately setback from the road in expectation of the future road widening of Palmers Road.

In summary, the Project rates "Very Well" against the Land Use assessment criteria since all but "Site Specific Impacts" are rated as "Very Well".

10.6 Mitigation Measures

Based upon the assessment in the Social Impact Assessment Report, AECOM (2014e) and the Land Use Planning Report (AECOM 2014f), the following project mitigation measures were recommended to reduce the impacts of the Project:

- Investigations to be undertaken at the time of construction to determine location, frequency and type of pedestrian crossing points;
- Signalised crossing at Community Hub - consider a solution to better manage the large volume of students crossing at the Palmers Road and Community Hub intersection at school start/end times;
- Erect suitable signage to advise drivers of entrances to the Organ Pipes National Park;
- Continue to consult with businesses to ensure that reasonable access can be retained; and
- The road reservation be pursued to ensure that the reservation is formalised and that land is not inadvertently developed within the proposed reservation.

10.7 Conclusion

The proposal to upgrade Calder Park Drive, Westwood Drive and Robinsons Road are included in the MESP). The MESP is referenced in the Melton Planning Scheme for the purpose of providing a six-lane north south arterial. Land use and development since 1997 has seen the implementation of the MESP and its strategic principles, including a 40-60m wide corridor with limited access. As urban development has occurred, land for the Project has been reserved through the subdivision process.

Overall, the Social Impact Assessment undertaken by AECOM (2014e) concludes that the proposed upgrade performs “Well” against a variety of evaluation criteria as shown in Table 10-5 below.

Table 10-5 Social evaluation rating

Draft evaluation criteria	Rating
Road Safety & Capacity	**Very Well**
Amenity and environmental quality	**Neutral**
Social, land use and infrastructure	**Well**
Integrated and sustainable transport	**Very Well**
Overall social rating	**Well**

The Project is consistent with State and local planning policies, which seek to provide major transport infrastructure that connects and links communities to community resources, facilities and employment. The design of the Project would provide for the safe and efficient movement of people and goods along and across the alignment. However, the Project will have an impact on land currently used for, and land proposed for future use by, commercial and industrial businesses.

Overall, the land use assessment undertaken by AECOM (2014f) concludes that the proposed upgrade performs ‘Very Well’ against the evaluation criteria as shown in Table 10-6.

Table 10-6 Land use evaluation rating

Evaluation criteria	Rating
Consistency with State Planning Policy Framework	**Very Well**
Consistency with Local Planning Policy	**Very Well**
Consistency with other planning documents	**Very Well**
Site specific impacts	**Neutral**
Overall Land Use rating	**Very Well**

From a social and land use perspective, the Project achieves industry accepted practice through the application of mitigation measures, a strong level of planning policy compliance and minor residual impacts when considering the positive and negatives of the Project. In addition, several design changes (realignment and redesign) have occurred during project development as a result of community and stakeholder consultation. These are outlined in Chapter 5 'Project Description' and Chapter 6 'Consultation'.

Overall, based on the evaluation undertaken using the criteria adopted for the assessment, and assuming the mitigation measures are applied, the Project has been rated 'Well' to 'Very Well' in relation to the following evaluation objective *'to minimise adverse social and land use effects, including impacts on existing infrastructure'*.

11 VISUAL AND LANDSCAPE VALUES

11.1 EES Objectives and Scope

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.5 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – *To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.*

Key issues

- The potential for effects on the landscape and recreational values of the Organ Pipes National Park from the project, in particular the proposed raised interchange at Calder Freeway.

Priorities for characterising the existing environment

- Characterise the landscape, existing viewshed and recreational values of the Organ Pipes National Park and Kororoit Creek environs.

Design and mitigation measures

- Identify potential and proposed design options and measures to mitigate adverse effects on the landscape values and associated recreational values of the Organ Pipes National Park and Kororoit Creek environs.

Assessment of likely effects

- Assess the likely effects on the landscape and recreational values of the Organ Pipes National Park and Kororoit Creek environs.

Approach to manage performance

- Any further measures that are proposed to either manage risks to landscape and recreational values or enhance visual amenity outcomes for residents living in the vicinity of the project are to be included in the EES, including as part of the EMF.

11.2 Legislative and Policy Context

Key legislation relevant to the Project from a visual and landscape perspective include:

- *Planning and Environment Act 1987* (P&E Act)
- *National Parks Act 1975.*

Included in the Local Planning Policy Framework provisions under the P&E Act is an Environmental Significance Overlay – Schedule 6 (ESO6) on the Calder Park Industrial Estate Grassland. The purpose of this planning control is to protect and enhance the landscape character and heritage values of the area.

The Local Planning Policy Framework provisions under the P&E Act designate the Ravenhall East Grasslands, Organ Pipes National Park and Bullum Bullum Aboriginal Place as Public Conservation and Resource Zone (PCRZ).

The City of Brimbank has several clauses and stated objectives within their Municipal Strategic Statement of relevance to visual and landscape issues including protection of the natural and built environments.

Melton's Municipal Strategic Statement refers to the MESP (GHD, 1997), which includes objectives for Landscape and Urban Design (Section 7), Recreation and Open Space (Section 8).

The Organ Pipes National Park is listed under Schedule 2 of the National Parks Act and is required to have a management plan that preserves the park in its natural condition. In addition, provisions set out in the Local Planning Policy Framework under the P&E designates the Park a 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.

11.3 Existing Conditions

In response to the EES Scoping Requirements (Victorian Government, July 2013), the areas of focus for the visual and landscape assessment are the Organ Pipes National Park, Kororoit Creek environs and other open space reserves. In the section below the key landscape types are described and in section 11.4 the landscape sensitivities are identified.

11.3.1 Built Landscape Elements

Although there are several natural and cultural landscape elements of importance, including the Organ Pipes National Park and Kororoit Creek, the landscape along the Project corridor is dominated by the built form. The vast majority of the route is lined with medium density residential developments, which have largely been built over the last 20 years and with only one remaining area yet to be developed in Burnside Heights. Given the recent development of the area, in many places the constructed landscape is immature. Avenues of trees, where planted, generally vary from immature (planted within the last 2 years) to semi-mature (5-10 years old) and therefore contribute varying degrees of visual amenity to the road corridor.

Aside from the areas of residential development, a pocket of commercial development exists between Riding Boundary Road and the Western Highway. The landscape in this area is dominated by large buildings set back from the road, signage, and parking areas with minimal vegetation.

There are several open space reserves along the corridor, but because the vegetation is generally immature, the trees do not yet significantly contribute to the visual amenity of the road. Some of these reserves are also very sparsely planted or treated and have a low level of amenity, such as Lachlans Field and the reserve opposite Copperfield College. There are also some isolated undeveloped areas along the corridor that generally appear as paddocks. A large area exists at the southern end of the corridor on the west side of Robinsons Road. At the northern end of the corridor, on the east side of Calder Park Drive there is a large portion of undeveloped zoned land.

The developed sections with the highest amenity can be found along Westwood Drive between Nicol Avenue and Kororoit Creek in Burnside and Caroline Springs. Wide verges are extensively planted with low shrubs and tussocks and the service roads are lined with semi-mature trees. Similarly, the section of road corridor between Hume Drive and Southbank Walk also has a high level of visual amenity, as it is lined with established garden beds and mature trees, along the roadside and within the Morton Homestead Activity Centre.

The Calder Park Motorsport Complex contains the most evidence of human alteration in the form of high embankments that enclose the racing track, and the presence of the transmission towers and lines. Calder Park contributes recreation resources; however these are not publicly accessible.

11.3.2 Natural Landscape Elements

There are several natural and cultural landscape elements of importance along the corridor. The corridor is located in the Victorian Volcanic Plain Bioregion. The gently undulating landform of the lava plains is only interrupted by several drainage lines crossing through the basalt surface. The key natural features include the Organ Pipes National Park, Kororoit Creek and several grassland reserves. In addition to key features, grassland reserves, other open spaces and recreational reserves are also present within and adjacent to the Project Area. A brief description of these features is provided below, specifically in relation to:

- Organ Pipes National Park;
- Kororoit Creek;
- Banchory Grove Nature Conservation Reserve;
- Ravenhall East Grassland Nature Conservation Reserve; and
- Other open spaces and reserves.

Organ Pipes National Park

The Organ Pipes National Park (shown in Figure 11-1) exists north of the Calder Freeway and is a park protected under the National Parks Act 1975. The geological features of the park were the principle reasons for its listing as a National Park in 1972, namely the Organ Pipes, Tessellated Pavement and Rosette Rock.

The park is publically accessible, contains walking tracks and provides resources for passive recreation. The park is considered to be of high scenic quality for its distinctive landform of basalt plains and distinctive gorges, defined patterns of vegetation and a river of a permanent nature.

Figure 11-1 View of the Organ Pipes National Park from the northern end of the Palmers Road corridor

Kororoit Creek

The Kororoit Creek (shown in Figure 11-2) intersects the alignment north of Rockbank Middle Road. In this reach the Kororoit Creek valley is broad and moderately incised at around 10m lower than the surrounding plain. Vegetation is evident along this creek line as scattered old growth River Red-gums (*Eucalyptus camaldulensis),* and an understorey of exotic weeds, including shrubs on the escarpments and grasses and groundcovers on the plains and fringing the creek. There is a good degree of accessibility and connectivity of the creek to surrounds. The Kororoit Creek environs also provide passive and active recreation resources, such as a shared bike path and extensive visual amenity through the provision of trees and plantings.

Figure 11-2 View of the location of the proposed Kororoit Creek bridge crossing

Banchory Grove Nature Conservation Reserve

The reserve (shown in Figure 11-3) is located between Calder Park Drive and the Bendigo Melbourne Railway. The grassland occurs on a gentle hillside and is characterised by an even cover of grasses with no overstorey present.

Figure 11-3 Banchory Grove Nature Conservation Reserve as viewed from Calder Park Drive

Ravenhall East Grassland Nature Conservation Reserve

The area is bounded by Robinsons Road and Western Freeway. The landscape (shown in Figure 11-4) is characterised by the broad and flat grassy plain against the backdrop of the Western Freeway; scattered with only a few Red Gums.

Figure 11-4 Ravenhall East Grassland Nature Conservation Reserve as viewed from Calder Park Drive

Open spaces

Other open spaces and reserves within or adjacent to the Project Area include parks and reserves, shared paths and planting and these areas provide improved visual amenity in residential and commercial areas.

A number of parks provide opportunities for passive recreation within or adjacent to the Project Area including:

- Bon Thomas reserve in Deer Park;
- Bothwell Park in Derrimut;
- Reserve on Arbour Boulevard in Burnside Heights;
- Pioneer Park, Lachlans Field and the reserve opposite Copperfield College in Sydenham;
- Morton Homestead Activity Centre in Taylors Hill; and
- Taylors Hill Youth and Community Centre Reserve and the reserve on Lucas Terrace in Taylors Hill.

Reserves identified adjacent to or near the Project Area include the Bullum Bullum Aboriginal Place and the reserves at the intersection of Westwood Drive-Carinya Boulevard and Westwood Drive-Roycroft Avenue. These areas provide facilities for passive recreation whilst the grasslands at Bullum Bullum contribute to visual amenity through the provision of views of the landscape, trees and planting.

Established plantings provide areas of improved visual amenity. Established planting within and adjacent to the Project Area include:

- Sections of established trees along Calder Park Drive;
- Semi-mature She-oaks lining Calder Park Drive in Watervale; and
- Extensive garden bed planting along Westwood Drive and the semi-mature Plane Trees lining the service roads and Westwood Drive in Burnside.

11.4 Landscape Sensitivity

11.4.1 Views and Viewshed

The landform of the corridor is generally quite flat with only a few vantage points. Additionally, the extensive development lining the road generally limits the views beyond the corridor itself. The viewshed expands significantly in the very northern end of the corridor, where the corridor intersects with the Calder Freeway and where there are large areas of undeveloped land with minimal overstorey vegetation. Long distance views towards Melbourne Airport and beyond to the ranges north of Melbourne can be seen in this location.

Other than this area, a wider viewshed exists in only two other locations where the absence of development does not restrict the view; at the crossing of Kororoit Creek and in the area west of the corridor, south of the Ballarat-Melbourne Railway Line. The relative importance of these views is then informed by the following criteria:

- Views from publicly accessible areas are more important than views from private or restricted access areas;
- Views observed by a large number of people at any one time are more important than those seen by individuals or small groups;
- Views observed for a longer period of time, such as several hours or more, are more important than those seen fleetingly or only over a very short period, such as less than 30 minutes;
- Views observed whilst participating in tourism and recreational activities, where the primary purpose of being there is to partake in the views, are more important than views observed whilst undertaking other activities where the views from that location are secondary to the purpose of being there; and
- Views observed of areas of high visual amenity are more important than those observed of areas of low visual amenity.

The most important view is considered the view to and from the Organ Pipes National Park south of Jacksons Creek. Other views of high importance are considered to be:

- Views to and from the Kororoit Creek and associated open space areas; and
- Views from the Organ Pipes National Park from the northern side of Jacksons Creek.

11.4.2 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. Each landscape character type also contains areas of distinct landscape character and each of these areas has been assessed in terms of scenic quality.

As shown in Figure 11-5 and Figure 11-6 the corridor is assessed as having three landscape character types, namely:

1. Basalt Plains: Organ Pipes, Calder Park, Calder Park Grasslands, Kororoit Creek and Ravenhall Grasslands;

2. Residential: Sydenham, Taylors Hill, Watervale, Burnside Heights, Burnside, Deer Park and Derrimut; and

3. Commercial: Ravenhall.

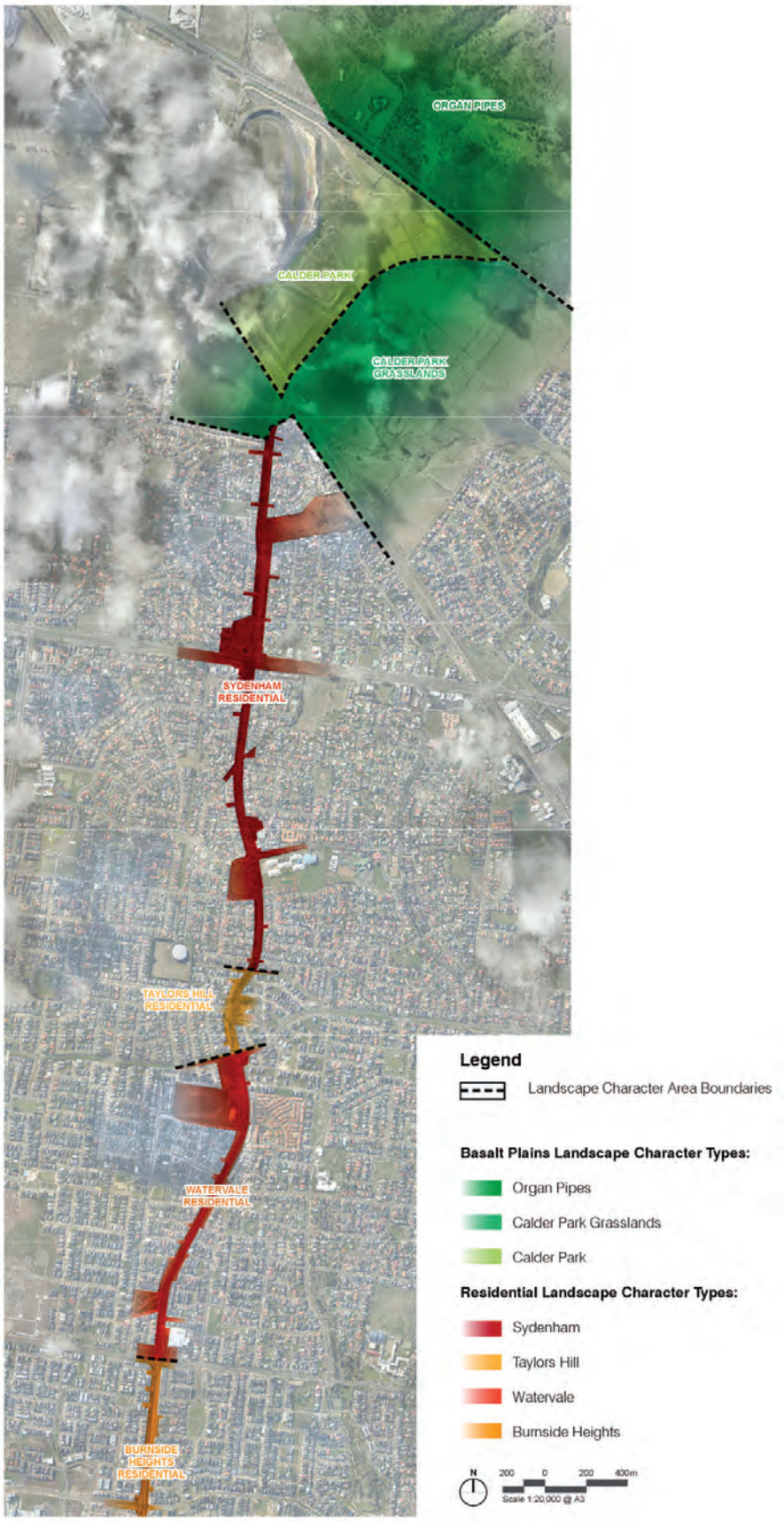


Figure 11-5 Landscape Character Areas (North)

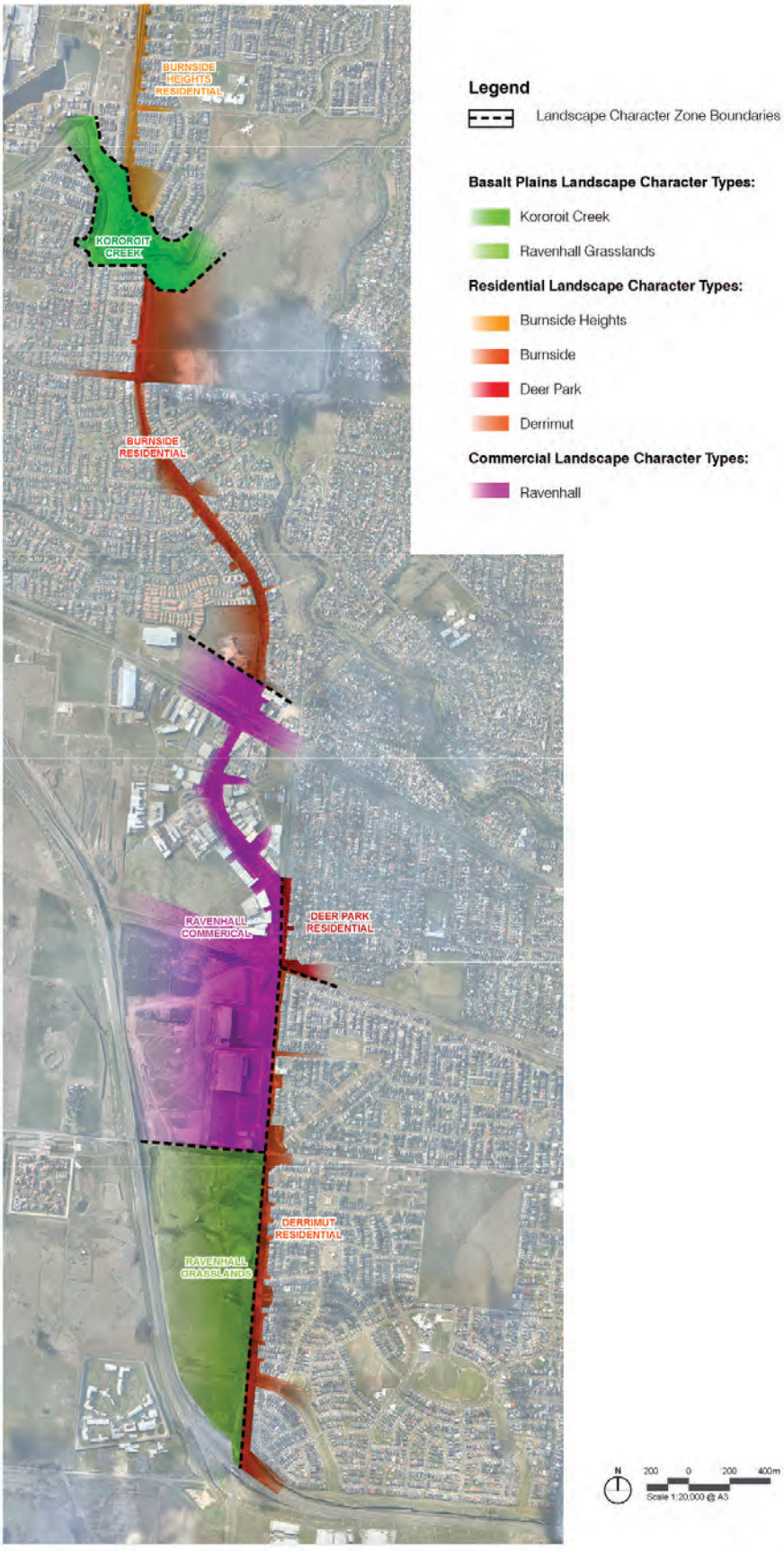


Figure 11-6 Landscape Character Areas (South)

The Basalt Plains landscape character type (shown in Figure 11-7) is defined by a general lack of development and the presence of broad expansive views across the natural features typical of the Western Basalt Plains. This includes views of the flat to gently undulating landform, the incised creeklines or shallow drainage lines, as well as some grassland, riparian and woodland vegetation. Structures and evidence of human alteration are generally not a dominant feature of this character type.

Figure 11-7 Typical view of the Basalt Plains landscape character type

In direct contrast with the Basalt Plains landscape character type, the Residential landscape character type (shown in Figure 11-8) is defined by a predominance of medium density residential development. This includes the built form and constructed landscape elements typical of residential development including houses, rear and side fences or front yards and gardens, street lights, footpaths, grassed nature strips and street trees. The landform is gently undulating to flat, water forms are non-existent and vegetation is present in the form of planted trees and garden beds within the road and open space reserves or within private gardens.

Figure 11-8 Typical view of the Residential landscape character type.

The Commercial landscape character type (shown in Figure 11-9) is dominated by the built form of large commercial and business development generally set back from the road. Large areas of pavement and car parking are prevalent. Vegetation is generally confined to lawn grass with sporadic plantings of planted understorey or shrub species.

Figure 11-9 Typical view of the Commercial landscape character type.

Signage dominates this landscape character type, both freestanding and located on the buildings. The landform is flat to gently undulating and water forms are non-existent. The transmission lines and towers also contribute to the visual dominance of the built form in this landscape character type.

11.4.3 Scenic Quality

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 human alteration, greater degrees of relative topographic relief and ruggedness and greater degrees of vegetative diversity and landscape variety.

The area with the highest scenic quality is the Organ Pipes landscape character area of the Basalt Plains landscape character type. The Kororoit Creek landscape character area, also of the Basalt Plains landscape character type, is considered of moderate scenic quality. All other landscape character areas, including all of the Residential and Commercial areas are considered to be of low scenic quality.

11.4.4 Landscape Value

Visual and landscape value is defined 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 and drinking fountains;
- Contribution to a ‘sense of place’ through the provision of views of landscapes representative of the landscape character types; 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 site’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.

This assessment is based on the landscape and visual values as they exist today and with the assumption that the proposed road bridge over the Kororoit Creek and associated road infrastructure by the City of Melton is not currently underway.

The Organ Pipes and Kororoit Creek landscape character areas are considered of high landscape and visual significance. The landscape character areas of the Calder Park Grasslands and Ravenhall Grasslands of the Basalt Plains landscape character types are considered of moderate landscape and visual significance. However, the development of the undeveloped areas within these landscape character areas in the future could potentially adversely affect the rating of this significance.

The Taylors Hill, Watervale and Burnside landscape character areas of the residential landscape character type are also considered of low-moderate landscape and visual significance. This is largely due to the existence of mature and established street trees and roadside planting, in addition to the provision of quality open space reserves within these areas.

The Calder Park, Sydenham, Burnside Heights, Deer Park, Derrimut and Ravenhall landscape character areas are all considered of relatively low landscape and visual value. This is largely due to the landscape and visual values being limited in extent, size or of a lesser quality than those values found within the other landscape character areas.

11.5 Assessment of Likely Effects

This section outlines the results of the assessment of the potential effects on landscape and recreational values of Organ Pipes National Park, Kororoit Creek environs and other open spaces. Measures that could avoid or minimise significant effects on the landscape values and associated recreational values, and minimise the visual effects on open spaces are outlined in Section 11.6.

An evaluation of compliance and residual impact assessment was completed in response to the relevant draft evaluation objective from the Scoping Requirements. The assessment of compliance and residual impact rating guide for visual and landscape values investigated in this EES is provided in Table 11-1.

11.5.1 Assessment Process

The likely landscape effects from the Project were assessed based on the:

- Changes to the site's landscape character; and
- Visual effects on existing views.

The landscape character and visual effects may be negative (an impact) or positive (a benefit).

The significance of the effect is determined by:

- The magnitude of a landscape effect based on the extent or size of change to the site's existing landscape character; and
- How sensitive the existing landscape is to change.

A landscape 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 following approach was used to assess the effect of the Project on existing views:

- The magnitude of a visual effect based on 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; and
- The sensitivity of a receptor based on importance or quality of the view and how sensitive the existing view is to change.

A visual effect that 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.

Table 11-1 Evaluation of compliance and residual impact rating guide – Visual and Landscape values

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Visual and Landscape values To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas.	Protect the visual amenity, recreational and natural landscape values of the Organ Pipes National Park Protect the visual amenity, cultural heritage and natural landscape values of the volcanic plains Protect the visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridor Protect the visual amenity and recreational values of the open space reserves Enhance the existing networks that provide cycling and walking accessibility and connectivity	National Parks Act 1975 Planning and Environment Act 1987 State Planning Policy Framework in Planning Schemes Local Planning Policy Framework in Planning Schemes	Negligible impact to visual and landscape values of the OPNP and open space areas. Strong policy compliance Best practice (incl. mitigation measures)	Minor impact to visual and landscape values of the OPNP and open space areas. Good policy compliance Improved practice (incl. mitigation measures)	Moderate impact to visual and landscape values of the OPNP and open space areas. Partial policy compliance Standard practice (incl. mitigation measures)	Moderate or major impact to visual and landscape values of the OPNP and open space areas. Policy non-compliance Poor practice (incl. mitigation measures)	Major impact to visual and landscape values of the OPNP and open space areas. Major policy non-compliance Very poor practice (incl. mitigation measures)

The assessment discussed in the following sections responds to five evaluation criteria that enable a broad assessment of the overarching evaluation objective 'to avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas'.

The five evaluation criteria are:

- Protect the visual amenity, recreational and natural landscape values of the Organ Pipes National Park;
- Protect the visual amenity, cultural heritage and natural landscape values of the volcanic plains;
- Protect the visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridor;
- Protect the visual amenity and recreational values of the open space reserves; and
- Enhance the existing networks that provide cycling and walking accessibility and connectivity.

11.5.2 Landscape and Recreational Values of the Organ Pipes National Park

The Project would result in a low impact on the Organ Pipes National Park overall, particularly those areas with high patronage.

The impact is largely a visual impact on the area of park directly adjoining the proposed grade separated interchange of the Calder Freeway, and other areas on the south side of Jacksons Creek. Due to the meandering and deeply incised nature of the creek valley and the extensive vegetation within the park, this interchange would not impact significantly upon the majority of the park, nor on the key visitor destinations in the park, including the Visitors Centre, Organ Pipes, Rosette Rock and Tessellated Pavement (refer to Figure 11-10.

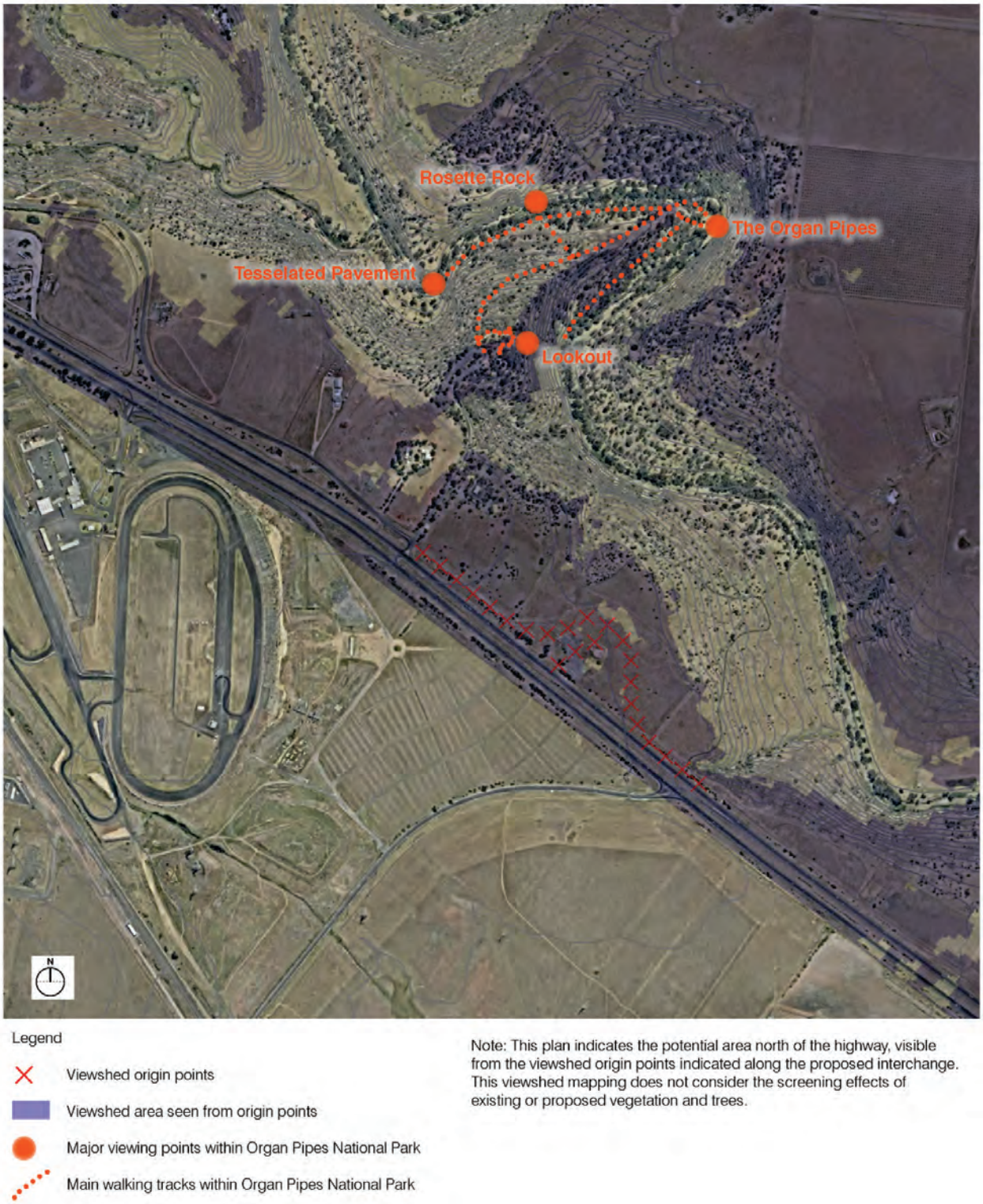


Figure 11-10 Organ Pipes National Park viewshed plan

Potential effects would be managed through mitigation measures such as retention of remnant vegetation, planting adjacent to the Organ Pipes National Park, the use of planting to screen the interchange and other elements of the road.

The current and indicative future (mitigated) views from within the Organ Pipes National Park to the south are shown in Figure 11-11.

Figure 11-11 Organ Pipes National Park, looking south: existing (top) and future mitigated (bottom) views

11.5.3 Visual Amenity, Cultural Heritage and Natural Landscape Values of the Volcanic Plains

The impact upon the visual amenity, cultural heritage and natural landscape values of the volcanic plains is relatively low.

Only minor acquisition of the Banchory Grove Nature Conservation Reserve is proposed and the impact upon the Sugar Gums and drystone wall at the Ravenhall Magazine and Storage Facility site can be mitigated through the realignment of the shared path and the incorporation of stone banding along the wall's original alignment.

11.5.4 Landscape and Recreational Values of the Kororoit Creek Environs

The proposed road development would have a moderate impact on the Kororoit Creek corridor. The proposed bridge and associated road infrastructure would impact on the valley and its visual amenity through the introduction of built infrastructure into a valley with predominantly natural, as well as some heritage value. The development would require the removal of open space reserve, steepen and constrain the natural width of the creek valley and constrict public access along the valley. It would also require the partial removal of the Drover's Hut remains and a River Red Gum, and create overshadowing of the creek line.

These impacts could be mitigated somewhat by creating a light well between the two bridge structures and planting indigenous vegetation on the embankments. Possible mitigation measures include the relocation of the Drover's Hut remains, their removal, or being buried under the future road reserve.'

The current and indicative future (mitigated) views over the Kororoit Creek valley are shown in Figure 11-12. The vantage point presented is from Sullivan Terrance towards the north east.

Figure 11-12 Kororoit Creek valley, looking north east: existing (top) and future mitigated (bottom) views

11.5.5 Landscape and Recreational Values and Visual Effects on Open Spaces

The impact on the visual amenity and recreational values of the open space reserves by the Project is low. Although most of the reserves lining the road corridor are impacted, only minor acquisition is proposed and the impact on visual amenity can be mitigated by the planting of additional trees and shrubs either within the road reserve or within the open space reserves.

11.5.6 Enhance the Existing Networks that provide Cycling and Walking Accessibility and Connectivity

The Project would have a positive impact on the existing networks that provide cycling and walking accessibility and connectivity. The provision of off-road shared paths in both directions and the connections to most of the existing shared path networks would be a significant landscape benefit of the Project.

11.6 Project Wide Mitigation Measures

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. Standard mitigation measures for VicRoads planning studies include:

- Bridge/culverts to be located and designed to complement and accommodate wildlife links, revegetation and creek systems;
- 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 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 freeway from adjacent residencies; and
- Where noise attenuation is required noise mounds should be the first option, followed by noise walls.

In addition to these standard mitigation measures, the following measures would be considered:

- All roadside walls or retaining structures would utilise materials, pattern, colour and texture which are sympathetic to the setting and congruous with their surrounds
- Bridge structures would:
    - Provide correct geometric relationships in the overall structural arrangement
    - 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
    - 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
    - For motorists, passengers, pedestrians and cyclists travelling over the bridge, provide views out beyond the sides of the bridge.

In considering the significance of the impacts after mitigation, it is assumed that the abovementioned standard mitigation measures would be adopted if relevant.

11.7 Landscape concept

The landscape concept for the Palmers Road corridor is intended to enhance the amenity of the proposed road development for all users of the corridor, as well as for the local and broader communities. The following principles have been applied for the concept:

- Mitigate wherever possible the landscape and visual impacts of the road development;
- Minimise native vegetation removal and retain and protect remnant indigenous vegetation wherever possible;

- Balance the provision of views from the road towards Jacksons Creek, Organ Pipes National Park, Pioneer Park, the Morton Homestead Activity Centre, Kororoit Creek, Banchory Grove Nature Conservation Reserve and Ravenhall East Grasslands Nature Conservation Reserve with the need to screen the road infrastructure from these key open space areas;
- Design planting in accordance with road safety requirements, including safety of ongoing maintenance, maintaining safe intersection sight distances, sight lines around curves and clear zone requirements;
- Plant trees wherever possible and appropriate within the road reserve to improve the amenity of the road corridor. Any opportunities for tree planting will require further investigation during detailed design to resolve safety, cost and ongoing maintenance implications. Where trees are not possible due to road safety requirements, plant taller shrubs or low growing plant species;
- Generally aim to provide tall shrub or low planting within centre medians and outer separators to improve the amenity of the corridor. The detailed design of planting or alternative surface treatments such as grass or paving will need to consider safety requirements with regard to maintaining these treatments in close proximity to the edge of running lanes and to enable safe intersection sight distances in conjunction with the need to maintain or screen views;
- Utilise indigenous plant species of local provenance, particularly in areas adjacent to the Organ Pipes National Park, Pioneer Park, Kororoit Creek and Ravenhall East Grasslands Nature Conservation Reserve; and
- To minimise weed infestation into Conservation Reserves, install measures such as crushed rock at the boundary interface with the road, specifically at Banchory Grove Nature Conservation Reserve.

11.8 Summary of Impacts and Mitigation Measures

A summary of impacts and mitigation measures is provided in Table 11-2. Measures to address impacts on visual and landscape character will be included as part of the project environmental management plan. Further information is provided in Chapter 16 ‘Environmental Management Framework’.

Table 11-2 Summary of impacts and mitigation measures

Evaluation Criteria	Key impacts	Key mitigation measures	Rating
Protect the visual amenity, recreational and natural landscape values of the Organ Pipes National Park.	Grade separated interchange with the Calder Freeway at the boundary of the Organ Pipes National Park.	Simple and elegant structure which makes a positive visual contribution to the environment. Minimise vegetation removal and replant indigenous vegetation where possible on the ramp embankments and between the interchange and ROW.	Well
Protect the visual amenity, cultural heritage and natural landscape values of the volcanic plains.	Removal of drystone wall and Sugar Gums on the west side of Robinsons Road.	Retain as many trees as possible and reconstruct drystone walling as a paving band along original alignment where possible.	Well
	Widening of the ROW into Banchory Grove Nature conservation reserve and a change to the natural landscape values of the volcanic plains.	Within the road reserve fill gaps with crushed rock to Banchory Grove Nature Conservation Reserve boundary to prevent weeds infesting the grassland.	
	Overpass of the Melbourne-Bendigo Railway line.	Provide views out beyond the sides of the bridge.	
Protect the visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridor.	Construction of Kororoit Creek Bridge.	Duplicating the bridge structure to allow more light and rain to penetrate beneath the structures. Design the bridges to be simple and elegant structures. Minimise vegetation removal and replant indigenous vegetation where possible on the ramp embankments and between the interchange and ROW.	Poor
	Removal of Drover's Hut remains.	Mitigation measures will be determined by Heritage Victoria. Possible measures include the relocation of the remains, their removal, or being buried under the future road reserve.'	
Protect the visual amenity and recreational values of the open space reserves	Widening of the road reserve into the existing open space.	Minimise width of naturestrip between shared path and left turn lane. Rectify landscape features disturbed by the works Re-establish garden beds and tree planting between the shared path and road reserve boundary. Plant additional shrubs within the recreation reserves adjacent to the shared path.	Well
Enhance the existing networks that provide cycling and walking accessibility and connectivity.	Provision of north and south bound off-road shared paths as well as connections to the existing off-road shared paths.	Provide connections to all existing networks, as well as allowing provision for future planned networks. Provide shade and shelter to paths.	Well

11.9 Conclusion

The Project aligns with existing planning legislation and policy through adhering to local planning controls, and demonstrates a good level of compliance with planning policy objectives. The Project would not impact significantly upon the majority of the Organ Pipes National Park, nor on the key visitor destinations in the park including; the Visitors Centre, Organ Pipes, Rosette Rock and Tessellated Pavement. Mitigation measures would reduce the impact on landscape and recreational values of Kororoit Creek and would also assist in protecting its visual and landscape value. A minor acquisition of designated open space is required and the visual impacts could be mitigated.

Overall, based on the evaluation undertaken using the criteria identified for this assessment and assuming the mitigation measures are applied, the Project has been rated 'Well' (refer to Table 11-3 in relation to the evaluation objective *'to avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas'.*

Table 11-3 Visual and landscape values evaluation

Evaluation Criteria	Rating
Protect the visual amenity, recreational and natural landscape values of the Organ Pipes National Park.	Well
Protect the visual amenity, cultural heritage and natural landscape values of the volcanic plains.	Well
Protect the visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridor.	Poor
Protect the visual amenity and recreational values of the open space reserves	Well
Enhance the existing networks that provide cycling and walking accessibility and connectivity.	Well
Overall Rating	**Well**

12 BIODIVERSITY AND HABITAT

12.1 EES Objectives and Scope

This chapter responds to the draft EES evaluation objective and addresses the requirements set out in Section 4.6 of the EES Scoping Requirements, which are as follows.

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

Key issues

- Loss of or degradation to significant habitat for listed protected flora and fauna species and communities, such as those associated with the remnant grasslands and Kororoit Creek environs.

Priorities for characterising the existing environment

- Characterise the distribution and quality of native vegetation, terrestrial and aquatic habitat and any wildlife movement in the area that could be impacted by the project.
- Identify the existence or likely existence of any species or communities listed under the FFG Act, as well as any declared weeds or pathogens.
- This characterisation is to be informed by relevant databases, literature and appropriate seasonal or targeted surveys.

Design and mitigation measures

- Identify potential and proposed design options and mitigation measures which could avoid or minimise significant effects on native vegetation and any listed ecological communities or flora and fauna species.

Assessment of likely effects

- Identify and assess likely direct and indirect effects on native vegetation, ecological communities and the habitat of any listed species of flora and fauna along the arterial corridor.

Approach to manage performance

- Identify proposed measures to further mitigate and manage residual effects of the project, including addressing the offset requirements of Victoria's native vegetation permitted clearing regulations and relevant provisions of planning schemes.
- Identify in the EES any further methods proposed to manage risks of effects on other biodiversity values and native vegetation, including as part of the EMF.

As discussed in Chapter 3 'Project Approvals' the project was determined to be a controlled action that requires assessment and approval under the EPBC Act. The project is to be assessed via preliminary documentation through a separate process. As part of the Commonwealth approval process, a Conservation Management Plan (CMP) is being prepared to manage potential impacts on EPBC Act listed ecological values. Prior to construction an overarching Contractor Environmental Management Plan (CEMP) will be developed to address known and potential impacts on biodiversity, including nationally and State significant values (Section 12.4.2).

Information presented through the following sections draws on the following technical specialist report prepared to document the potential impacts of the Project:

- Final Report: Flora and Fauna Assessment and Biodiversity Offset Analysis, Palmers Road Corridor: Western Freeway to Calder Freeway, September 2014 (Ecology and Heritage Partners Pty Ltd, 2014).

12.2 Legislative and policy context

12.2.1 EPBC Act

Ecological values that are of national significance are protected under the EPBC Act as Matters of National Environmental Significance (MNES). It should be noted that some EPBC listed species are also listed under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) (e.g. Spiny Rice Flower *Pimelea spinescens* subsp. *spinescens*). The Project has been determined to be a controlled action under the EPBC Act, with Commonwealth approval being sought through a separate process.

12.2.2 FFG Act

The assessment focused on species and ecological communities of State significance listed under the *Flora and Fauna Guarantee Act 1988* (Vic) (FFG Act) as well as any declared weeds, pests and pathogens. The FFG Act is the primary legislation dealing with biodiversity conservation and the sustainable use of native flora and fauna in Victoria. The provisions of the FFG Act bind all public agencies, public landowners and land managers. If an area of public land supports an FFG Act listed species or community, then the management and development of that land must be consistent with the objectives of the Act. Removal of listed flora species, i.e. flora species that are members of listed communities or protected flora, requires a permit from the Department of Environment, Land, Water and Planning (DELWP), where this occurs on public land.

12.2.3 Planning and Environment Act 1987

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of Planning Schemes. All Planning Schemes contain biodiversity provisions at Clause 12.01 to assist the protection and conservation of Victoria's biodiversity, including important habitat for Victoria's flora and fauna and other strategically valuable biodiversity sites. The biodiversity provisions require Councils to ensure that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

12.2.4 Biodiversity Conservation Strategy

A small section of the Project Area lies within the Ravenhall (Quarry Site) Precinct (PSP 1084), which is subject to the provisions of the *Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (DEPI 2013a) (the BCS). The strategy provides details of potential impacts of proposed urban development on MNES and sets requirements for development within these areas and will form part of the Commonwealth and State approval process.

12.2.5 Permitted clearing of native vegetation – Biodiversity assessment guidelines ('the Guidelines')

The main objective of the Guidelines (DEPI, 2013c) is to ensure 'no net loss in the contribution made by native vegetation to Victoria's biodiversity'. The objective of 'no net loss' is to ensure permitted clearing has a neutral effect on the biodiversity of Victoria.

The Guidelines classify native vegetation into two categories:

- a remnant patch
- scattered trees.

Under the Guidelines, impacts on biodiversity are first assessed against risk-based pathways. The risk associated with removal of vegetation or scattered trees is determined by the analysis of two factors – extent risk and location risk. The extent risk is identified by the amount of remnant patch removal proposed (in hectares) or the number of Scattered Trees proposed to be removed. Location risk has been identified for all areas in Victoria through DEPI's Native Vegetation Information Management (NVIM) Tool. By combining the extent risk and location risk of the vegetation to be removed through the habitat hectare assessment, the project was determined to fall under a High Risk pathway.

For moderate and high risk-based pathway projects seeking permit applications, habitat hectares must be calculated. A habitat hectare assessment was undertaken for the Project.

12.3 Existing conditions

The following definitions apply to this chapter:

- **Project Area**: shown in Figure 12-1 this area encompasses the Functional Design Footprint and additional areas previously surveyed in 2009
- **Functional Design Footprint**: The area nominated by VicRoads as encompassing the likely extent of direct impacts associated with the Project. The biodiversity offset targets have been calculated based on this footprint.
- **Study Area**: The area within 10km of the Project Area, this is consistent with the extent of the database searches.

While much of the Project Area has been modified by the direct and indirect effects of urbanisation, a number of important ecological values remain. Desktop reviews and field surveys were carried out to investigate the native vegetation, terrestrial and aquatic habitat and any significant wildlife corridors in the area. Table 12-1 provides a summary of the key surveys undertaken.

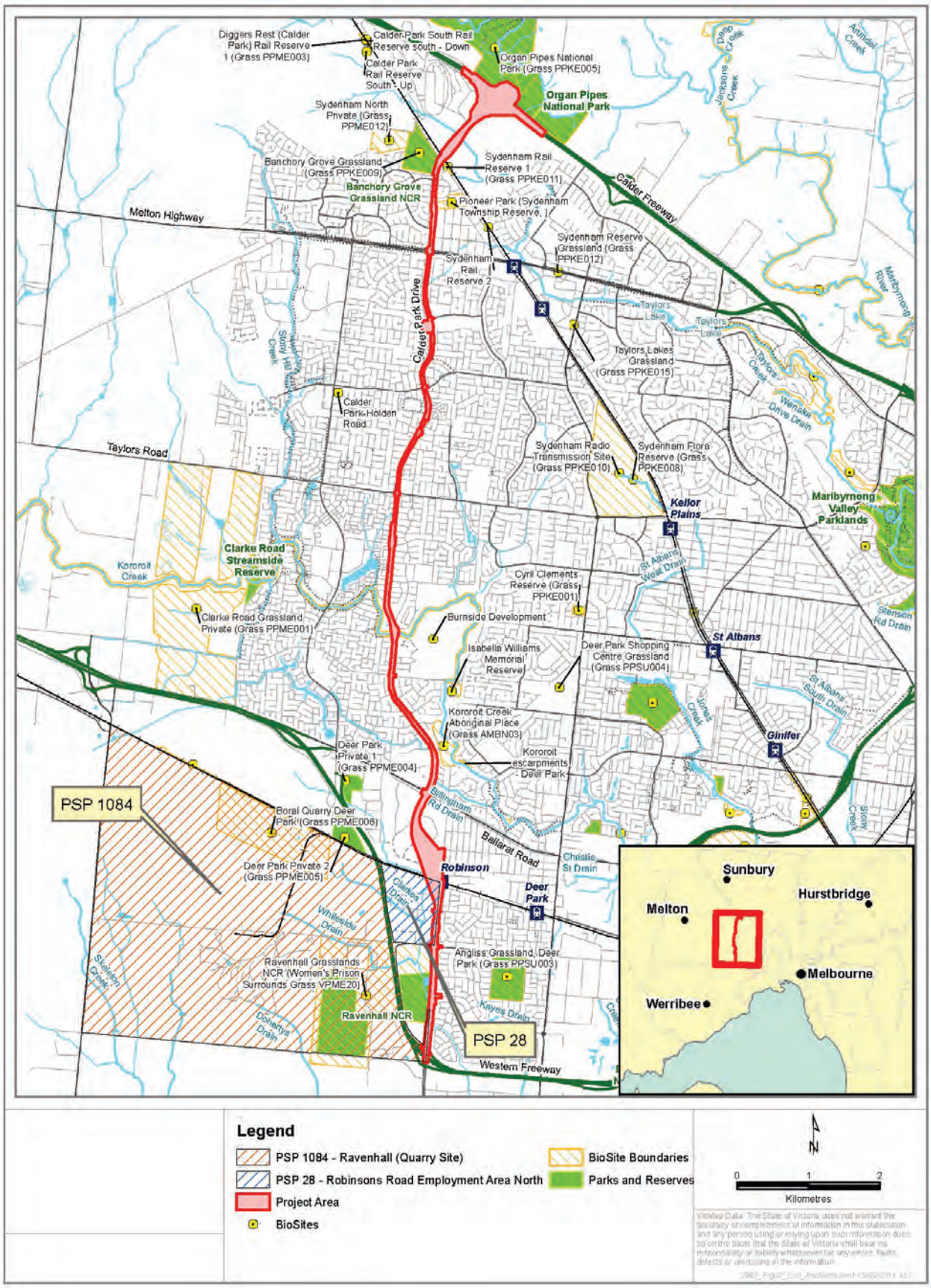


Figure 12-1 Project Area

Table 12-1 Key surveys completed in the Palmers Road Corridor

Report Title	Areas of field survey	Survey effort
Ecology Partners (2007) Flora, Fauna and Net Gain Assessment	Entire Palmers Road Corridor, excluding land between the Western Highway and the southern end of Westwood Drive and between the southern and northern ends of Calder Park Drive	Flora assessments completed 26 and 30 October 2006 Habitat-based fauna assessments completed 02 and 03 October 2006 Targeted Growling Grass Frog *Litoria raniformis* surveys of Kororoit Creek completed 11 and 14 December 2006 Establishment of tile grids for Striped Legless Lizard *Delmar Impar* and inspections completed in 2006 and 2007 Targeted Golden Sun Moth *Synemon plana* surveys completed 13 and 18 December 2006, and 05 January 2007
Ecology Partners (2009) Flora, Fauna and Net Gain Assessment	Entire Palmers Road Corridor, including corridor areas not assessed in 2007 report	Habitat-based flora and fauna surveys completed on 22 December 2008 and 14 January 2009
Ecology Partners (2010) Targeted Surveys for EPBC Act Listed Plants	Surveys focused on seven areas of potential habitat for these listed species: • north of the Calder Freeway, near Calder Park Drive • adjacent to the Bendigo railway line on Calder Park Drive • Kororoit Creek reserve and associated areas near Westwood Drive • areas near the Melbourne-Ballarat Railway line south of the Western Highway • between Riding Boundary Road and the Deer Park Bypass, Palmers Road, Derrimut • between Doherty's Road and Boundary Road, Palmers Road, Truganina • between Sayers Road and Doherty's Road, Truganina	Targeted surveys over six days for species included Spiny Rice-flower *Pimelea spinescens subsp. spinescens*, Maroon Leek Orchid *Prasophyllum frenchii*, Sunshine Diuris *Diuris fragrantissima* and Small Golden Moths *Diuris basaltica*
Ecology Partners (2014) Final Report: Flora and Fauna Assessment and Biodiversity Offset Analysis, Palmers Road Corridor: Western Freeway to Calder Freeway	Survey assessed new areas within the corridor associated with the Functional Design Footprint and ground-truthed the results of previous site assessment	Flora and fauna survey completed 30-31 May and 02 July 2013

12.3.1 Species of state significance

Flora

Based on a review of the Victorian Biodiversity Atlas (VBA) (DSE, 2011), 24 FFG Act listed plant species have been recorded, or are considered likely to occur within the Study Area. Field surveys conducted for the project in 2009 recorded two FFG Act listed species, the Spiny Rice-flower and the Tough Scurf-pea *Cullen tenax*. Field surveys in 2013 did not record the FFG Act listed species previously recorded in the Project Area. Based on field survey databases and a likelihood-of-occurrence assessment, two FFG Act listed species of plant are considered to occur within the Project Area and are listed below:

- Spiny Rice-flower; and
- Tough Scurf-pea.

Given the high level of survey effort in recent years, the relatively small area of suitable habitat remaining in the Project Area and the lack of management within the residual native vegetation patches, it is unlikely that any other FFG Act listed flora species occur.

A summary of the significant species recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in EES Technical Appendix I (Ecology and Heritage Partners, 2014).

Fauna

Based on a review of the VBA (DSE 2011), 57 FFG Act listed fauna species have been recorded, or are predicted to occur within the Study Area. Field surveys conducted in 2009 and 2013 did not record any FFG Act listed fauna species. The assessment undertaken by Ecology and Heritage Partners indicates that 10 FFG Act listed fauna species are considered to have a moderate-high likelihood of occurring in the Project Area, including:

- One mammal (Grey-headed Flying-fox);
- Six birds (Swift Parrot, Blue-billed Duck *Oxyura australis*, Eastern Great Egret *Ardea modesta*, Lewin's Rail *Lewinia pectoralis*, Baillon's Crake *Porzana pusilla palustris* and Diamond *Firetail Stagonopleura guttata*);
- One reptile (Striped Legless Lizard);
- One frog (Growling Grass Frog); and
- One invertebrate (Golden Sun Moth).

A summary of FFG Act listed species recorded or predicted to occur in the Project Area and the likelihood of occurrence assessment is provided in EES Technical Appendix I (Ecology and Heritage Partners, 2014).

12.3.2 Matters of national environmental significance

Communities

Nationally significant vegetation communities in the Project Area include 3.27 hectares of Natural Temperate Grasslands of the Victorian Volcanic Plains (NTGVVP) and 0.03 hectares of the Seasonal Herbaceous Wetland (SHW).

Flora

Previous records of species contained within the VBA identify that 11 EPBC Act listed flora species have previously been recorded in the Study Area, while the EPBC Protected Matters Search Tool indicates there is potential for a further two species to occur (refer to Figure 12-2 to Figure 12-5). Field surveys undertaken in 2007 recorded two Spiny Rice Flower individuals within remnant grassland now classified as Habitat Zone PG1 (outside of the Functional Design Footprint). Subsequent surveys completed between October and December 2009 (outside the flowering period) did not detect this species, nor did targeted surveys completed as part of the 2014 assessment. During these surveys the Spiny Rice-flower plants may have been covered by the thick swards of Kangaroo Grass, only persisted as underground lignotubers or were potentially no longer present due to natural processes or disturbance in the local area associated with construction of the Deer Park Bypass and surrounding urban development. Through application of the precautionary principal, the species is considered to be present within the patch of habitat in which it was previously detected.

None of the remaining 12 species recorded or predicted to occur within the Study Area have been detected during surveys for this project since 2007 and are no longer considered present.

Fauna

The Victorian Fauna Database (VFD) lists 19 EPBC Act fauna species previously recorded in the Study Area, while the EPBC Protected Matters Search Tool indicates there is potential for a further eight species to occur. Of these 27 species, five are considered to have a moderate to high likelihood of occurrence, with several others potentially visiting the area for foraging or during nomadic movements. The remaining nominated species have no habitat available within the Project Area.

Field surveys undertaken in 2009 and 2013 did not record any nationally significant fauna species within the Project Area. Regardless, the five species with moderate to high likelihood to occur in the Project Area include:

- Striped Legless Lizard - Whilst not detected during targeted tile grid surveys, it cannot be confirmed as absent from the Project Area. If present, this species is likely to be supported in Habitat Zones PG1, PG2, PG3, PG6 and PG8 (refer to Figure 12-2 to Figure 12-5).
- Golden Sun Moth - If present, this species is considered likely to inhabit higher quality connected patches of indigenous grassland in Habitat Zones PG1, PG2, PG3, and PG8 (refer to Figure 12-2 to Figure 12-5).
- Growling Grass Frog - This species was most recently recorded in 2007 within the vicinity of the Project Area. Although targeted surveys did not record the Growling Grass Frog in 2009 or 2013, Kororoit Creek is considered to be of national conservation significance for the species and comprises high quality breeding habitat. The species, although not detected, is assumed to be present within Kororoit Creek.
- Swift Parrot *Lathamus discolour* - This species is considered likely to flyover the Project Area on route to areas of higher quality habitat in central and northern Victoria. The Project Area supports limited foraging habitat for this species.
- Grey Headed Flying Fox *Pteropus poliocephalus.* This species is likely to flyover the Project Area and potentially forage along the Kororoit Creek corridor and within planted trees. There is no suitable roosting habitat for this species in the Study Area.

There are previous records for a number of EPBC Act listed migratory species in the vicinity of the Project Area. However, the site does not support 'important habitat' for migratory species as defined within the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines*.

12.3.3 Native vegetation communities

A review of the DEPI Biodiversity Interactive Map (DEPI, 2013b) indicated that prior to European settlement the Project Area was likely to have supported three Ecological Vegetation Classes (EVCs) as follows:

- Heavier-soils Plains Grassland – EVC 132_61;
- Creekline Grassy Woodland – EVC 68; and
- Aquatic Herbland – EVC 653.

A field survey undertaken in 2013 confirmed the presence of the following two EVCs within the Project Area:

- Heavier-soils Plains Grassland: occurs within 43 patches across the Project Area in 11 Habitat Zones, as shown in Figure 12-2 to Figure 12-5. The condition of this EVC varies from very poor quality vegetation occupying roadside reserves, to high quality vegetation within conservation areas.
- 3.27 hectares of this EVC meet the condition thresholds for the nationally significant community NTGVVP.
- Plains Grassy Wetland: occurs within the Project Area as small, relatively weed-free patches within a larger remnant Plains Grassland patch. These patches are dominated by Common Nardoo *Marsilea drummondii*, Common Tussock-grass *Poa labillardierei* and Finger Rush *Juncus subsecundus*. This EVC also includes areas that were mapped by DEPI as Aquatic Herbland, which is now referenced as the Plains Grassy Wetland community.
- 0.03 hectares of this EVC meet the condition threshold for the nationally significant community Seasonal Herbaceous Wetland (SHW).

The Creekline Grassy Woodland mapped by DEPI along Kororoit Creek no longer meets the condition thresholds of an EVC. Field –mapped vegetation within the Project Area is shown in Figure 12-2 to Figure 12-5.

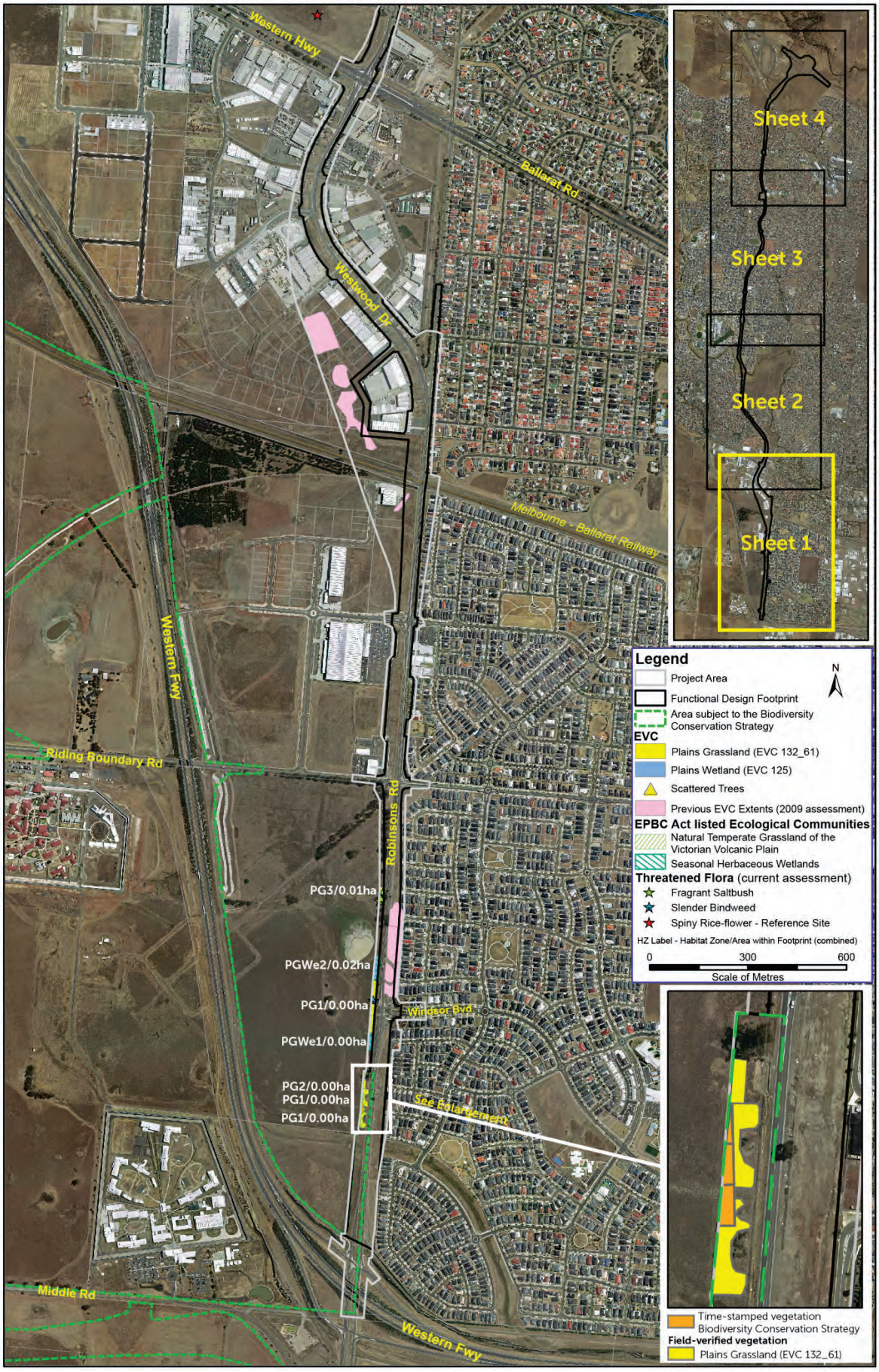


Figure 12-2 Sheet 1 of 4 Field mapped vegetation within study area

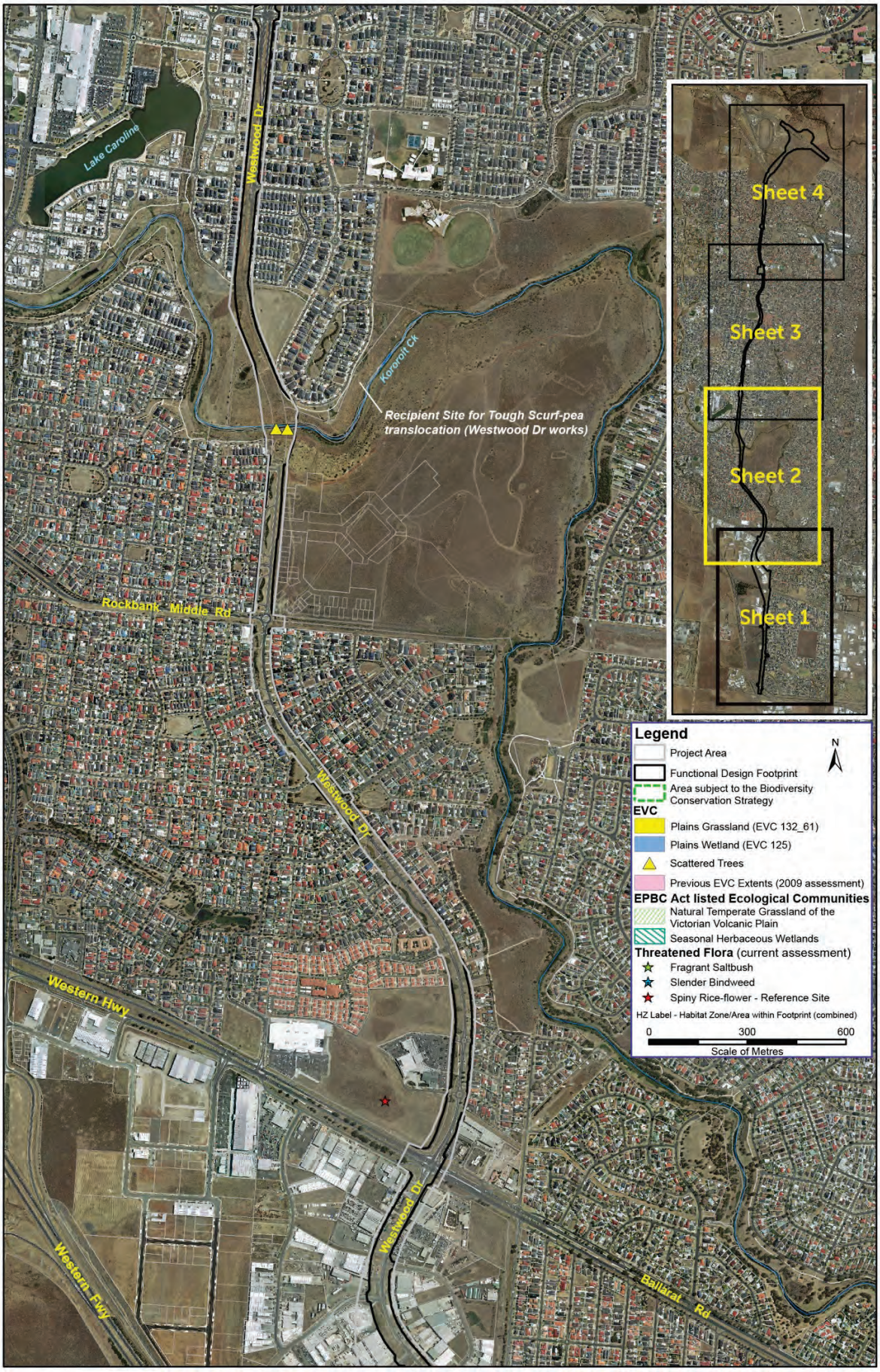


Figure 12-3 Sheet 2 of 4 Field mapped vegetation within study area

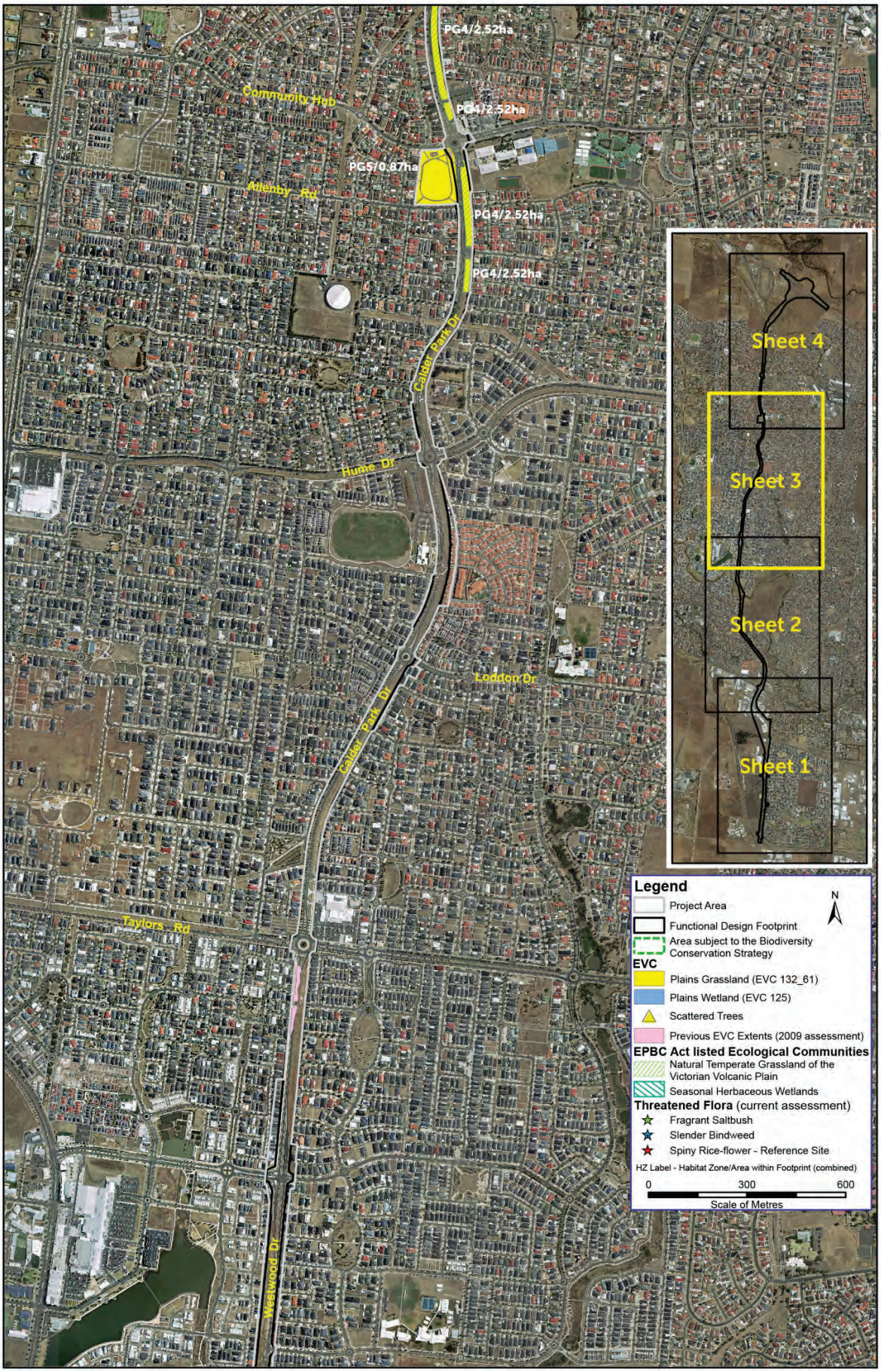


Figure 12-4 Sheet 3 of 4 Field mapped vegetation within study area

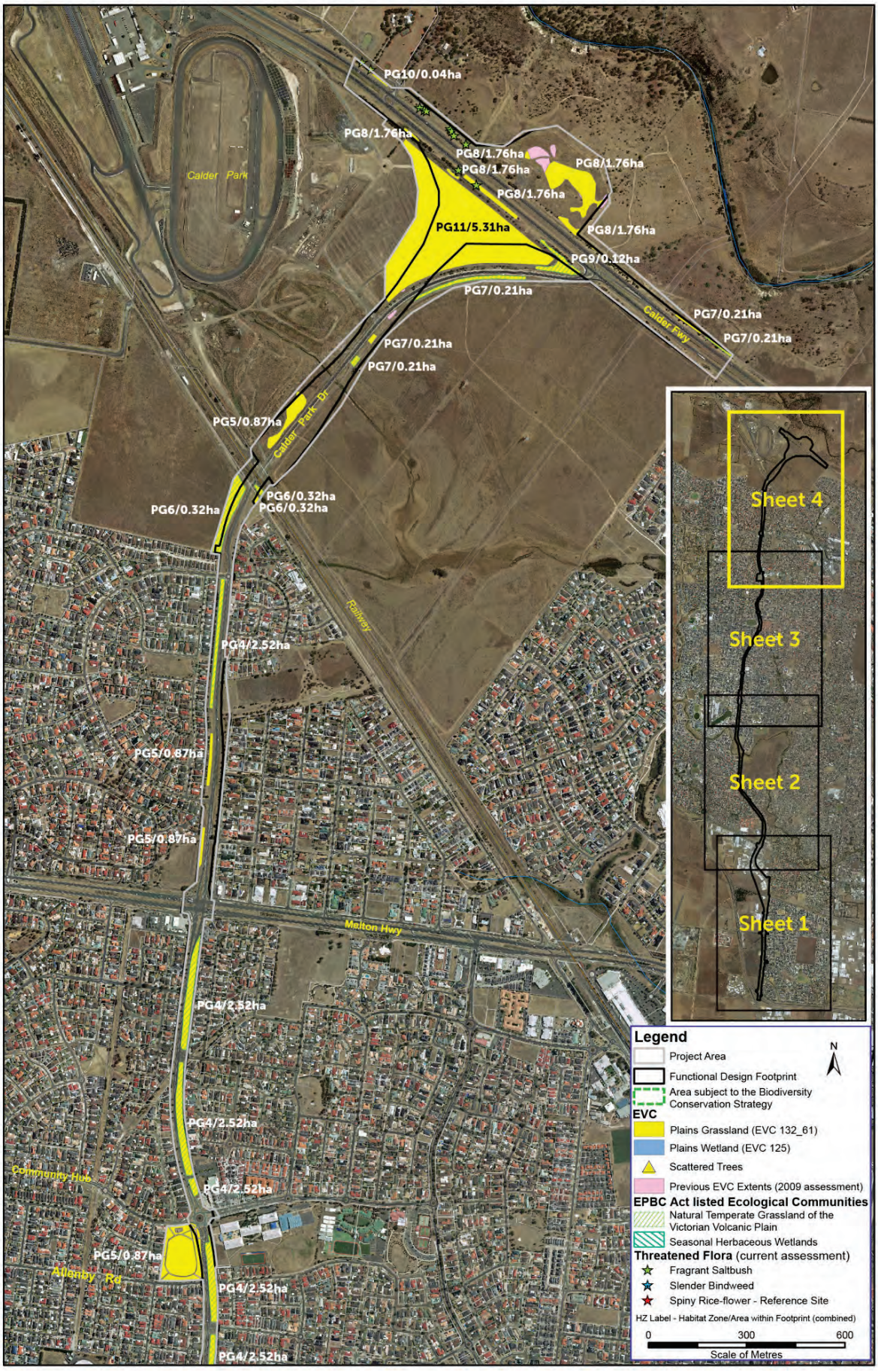


Figure 12-5 Sheet 4 of 4 Field mapped vegetation within study area

12.3.4 Significant sites

Managed conservation reserves within the vicinity of the Project Area include Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve and Organ Pipes National Park. The Functional Design Footprint adjoins the Ravenhall Nature Conservation Reserve and Organ Pipes National Park, and encompasses approximately 0.13 hectares of the Banchory Grove Grassland Nature Conservation Reserve (Figure 12-2 and Figure 12-5). A summary of the species these areas potentially contain is provided below:

- Organ Pipes National Park (Nationally Significant BioSite 3545), contains previous records of Striped Legless Lizard (EPBC listed)
- Ravenhall Grasslands Nature Conservation Reserve (State significant BioSite 4205) contains previous records of Striped Legless Lizard, Spiny Rice Flower (EPBC listed), Pale Swamp-everlasting *Coronidium aff. Rutidolepis* (Victoria Advisory List) and Slender Bindweed *Convolvulus angustissimus* subsp. *omnigracilis* (Victoria Advisory List)
- Banchory Grove Grassland Nature Conservation Reserve (State significant BioSite 3549) contains previous records of Striped Legless Lizard, Spiny Rice-flower, Clover Glycene *glycine latrobeana* (EPBC listed) and Rye Beetle-grass *Tripogon loliiformis* (Victoria Advisory List).

In addition to managed conservation reserves, the Functional Design Footprint includes a small section of Pioneer Park (State significant BioSite 5270), a council managed reserve. The area included in the footprint is zoned General Residential Zone (GRZ3) under the Brimbank City Council Planning Scheme.

12.3.5 Fauna habitat

The Project Area contains sufficient habitat characteristics to support a moderate diversity of common fauna species. Conditions that prevent high diversity from occurring are related to the cleared nature of much of the Project Area, due to a long history of agricultural land use and more recent urbanisation. This has led to large areas being dominated by introduced grasses and weed species, and a scarcity of mature native trees that would typically support a high diversity of animals. Habitat features recorded in the Project Area generally include those associated with remnant indigenous grassland, exotic dominated grassland, planted vegetation, aquatic vegetation and habitat and developed areas. The key habitats and species associations within the Project Area are detailed below:

- **Remnant Indigenous Grassland** - This habitat type is characterised by a dense sward of native grasses (Kangaroo Grass *Themeda triandra* and Wallaby grasses *Rytidosperma* sp.), interspersed with exotic grasses up one metre high. Many of these areas contain a moderate to high level of embedded and loose surface rocks throughout. Grassland remnants are relatively isolated from other indigenous grassland patches in the local area, limiting contribution to local habitat corridors for grassland dependant fauna. This habitat is likely to support a diversity of native fauna, including the threatened Striped Legless Lizard and Golden Sun Moth, and a diversity of grassland birds and ground dwelling fauna such as Eastern Brown Snake *Pseudonaja textilis* and Little Whip Snake *Suta flagellum*.
- **Exotic Dominated Grassland** - Large areas of exotic dominated grassland are common throughout the Project Area and have been classified as degraded treeless vegetation. These grasslands range from maintained exotic lawns and road reserves, to unmaintained areas of open space dominated by opportunistic weed species. The grasslands are composed of exotic plant species commonly associated with urban environments. Generally, this vegetation provides little fauna habitat and is suitable for common urban-adapted native birds including Australian Magpie *Gymnorhina tibicen* and Noisy Miner *Manorina melanocephala*.
- **Planted Vegetation** – Given that a large proportion of the Project Area has been cleared for agricultural land use and development, a large proportion of the vegetated land remaining comprises planted trees and shrubs. These plantings range from mature trees within road reserves to newly established and landscaped garden beds, the majority of which contain species that are not indigenous to the project locality. Generally, this vegetation provides little fauna habitat and is suitable for common urban-adapted native birds.
- **Aquatic Vegetation and Habitat** - Aquatic habitats within the Project Area include Kororoit Creek, drainage lines and low-lying areas subject to inundation following heavy rainfall events. Kororoit Creek has a long history of disturbance ; however it is recognised as a site of national significance for the EPBC Act listed Growling Grass Frog and supports a range of native species of fish including Spotted Galaxiid *Galaxias truttaceus*, Common Galaxiid *Galaxias maculatus*, Australian smelt *Retropinna* sp., Tupong/Congoli *Pseudaphritis urvillii* and Flat-headed gudgeon *Philypnodon grandiceps* (Melbourne Water 2011). Within the Project Area, vegetation along the banks of Kororoit Creek comprises scattered River Red-gum trees with an understorey dominated by exotic weeds.

- **Developed Areas** - The Project Area is highly urbanised and as such, developed areas are prevalent. The developed residential, commercial and industrial portions of the Project Area contain street plantings and gardens, which include a range of common garden plants and trees that are not indigenous to the project locality. These areas generally provide little habitat for native animals, except those species adapted to exploit urbanised environments. The developed areas are suitable for a range of common native bird species.

12.4 Assessment of likely effects

This section outlines the assessment of potential direct and indirect effects on native vegetation, ecological communities and the habitat of EPBC Act and FFG Act listed flora and fauna species within the Project Area. Potential effects during construction and operation have also been considered. Measures that could avoid or minimise significant effects on native vegetation and any listed ecological communities or flora and fauna species are outlined in Section 12.4.2. Measures to mitigate and manage residual effects of the Project will be included as part of the project environmental management plan. Further information is provided in Chapter 16 'Environmental Management Framework'.

The chapter assesses the potential impacts associated with the ultimate six lane development.

The evaluation of compliance and residual impact rating guide for biodiversity and habitat investigated in this EES is provided in Table 12-2.

Table 12-2 Evaluation of compliance and residual impact rating guide – Biodiversity and Habitat

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Biodiversity and Habitat To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.	Potential impact on matters of national environmental significance Potential impact on species of state significance Potential impacts on native vegetation communities Potential impacts to sites of significance	Environment Protection and Biodiversity Conservation Act 1999 Planning and Environment Act 1987 Environment Protection Act 1970 Flora and Fauna Guarantee Act 1988 Wildlife Act 1975 State Environment Protection Policies (SEPPs) Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI, 2013c) Environmental Guidelines for Major Construction Sites (EPA, 1996)	(i) Negligible impact to vegetation or habitat of medium or higher conservation significance or (ii) Minor impact to vegetation or habitat of low conservation significance Strong policy compliance Best practice (incl. mitigation measures)	(i) Negligible impact to vegetation or habitat of very high or high conservation significance or (ii) Minor impact to vegetation or habitat of medium conservation significance or (iii) Moderate impact to vegetation or habitat of low conservation significance Good policy compliance (No Net Loss achievable) Improved practice (incl. mitigation measures)	(i) Minor impact to vegetation or habitat of very high or high conservation significance or (ii) Moderate impact to vegetation or habitat of medium conservation significance or (iii) Major impact to vegetation or habitat of low conservation significance Partial policy compliance (No Net Loss achievable) Standard practice (incl. mitigation measures)	(i) Moderate impact to vegetation or habitat of high conservation significance or (ii) Major impact to vegetation or habitat of medium conservation significance Policy non-compliance (No Net Loss not achievable) Poor practice (incl. mitigation measures)	(i) Moderate or major impact to vegetation or habitat of very high conservation significance or (ii) Major impact to vegetation or habitat of high conservation significance Major policy non-compliance (No Net Loss not achievable) Very poor practice (incl. mitigation measures)

12.4.1 Potential Impacts

12.4.1.1 Matters of National Environmental Significance

The Functional Design Footprint contains 3.27 hectares of the NTGVVP ecological community and 0.03 hectares of the SHW ecological community.

The Project Area provides habitat for the Spiny Rice-flower and potential habitat for five EPBC Act listed species of fauna, including Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Grey-headed Flying-fox and Swift Parrot. The six EPBC Act listed species are considered to inhabit or use habitat resources within the Project Area, which includes the Functional Design Footprint.

12.4.1.2 Matters of State Significance

State Significant Flora Species

According to Part 5, Division 2 of the FFG Act, 'a person must not take, trade in, keep, move or process protected flora on public land without a licence or permit'. Surveys have been conducted on numerous occasions with the aim of identifying FFG Act listed flora species.

The Spiny Rice-flower was recorded within the Project Area during field surveys completed in 2007. Targeted surveys undertaken in 2009 and in 2013 failed to detect this species. However, in accordance with the precautionary principle it is considered to still occur within the Project Area due to the persistence of suitable habitat. It should be noted that the proposed Functional Design Footprint has been designed to exclude the area where Spiny Rice-flower has previously been recorded in order to minimise any potential impacts.

Field surveys reported in 2009 recorded 10 specimens of Tough Scurf-pea on the southern side of Kororoit Creek at the top of a stony rise amongst basalt rock and Serrated Tussock. Consultation with Melton City Council indicated that recent ecological surveys completed for construction of the initial bridge over Kororoit Creek recorded 11 Tough Scurf-pea plants in the previous record location; with all plants within Council's construction footprint. In response to the known impact, Council commissioned the preparation of a Translocation and Conservation Management Plan involving the collection and propagation of seeds from the existing population and translocation to a recipient site located on the northern banks of Kororoit Creek, approximately 150m north-east of the collection site and approximately 100m east of the Functional Design Footprint. Seed collection and removal of the 11 Tough Scurf-pea plants was undertaken on 30 – 31 May and 02 July 2013. While not recorded at any other location in the Project Area, the Tough Scurf-pea is considered likely to occur based on the presence of potential habitat.

State Significant Fauna Species

Direct impacts to FFG Act listed fauna species are not likely to occur given the extent and condition of potential habitat within the Project Area. However, a number of FFG Act listed fauna species may be subject to indirect impacts, including:

- noise pollution - disturbance to normal animal behaviour due to noise from construction activity or vehicle movements when operating;
- increase in fauna mortality - fauna injury or death as a result of vegetation (fauna habitat) clearing, collision with vehicles, fences or plant and incidental trapping or drowning in trenches or earthworks; and
- aquatic disturbance - the Project would require works to be completed within the vicinity of Kororoit Creek, which provides known habitat for the EPBC Act and FFG Act listed Growling Grass Frog. Works within the creek and riparian zone have the potential to affect fish passage, increase sedimentation, decrease water quality and damage or remove aquatic and riparian vegetation.

Ecological Communities

The Functional Design Footprint contains 11.16 hectares of the FFG Act listed Western (Basalt) Plains Grasslands community. All Heavier-soils Plains Grassland (EVC 132_61) within the footprint corresponds with this community and it is noted that the FFG Act listings do not specify condition thresholds and therefore can include remnant patches which are not considered to be the EPBC Act listed NTGVVP ecological community.

12.4.1.3 Native Vegetation Communities

Potential direct and indirect affects to native vegetation from construction and operation activities include:

- loss of vegetation from land clearing and earthworks which can result in:
  - a reduction in the extent of vegetation communities and associated habitats;
  - a loss of local populations of species;
  - fragmentation of remnants of vegetation communities or local populations of individual species;
  - increased edge effects and habitat for invasive species;
  - reduction in the viability of ecological communities resulting from loss or disruption of ecological functions (e.g. weed invasion, predation, parasitism);
  - riparian zone degradation; and
  - soil exposure and altered water flow patterns resulting in increased erosion and sedimentation.
- a reduction of the habitat quality of native vegetation from activities such as, earthworks, and attachment of seed to vehicles and machinery have the potential to disperse weeds and pest species into the environs including into adjoining patches of native vegetation that are not currently dominated by these species.

Field surveys identified that the Functional Design Footprint contains approximately 2.64 habitat hectares (11.19 hectares) of remnant vegetation within two EVCs. The 2.64 habitat hectares comprise:

- 2.63 habitat hectares (11.16 hectares) of Very High conservation significance Heavier-soils Plains Grassland (EVC 132_61); and
- 0.01 habitat hectares (0.03 hectares) of Very High conservation significance Plains Grassy Wetland (EVC 125).

The Functional Design Footprint also contains two large scattered trees in the riparian zone of Kororoit Creek that would be removed (Figure 12-4).

Under the Guidelines (DEPI 2013c), the project falls under the High Risk-based Pathway, with a General Offset of **2.425 Biodiversity Equivalence Units** (BEUs) required to compensate for the removal of 11.19 hectares of native vegetation and two Scattered Trees (refer section 12.4.2).

12.4.1.4 Sites of Significance

The Functional Design Footprint includes a small area of the Banchory Grove Grasslands Nature Conservation Reserve and Pioneer Park (refer section 12.3.4). Direct impacts on other significant sites have been avoided through amendments to the footprint where practical, in consultation with Parks Victoria. Considering mitigation measures of indirect impacts (such as dust emissions, spread of weeds and pests, and noise), (Ecology and Heritage Partners, 2014) rate the potential impacts to sites of significance as 'Well'.

12.4.1.5 General Impacts to Flora and Fauna Habitat

Potential impacts to threatened flora and fauna habitat resulting from the construction and operation of the Project are summarised below:

- noise and dust pollution - many animals detect and depend on sound to communicate, navigate, evade danger and find food. Anthropogenic noise can alter the behaviour of animals or interfere with their normal functioning. Elevated levels of dust deposited onto foliage of vegetation has the potential to reduce photosynthesis and reduce growth rates and decrease the overall health of vegetation adjacent to construction activities.
- habitat fragmentation and edge effects - dividing up continuous habitats into separate smaller fragments tend to make a matrix of less suitable habitat and favour generalist aggressive species. This in turn can decrease population levels of other species remaining in the fragments. Edge effects are zones of changed ambient conditions, for example altered light levels; wind speed and temperature occurring along the edges of habitats, changes in ambient conditions could indirectly or directly affect habitats.

The Project Area is already fragmented by the existing highly urbanised environment and contains local flora and fauna already subject to significant and perpetual noise and dust pollution from traffic.

12.4.2 Mitigation Measures

State Significant Species

To mitigate and manage residual impacts to FFG Act listed plant species from the Project, the following are proposed:

- staff and contractor inductions to address the location of sensitive ecological values and their roles and responsibilities regarding the protection and/or minimisation of impacts to all ecological values;
- pre-clearing surveys and salvage/ translocation where required and practicable; and
- vegetation clearing protocols.

The following measures to mitigate the potential impacts to fauna from the construction and operation of the Project are proposed:

- where required, remove native vegetation which contains potential roosting/nesting resources for birds and/or arboreal mammals outside of breeding/hibernations periods. A permit to remove fauna would be required under either the Wildlife Act 1975 or the Wildlife Regulations 2002. Following completion of the final design and confirmation of project clearing requirements, DEPI would be contacted regarding the permit process;
- detailed design of the bridge crossing at Kororoit Creek conducted with consideration to impacts and mitigation from loss of connectivity, shading, runoff, scour and placement of piers and abutments;
- staff/contractor inductions would be carried out by a qualified ecologist or environment officer;
- sensitive areas such as those containing fauna habitat would be surveyed and cleared of fauna prior to construction activities or marked to avoid unnecessary vegetation or habitat removal prior to commencing works by a trained ecologist or environmental officer;
- where applicable, bridge piers would be sited outside of the main waterway area of Kororoit Creek on creek banks;
- appropriate erosion and sediment control strategies would be implemented to prevent erosion and sedimentation;
- construction in the vicinity of Kororoit Creek would be avoided during rainfall events (>10mm in 24hrs) when practicable;
- fish passage would be maintained during construction;

Native Vegetation Communities

A CEMP is proposed to address the 'avoid and mitigate' principles for the construction and operational phases. This is further detailed in Chapter 16 'Environmental Management Framework'.

The following mitigation measures are proposed to mitigate impacts on native vegetation:

- areas outside of those necessary for the operation of project, in particular those deemed to be ecologically sensitive such as native vegetation that is in moderate to good condition or provides suitable habitat for threatened species, would be protected from direct and indirect disturbance;
- ancillary infrastructure would be designed and located to minimise further impacts, be developed to minimise impacts to native vegetation and ensure compliance with the Australian Standard for Protection of Trees on Development Sites (AS 4970-2009);
- revegetation of disturbed areas to recreate pre-existing vegetation communities, including the planting of locally occurring native shrubs, trees and groundcover plants;
- implementation of appropriate weed hygiene protocols; and
- weed infested topsoil would be removed from site and disposed of at an appropriate waste facility.

Offsets

Mitigated impacts on biodiversity will be offset under the EPBC Act at the Commonwealth level and under the Guidelines (DEPI 2013c) and BCS (DEPI 2013a) at the State level.

Biodiversity offsets under the EPBC Act are likely to be required to compensate for the removal of 3.27 hectares of the NTGVVP ecological community and potentially other impacts on MNES (i.e. Growling Grass

Frog habitat). The Commonwealth approvals process is ongoing and offsetting arrangements under the EPBC Act will be made separate the State EES process.

At the State level, biodiversity targets for the small section of the Functional Design Footprint sited within the Ravenhall (Quarry Site) Precinct (PSP 1084) will be secured in accordance with the BCS (DEPI 2013a). Native vegetation losses within the remaining areas of the footprint will be offset in accordance with the Guidelines (DEPI 2013c).

In order to inform the EES process, indicative offset requirements under both policies have been calculated. As construction of the project is unlikely to occur for a number of years, offset obligations will be reassessed closer to the construction phase, following detailed design.

Offset requirements for native vegetation losses in land subject to the Guidelines (DEPI 2013c) have been determined through a through a five step process:

1) Establish whether or not the vegetation to be removed provides habitat for rare or threatened species;

2) Determine the relevant biodiversity equivalence score;

3) Determine whether the offset required is general or specific;

4) Apply the offset factor to calculate the required offset amount; and

5) Determine the attributes of the offset.

Using this methodology, (Ecology and Heritage Partners, 2014) indicate that a General Offset of **2.425 BEUs** is required to compensate for the 2.64 habitat hectares to be removed under the Guidelines.

Offset obligations for the area subject to the provisions of the BCS have been calculated by DEPI and provided in a BCS Statement. The applicable offset targets under the BCS (DEPI 2013a) are:

- 0.047 hectares of native vegetation at a cost of **$4,468.53;**
- 0.047 hectares of Spiny Rice-flower habitat at a cost of **$373.03; and**
- 0.990 hectares of Golden Sun Moth habitat at a cost of **$7,834.86**.

12.4.3 Summary of ecological values, mitigation measures and impacts

A summary of ecological values, mitigation measures and impacts is provided in Table 12-3.

Table 12-3 Summary of ecological values, mitigation measures and impacts

Ecological values	Mitigation measures	Impacts	Rating
Matters of national environmental significance: • Threatened flora species (Spiny Rice-flower) • Threatened fauna species (Golden Sun Moth, Stripped Legless Lizard, Growling Grass Frog, Swift Parrot and Grey-headed Flying-fox) • Migratory species • Threatened ecological communities including NTGVVP and SHW	Impacts have been avoided and minimised throughout the planning and design process. Matters will be managed in accordance with the Conservation Management Plan. The plan will be revised and developed in consultation with the Department of the Environment.	The Functional Design Footprint contains 3.27 hectares of the NTGVVP ecological community and 0.03 hectares of the SHW ecological community. The Project Area and Functional Design Footprint provides habitat for the Spiny Rice-flower and potential habitat for five EPBC Act listed species of fauna (Golden Sun Moth, Striped Legless Lizard, Growling Grass Frog, Grey-headed Flying-fox and Swift Parrot.	Well

Ecological values	Mitigation measures	Impacts	Rating
Matters of State significance: • Threatened flora species • Threatened fauna species • Threatened ecological species (Western [Basalt] Plains Grasslands Community)	Impacts have been avoided and minimised throughout the planning and design process. State significant values will be managed in accordance with a CEMP.	The Functional Design Footprint contains 11.16 hectares of the Western (Basalt) Plains Grasslands Community (including 3.27 hectares also classified as NTGVVP). The Project Area provides habitat for two FFG Act listed species of flora and potential habitat for 10 FFG Act listed species of fauna. The 12 FFG Act listed species are considered to have a moderate-high likelihood of occurrence within the Functional Design Footprint.	Well
Native vegetation: • Plains Grassland (EVC 132_61) • Plains Grassy Wetland (EVC 125) • Scattered Trees	Impacts have been avoided and minimised throughout the planning and design process. Impacts on native vegetation will be managed in accordance with a CEMP. Offset obligations will be met prior to works commencing. The biodiversity offsets will meet the key objective of the Guidelines (DEPI 2013c), being no net loss.	The Functional Design Footprint contains: 11.16 hectares of Plains Grassland (EVC 132_61) represented by 32 Remnant Patches and nine Habitat Zones 0.03 hectares of Plains Grassy Wetland (EVC 125) represented by two Remnant Patches and Habitat Zones two Scattered Trees located in the riparian zone of Kororoit Creek.	Neutral
Significant sites: • BioSites of national and state significance • Managed conservation reserves including Ravenhall Nature Conservation Reserve, Banchory Grove Grassland Nature Conservation Reserve Organ Pipes National Park • Pioneer Park, a Council managed reserve	Impacts have been avoided where possible. Indirect impacts on reserves/BioSites adjoining the Functional Design Footprint will be managed in accordance with a CEMP.	The Functional Design Footprint includes a small area (0.13ha) of the Banchory Grove Grassland Nature Conservation Reserve and a small area of Pioneer Park. The Functional Design Footprint adjoins both the Ravenhall Nature Conservation Reserve and Organ Pipes National Park.	Well

12.5 Conclusion

The Project sets out to achieve best practice in avoiding and minimising adverse effects on native vegetation, listed flora and fauna species and ecological communities. A strong level of policy compliance is demonstrated through the adherence of relevant legislation and by the commitment to prepare a CEMP to detail the design, construction and operation mitigation measures. The Project has the potential to impact on ecological values within the Project Area, such as through the loss of vegetation/ habitats, habitat fragmentation and edge effects, noise and dust pollution, increases in fauna mortality and aquatic disturbance. Given that the Project Area has been relatively disturbed and that mitigation measures and offset requirements would be implemented, adverse impacts would be limited.

Overall, based on the evaluation undertaken using the criteria adopted for the assessment, and assuming the mitigation measures are applied, the project has been rated “Well” (refer to Table 12-4) in relation to

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

Table 12-4 Biodiversity and habitat evaluation

Evaluation Criteria	Rating
Potential impact on matters of national environmental significance	Well
Potential impact on species of state significance	Well
Potential impacts on native vegetation communities	Neutral
Potential impacts to sites of significance	Well
Overall	**Well**

13 CATCHMENT VALUES

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.7 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – *To maintain the functions and values of surface water and floodplain environments.*

Key issues

- The potential for adverse effects on the functions and values of adjacent water environments (primarily Kororoit Creek and its floodplain).

Priorities for characterising the existing environment

- Identify and characterise relevant surface water and floodplain environments, including in terms of the existing drainage functions and behaviour.

Design and mitigation measures

- Identify potential and proposed design options and measures which could avoid or minimise significant effects, especially on floodplain of Kororoit Creek.

Assessment of likely effects

- Identify potential effects on adjacent surface water and floodplain environments, particularly the hydrological function and values of Kororoit Creek.

Approach to manage performance

- Describe in the EES any further methods proposed to manage risks of effects on floodplain values and water quality, including as part of the Environmental Management Framework.

Information presented in the following sections is based on:

- A Surface Water Memorandum (AECOM 2013g);
- A hydraulic assessment for the initial 3 lane bridge prepared by Noel Ransome and Associates Consulting Structural and Bridge Engineers; and
- A letter from Melbourne Water acting as a referral authority dated 26 October 2009 not objecting to a permit being granted for the initial 3 lane bridge subject to a number of conditions. Melbourne Water reference number 154066.

The ecological values of the catchment relevant to the Project Area and potential impacts on these arising from the Project are addressed in Chapter 12 'Biodiversity and Habitat' and Chapter 16 'Environmental Management Framework.

13.1 Existing Conditions

The Palmers Road Corridor falls within the Port Phillip and Westernport Catchment Management Authority's (PPWCMA) jurisdiction. PPWCMA has delegated authority to Melbourne Water to manage the drainage within the catchment.

The catchment within the Project Area is highly modified and developed. The predominant land use is residential with some commercial, with industrial properties also present. An existing 2-lane road is located within the Project Area for almost the entire length of the corridor.

An initial step was to determine the condition of watercourses within the Project Area based on ratings made by Melbourne Water using the Index of River Condition (IRC). Melbourne Water uses this rating tool to assess particular features to inform an overall assessment of the health of rivers. These features are:

- Water quality;
- Habitat for plants and animals;
- River flow patterns;
- How connected the river is to other rivers and creeks, allowing animals to migrate easily;
- Physical shape of the river; and
- Diversity and abundance of plants and animals.

Scores from zero to 10 are given for each feature. The overall rating can range from 0 to 50 with 0-19 being very poor through to 42-50 being excellent.

The five watercourses within the corridor intersected by the Project as shown in Figure 13-1 are:

- **Kororoit Creek** - Kororoit Creek is part of the 'Cherry, Kororoit, Laverton and Skeleton system' as described in the *Draft Healthy Waterway Strategy* 2013 (Melbourne Water, 2013).This system is within the Werribee Catchment. Kororoit Creek begins in the rural foothills of the Great Dividing Range around Gisborne and Sunbury before entering the western areas of Melbourne at Caroline Springs and Deer Park. Eventually, Kororoit Creek flows into Port Phillip Bay at Altona. Kororoit Creek is one of the many waterways within the catchment that provides important recreational spaces and natural habitat in an area that is rapidly transforming due to residential development.

  Lower Kororoit Creek, stretching from the western urban area of Melbourne to where it enters Port Phillip Bay at Altona, is of relevance to the Palmers Road Corridor and is within the City of Melton and City of Brimbank local government area. A water quality monitoring site is located at Deer Park. Lower Kororoit Creek is a modified reach receiving a Melbourne Water IRC score of 21, which corresponds to a 'Poor' condition (Melbourne Water, 2004a).

  The Melton East Strategy Plan (GHD, 1997) highlighted that although Kororoit Creek is considered to be in degraded condition, it contains certain natural and cultural features and qualities of importance. Areas of cultural heritage and habitat for significant flora and fauna are also acknowledged along the Kororoit Creek floodplain and tributaries in the Growth Corridor Plans (GAA, 2012).

- **Taylors Creek** - Taylors Creek as outlined in the Draft Healthy Waterways Strategy 2013, is part of the Lower Maribyrnong System. Taylors Creek originates near Sydenham and flows through Taylors Lakes before entering the Maribyrnong River at Brimbank Park in Keilor. Taylors Creek is a modified reach receiving a Melbourne Water IRC score of 23, which corresponds to a 'Poor' condition (Melbourne Water, 2004b). A search of the Victorian Water Resources Data Warehouse identified two surface water monitoring locations relevant to Taylors Creek, approximately 3.5km east of the Project Area (TAY1 and TAY2). However, no measurement data is available for these sites. Taylors Creek is one of the many waterways within the catchment that is valued by the community for its sparse remnant native vegetation and recreational opportunities, however has been significantly impacted by urbanisation and development.

- **Sydenham Drain, Billingham Road Drain and the unnamed drain** downstream of the confluence with Whiteside Drain, cross the Project Area beneath Calder Park Drive, Westwood Drive and Robinsons Road respectively. In addition to these crossings, an unnamed minor water crossing is located south of Ballarat Road in the vicinity of Wagani Avenue. As these are urban drains, no monitoring or condition assessments have been undertaken regarding catchment characteristics or water quality.

Planning controls exist in municipal planning schemes to protect waterways and water quality in accordance with local planning policy and the State Environmental Protection Policies (SEPPs). The planning scheme overlays and zones that relate to surface water include:

- Land Subject to Inundation Overlay (LSIO) - identifies land that is susceptible to flooding caused by a 1 in 100 year flood (or any other area determined by the floodplain management authority);

- Special Building Overlay (SBO) - identifies land in urban areas that is liable to inundation by overland flows from the urban drainage system and sets appropriate conditions and building floor levels to address the flood risk; and

- Urban Floodway Zone (UFZ) - applies to riverine flooding in urban areas where development has not occurred and the primary function of the land is to convey active flood flows.

Figure 13-1 presents the surface water planning controls within and in the vicinity of the Project Area. In particular it shows that UFZs and LSIOs are encountered where significant waterways cross or are adjacent to the corridor, namely Taylors Creek, Kororoit Creek and the unnamed drain, downstream of the confluence with Whiteside Drain. An SBO is observed in the vicinity of the Sydenham Drain indicating that this area acts as an overland flood path generally due to insufficient capacity within the drainage infrastructure in the area. A SBO is also observed at the minor waterway crossing south of Ballarat Road in the vicinity of Wagani Avenue. No overlays or zones are present near the intersection of Billingham Road Drain and the corridor at the time of this assessment. However, it may not be appropriate to assume that this area is free from flood risk in the absence of a flood planning control.

In addition, an Environmental Significance Overlay (ESO) Schedule 2 (Wetlands, Waterways and Riparian Strips) exists within the Project Area and applies to Kororoit Creek, within the City of Melton. The purpose of the ESO is to identify areas where development of land may be affected by environmental constraints and to ensure that development is compatible with identified environmental values. Further information on ecological values is provided in Chapter 12 'Biodiversity and Habitat'.

A permit is required to construct or carry out works within the above zone and overlays. Permits are generally issued by the local council and include a referral to Melbourne Water as the responsible Catchment Management Authority (CMA).

The planning controls provide an indication of areas affected or are liable to inundation. This is a matter that would be further investigated during detailed design to verify surface water flows in all areas of the corridor.

13.2 Existing Approvals

Melton City Council referred a town permit planning application for the construction of the initial 3 lane bridge over Kororoit Creek to Melbourne Water.

Melbourne Water (acting as the referral authority) responded on 26 October 2009 (reference number 154066) not objecting to a permit being granted for the initial 3 lane bridge subject to a number of conditions listed below.

- No polluted and / or sediment laden runoff is to be discharged directly or indirectly into Melbourne Water's drains or watercourses;
- The design and construction of the bridge is not to affect upstream or downstream flood levels;
- A separate application shall be made directly to Melbourne Water's Asset Services Team for any new or modified waterway crossing. Upon receipt of a formal application for the crossing of the waterway for construction purposes, detailed terms and conditions shall be provided for the proposed works;
- Prior to commencement of construction, detailed design plans (including rock beaching) are to be submitted to Melbourne Water for approval;
- A legal Crossing Agreement is to be entered into with Melbourne Water;
- Prior to commencement of construction, a Site Environmental Management Plan (SEMP) is to be submitted to Melbourne Water. The SEMP must address the following:
    - Sediment and silt management controls;
    - Vegetation management techniques;
- Prior to undertaking any works on or near a Melbourne Water asset, the contractor must be in receipt of a Melbourne Water permit to work;
- Prior to the commencement of works a separate application, direct to Melbourne Water's Asset Services team, must be made for any new or modified stormwater connection to a Melbourne water asset;
- Any individual carrying outs works on Melbourne Water's assets shall be recipient trained; and
- Prior to commencement of construction, a Work Method Statement and a Risk Task Assessment must be submitted outlining the general construction technique to be adopted. The statement must address the following:
    - Process for machinery to access the waterway;
    - Diversion of flows for low and high flows;
    - Evacuation procedure during times of high flows.

Melton City Council who is responsible for construction of the first 3 lane bridge over Kororoit Creek would need to comply with these Melbourne Water permit conditions and mitigation measures set under the *Water Act 1989*.

VicRoads is responsible for the construction of the second bridge over Kororoit Creek. Similar mitigation measures to the initial bridge are likely to be required with the second bridge. These mitigation measures would be confirmed as part of an approval under the Water Act 1989 at the time of construction.

13.3 Assessment of Likely Effects and Design and Mitigation Responses

This section outlines the results of the assessment of the potential effects on surface water and floodplain environments as a consequence of the Project. Potential effects during construction and operation have been considered. In addition, measures that could avoid or minimise significant effects especially on the floodplain of Kororoit Creek are described. An evaluation of compliance and residual impact assessment was completed in response to the relevant draft evaluation objective from the Scoping Requirements.

The focus of this assessment of potential effects on catchment values was floodplain capacity and water quality. The basis for rating project performance in relation to catchment values is presented in Table 13-1. The outcome of this assessment is provided in Section 13.4.

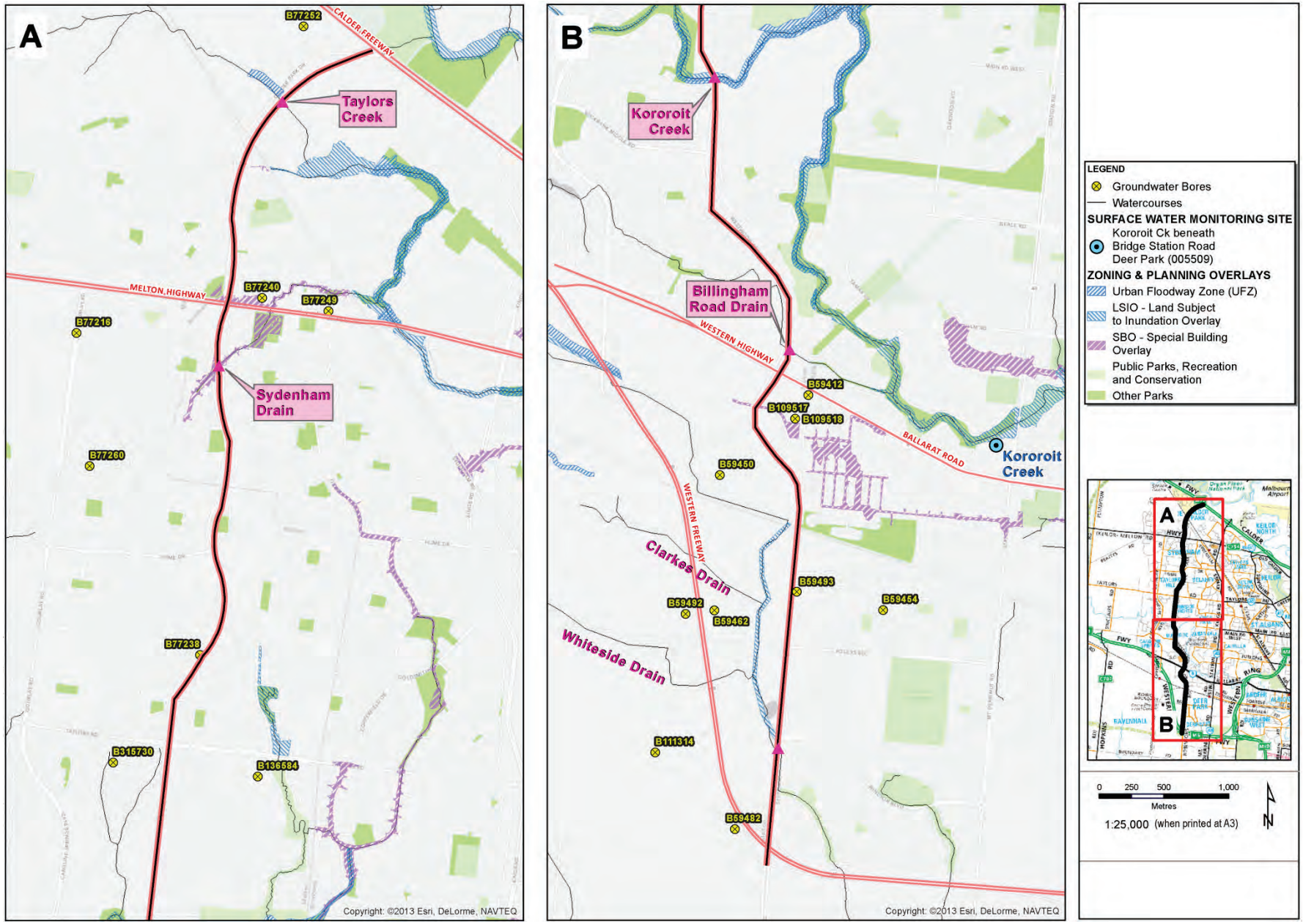


Figure 13-1 Watercourses in the Project Area

Table 13-1 Evaluation of compliance and residual impact rating guide – Catchment Values

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
Catchment Values To maintain the functions and values of surface water and floodplain environments.	Extent of increased flooding risk Extent of increased risk to water quality	Planning and Environment Act 1987 Water Act 1989 SEPP Waters of Victoria (EPA, 2013) VicRoads Environmental Management Guidelines (VicRoads 2012) Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999) Environmental Guidelines for Major Construction Sites (EPA 1996) Integrated Water Management Guidelines (VicRoads 2012)	Negligible change to surface water and floodplain environments Strong policy compliance Best practice (incl. mitigation measures	Changes to surface water and floodplain environments with minor implications Good policy compliance Improved practice (incl. mitigation measures)	Changes to surface water and floodplain environments with moderate implications Partial policy compliance Standard practice (incl. mitigation measures)	Surface water and floodplain environments significantly compromised Policy non-compliance Poor practice (incl. mitigation measures)	Extensive impacts on surface water and floodplain environments. Major policy non-compliance Very poor practice (incl. mitigation measures)

13.3.1 Construction

The potential effects from the Project construction, discussed in this section include:

- Increase flooding risk due to reduced floodplain capacity; and
- Increased risk to water quality due to erosion and sediment inputs, and contamination from fuels or other chemicals.

Extent of Increased Flooding Risk

The construction of the Kororoit Creek Bridge has the potential to reduce the floodplain capacity and subsequently increase flooding risk upstream of the site. This may occur where:

- Project design and construction methodology involves installed barriers to the natural water regime; and
- Fill is placed in a way as to change the natural creek profile.

The design of the bridge also has potential to reduce floodplain capacity where infrastructure is placed in the floodplain, for example, bridge piers.

The hydraulic assessment prepared by Noel Ransome and Associates for the initial three lane bridge over Kororoit Creek has concluded an afflux (the rise in water level (above normal) on the upstream side of a bridge or obstruction caused when the effective flow area at the obstruction is less than the natural width of the stream immediately upstream of the obstruction) of 66mm is to be expected as a result of the changed hydraulics. The calculations also show that the increased flood level will be contained within the channel, will not affect private land and will only extend 17m upstream.

A hydraulic assessment would be incorporated into the detailed design of the second bridge crossing at Kororoit Creek to ensure that existing floodplain capacity is maintained and where there are potential adverse impacts on flood levels, risks to neighbouring private property are minimised. Piers within the waterways would be avoided where capacity of the creek will be significantly reduced, and reduce the conveyance of flood waters. The design of the Project would comply with Melbourne Water requirements regarding floodplain protection.

Construction activities must be undertaken in accordance with the *Water Act 1989* (Water Act). It is proposed that the following measures be implemented to mitigate the risks to floodplain capacity associated with construction works:

- Consideration be given to the position of temporary work offices and storage of materials in relation to identified floodplains;
- Restrictions or requirements regarding cutting and filling activities and volumes within floodplains, for example designating locations for stockpiles;
- Prior to undertaking any works on or near a Melbourne Water waterway, obtain a permit to work and licence to construct works under Section 67 of the Water Act from Melbourne Water, including further hydraulic assessment during detailed design if required ; and
- Staging of project works, for example, avoiding season of typically high rainfall at Kororoit Creek if practicable, to minimise changes in the natural flow regime and to maintain the functionality of the Creek in its conveyance of stormwater during flood events.

Mitigation of the impacts identified above for construction of the second three lane bridge over Kororoit Creek bridge would be managed through; adherence to VicRoads procedures and processes and development and implementation of a Contractor Environmental Management Plan (CEMP).

The adoption of these mitigation measures during the Project's implementation would result in the risk rating of 'neutral' against this criterion.

Extent of Increased Risk to Water Quality

Construction activities that have the potential to degrade water quality as a result of erosion and sediment inputs, or discharge of chemicals into watercourses such as Kororoit Creek and Jacksons Creek (immediately north of the Project Area) include:

- Site establishment and earthworks;
- The movement and deposit of fill soils and stockpiles;

- The inappropriate handling of chemicals and storage i.e. leakage; and
- Accidental spills.

To mitigate the risks to water quality associated with erosion and sediment inputs, it is necessary to comply with Clause 23, Schedule 6 of the SEPP (Waters of Victoria) (SEPP WoV) which aims to '*ensure developers, contractors and protection agencies manage and develop sites in accordance with best practice thus helping to protect the beneficial uses of Port Phillip Bay from adverse impacts of sediment'*.

An erosion and sediment control plan would be incorporated into the CEMP outlining measures to reduce erosion and sediment generation and to protect watercourses from sediment inputs, for example the erection of silt fences. Measures will be in accordance with the *Best Practice Guidelines for Major Construction Sites* (EPA Victoria, 1996) and the *Environmental Risk Management Guidelines* (VicRoads, 2012). To mitigate the risks to water quality associated with contamination from fuels or other chemicals, prior to the commencement of construction, storage and handling procedures would be developed for chemicals and other hazardous materials for implementation, including procedures for preventing spills and plans for safely and effectively responding to incidents and emergencies.

Specific measures proposed during construction to manage these risks are as follows:

- Storage locations would be chosen to reduce the risk of flood events damaging storage areas and resulting in contamination incidents; and
- Mitigation measures would be implemented that generally limit the impact of an incident (e.g. bunding).

The strict adoption and implementation of these mitigation measures within the CEMP by the contractor(s) results in the Project rating Neutral' for this criterion.

13.3.2 Operation

The potential operational environmental effects associated with the Project are:

- Increased flooding risk due to reduced floodplain capacity and increased run-off from greater areas of impervious surfaces; and
- Increased risk to water quality due to contaminant run-off and litter discharge.

Extent of Increased Flooding Risk

The area of impervious surface would be increased as a consequence of the Project, i.e. from hard surfaces such as road and footpaths. As a result of reducing areas where rainfall can infiltrate into the ground, the volume of runoff would increase, placing more pressure on the existing capacity of the stormwater network. The adoption of water sensitive road design (WSRD) measures into the design will improve water quality , however it is acknowledged these WSRD opportunities may be restricted by the narrow corridor as such the rating of the Project against this criterion is 'Neutral'.

Extent of Increased Risk to Water Quality

Increased use of the Project Area by traffic and people is likely to generate more contaminants and litter. As a result, this could potentially increase the amount of pollutants and litter on the road surface that could enter the stormwater.

The potential impact of runoff from the road surface to the receiving waterway would be reduced by integrating WSRD measures as outlined in *Integrated Water Management Guidelines* (VicRoads, 2012). Mitigation measures could include measures as set out in the *Urban Stormwater - Best Practice Environmental Management Guidelines* (CSIRO, 1999) (BPEMG) or contribute towards Melbourne Water dealing with water quality at another location. These options would be considered during the detailed design phase for the Project to the extent possible given the space constraints within the road reservation.

Adoption of WSRD and BPEMG measures would reduce the risk to water quality however it is acknowledged these WSRD opportunities may be restricted by the narrow corridor as such the rating of the Project against this criterion is 'Neutral'.

13.4 Conclusion

The Project Area intersects five watercourses; all of these are of diminished quality due to urbanisation and development. The key waterway in the Project Area is Kororoit Creek.

A number of potential impacts on catchment values were identified during construction and operation phases of the Project, including the reduction of floodplain hydraulic capacity and increase of contaminants and pollutants to stormwater. A range of best practice measures are proposed to be implemented through the guidance provided by the SEPP WoV, and by adhering to the BPEMG and adopting WSRD measures where practicable given the existing space constraints within the road corridor.

Adoption of these measures in design and a CEMP would achieve policy compliance and therefore the project rates 'Neutral' in terms of the potential impact to water quality during construction and 'Neutral' during operation.

Given that a staged development is proposed for the Project; from an existing 2-lane unconnected corridor, ultimately a 6-lane configuration over time; any implications as a result of changes to surface water and floodplain environments would be managed through best practice measures determined during detailed design.

Overall, based on the evaluation undertaken using the criteria adopted for the assessment and assuming the mitigation measures are applied, the Project has been rated 'Neutral' (refer to Table 13-2) in relation to the following evaluation objective *'to maintain the functions and values of surface water and floodplain environments*'.

Table 13-2 Catchment values evaluation

Evaluation Criteria	Rating
Extent of increased flooding risk	**Neutral**
Extent of increased risk to water quality	**Neutral**
Overall	**Neutral**

14 CULTURAL HERITAGE

14.1 EES Evaluation Objectives and Scope

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.8 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – To avoid or minimise effects on Aboriginal and historic cultural heritage

Key issues

- The potential for adverse effects on Aboriginal cultural heritage.
- The potential for the loss of significant historic heritage values.

Priorities for characterising the existing environment

- Identify and characterise Aboriginal cultural heritage sites and areas of sensitivity within the project area, particularly in the vicinity of Kororoit Creek in accordance with the requirements for the CHMP under the AH Act.
- Identify and document known and previously unidentified historic heritage values within the project area, including any areas of significant archaeological interest, in accordance with the Guidelines for Conducting Archaeological Surveys (Heritage Victoria, 2008), as updated in 2013.

Design and mitigation measures

- Potential and proposed design and mitigation measures to address effects on any Aboriginal and historic cultural heritage, particularly in the vicinity of Kororoit Creek.

Assessment of likely effects

- Identify the potential effects on Aboriginal and historic cultural heritage resulting from the project.
- Archaeological investigations to evaluate the significance, location and extent of archaeological sites that may be affected by the project works, in accordance with the Guidelines for Investigating Historical Archaeological Artefacts and Sites (Heritage Victoria, 2012).

Approach to manage performance

- Identify in the EES any further methods proposed to manage risks of effects on cultural heritage values, including as part of the EMF.
- Response to any relevant requirements under the AH Act, such as preparation of a draft CHMP.

Information presented through the following sections draws on the technical specialist reports, listed below, that have been prepared to document the potential impacts of the Project:

- Dr Vincent Clark and Associates (2014a), *Palmers Road Corridor (Western Freeway to Calder Freeway): Desktop, Standard and Complex Assessment Report – Cultural Heritage Management Plan Number: 12662* also referred to as the CHMP report in this Chapter.
- Dr Vincent Clark and Associates (2014b), *Palmers Road Corridor (Western Freeway to Calder Freeway) – Historic Archaeology and Cultural Heritage, Heritage Victoria Project Number: 4334* also referred to as Cultural Heritage report in this Chapter.

14.2 Existing Conditions

The following definitions apply to this chapter:

- **Project Area**: shown in Figure 14-1 is the section of the Palmers Road Corridor from the Western Freeway to the Calder Freeway, plus the proposed interchange south of the Organ Pipes National Park and north of the Calder Freeway.
- **Activity Area**: the draft CHMP refers to the "Project Area" as the "Activity Area".
- **Study Area**: comprises the area approximately within 200m of the Project Area.
- **Registered Aboriginal Party (RAP):** The Wurundjeri Registered Aboriginal Party (RAP) area is also shown in Figure 14-1.

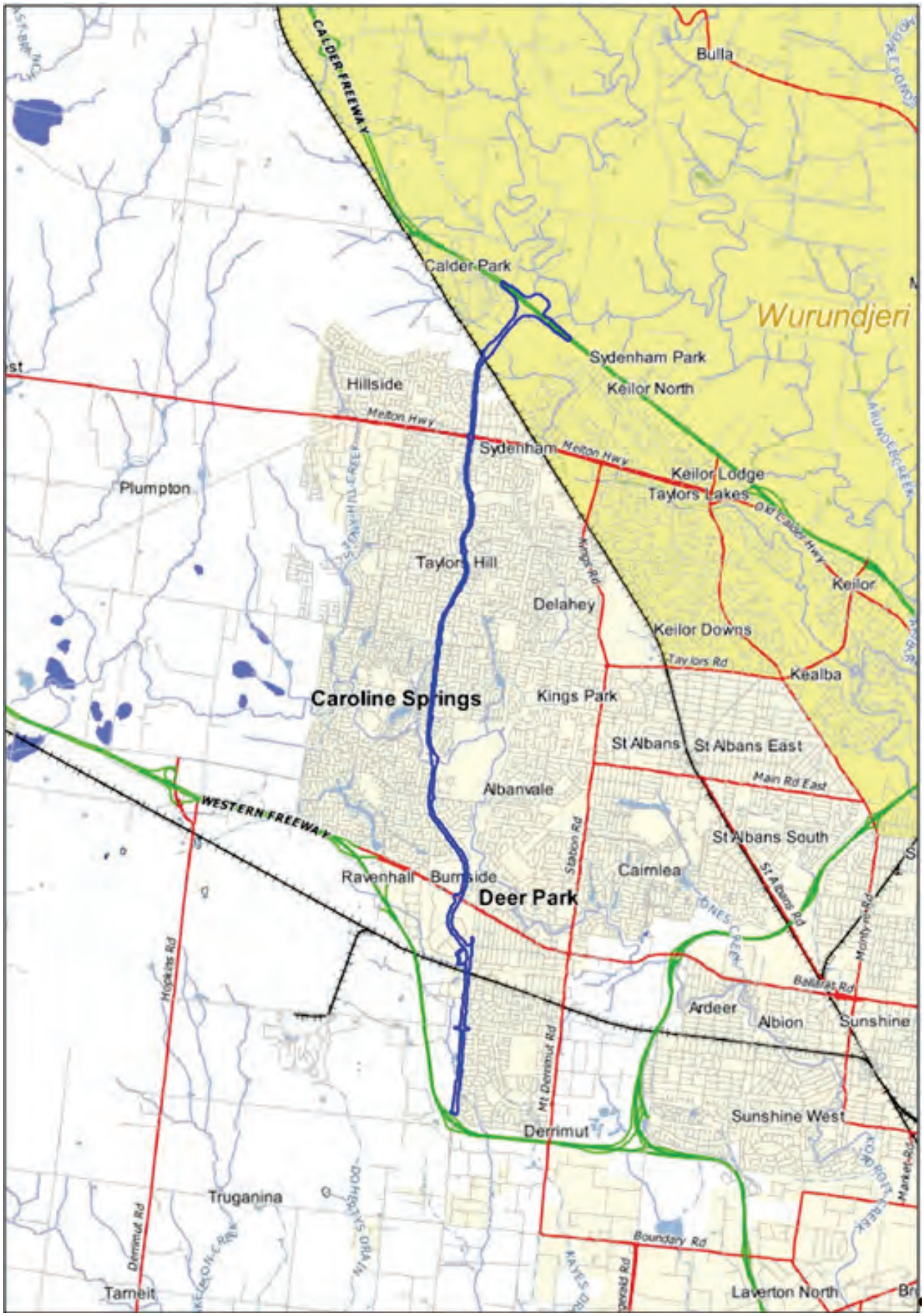


Figure 14-1 Project Area and Wurundjeri RAP area (yellow)

14.2.1 Aboriginal Cultural Heritage

Legislation

A CHMP for the Project is compulsory under the AH Act (section 49) when an EES is required to assess the Project's environmental effects. The CHMP requires Desktop, Standard and Complex Assessments. It is important to assess significant ground disturbance when considering whether a CHMP is required because:

- A CHMP does not need to be prepared for a high impact activity if all the area of cultural heritage sensitivity within the activity area has been subject to significant ground disturbance.
- Some types of activity will not be a high impact activity, meaning a CHMP would not need to be prepared, if the activity does not cause significant ground disturbance.

In this report the term "sites" represents the term "place" since it was used in the Project's *EES Scoping Requirements (Victorian Government, July 2013)*. The term Site Name and Site Number is also use in the Dr Vincent Clark and Associates (CHMP 12662).

Under the AH Act, Registered Aboriginal Parties (RAPs) are the cultural heritage decision-makers for a designated area and are determined by the Aboriginal Heritage Council. For the Calder Park Drive section (north of the Bendigo railway line), the Wurundjeri Tribe Land Cultural Heritage Council is the RAP. There is no RAP for the section south of the Bendigo railway line to the Western Freeway, therefore OAAV is the relevant body for the approval of the CHMP for this section of the Project. The CHMP will be submitted to the Wurundjeri and OAAV for evaluation and approval. Figure 3-6 in Chapter 3 of this EES report outlines the CHMP process.

Consultation

Following the notification by VicRoads of its intention to carry out a cultural heritage management plan, on 31 May 2013, the Wurundjeri indicated its intention to participate in the assessment and to evaluate the CHMP for the part of the activity area within its RAP area.

For parts of the activity area which do not have an assigned RAP, the Wurundjeri, the Boon Wurrung Foundation and the Bunurong Land Council participated in the field assessment and were consulted regarding the results of the assessment.

The OAAV have provided comments on the draft CHMP which has been incorporated into the current draft CHMP.

Desktop Assessment

Dr Vincent Clark and Associates (CHMP 12662) concluded from an assessment of existing information that there has been a steady growth of housing developments in the region, especially from the 1990s. This has entailed large scale modification of land which has caused significant ground disturbance. These developments have had a major impact on the survival and condition of Aboriginal cultural heritage in the activity area. Few parts of the activity area have not been subject to ground disturbance in recent years.

The Desktop Assessment identified 30 Aboriginal sites listed on the Victorian Aboriginal Heritage Register (VAHR) that are located within the Project Area or within 200m of it. Twelve of these sites are in the Project Area. However, three of these sites were not re-discovered in the Project Area. They are summarised in Table 14-1.

Aboriginal sites within or near the Project Area are mostly concentrated near two key features; the Kororoit Creek (7 VAHR sites) and Jacksons Creek (13 VAHR sites), north of the Project Area. Dr Vincent Clark and Associates (CHMP 12662) concluded from the Desktop Assessment that several of the sites may have been damaged or destroyed since they were initially recorded. It is therefore hard to give a precise figure on the number of Aboriginal sites within the Project Area, though it can be said that there is a high likelihood for archaeological deposits to be present, especially north of the Calder Freeway and beside Kororoit Creek, which are the two areas where most of the previously recorded sites are located.

Standard Assessment

The Standard Assessment involved archaeological ground surveys using systematic methods to investigate particular places in the Project Area. The surveys assessed land use and ground conditions, identified places of cultural heritage sensitivity where archaeological material was likely to be present, and located and recorded artefacts present on the surface. Aboriginal artefacts were located in areas where there was good ground visibility and where sites have been previously recorded, particularly on the banks of Kororoit Creek and above the escarpment of Jacksons Creek, north of the Calder Freeway.

Besides locating and recording Aboriginal sites and artefacts, a thorough assessment of ground conditions was made by the consultant. From observations in the field and by referring to maps, satellite images and written sources, it was determined that large stretches of the activity area have undergone significant ground disturbance. Artificial and heavily modified surfaces, where the ground has been entirely excavated out and redeposited, were found to be present across large parts of the Project Area.

Areas of land where cultural deposits are certain or likely to be located were found to be concentrated in areas north of the Calder Freeway, the west side of Calder Park Drive south of the Sunbury railway line and both sides of Kororoit Creek. Other areas where there is the possibility of undisturbed land and where cultural deposits may be present are Banchory Grove Nature Conservation Reserve and Ravenhall Nature Conservation Reserve.

Complex Assessment

The Complex Assessment included subsurface testing through targeted excavations in the Project Area. The assessments were carried out in sections in August and September 2013 on 11 days. The results of this Complex Assessment are detailed in the draft CHMP and summarised in Table 14-1.

The excavations confirmed that most land within the Project Area is heavily disturbed but that there are some areas of undisturbed ground where Aboriginal material culture is present. These turned out to be smaller than originally suspected. For example, ground disturbance has affected approximately half the property north of the Calder Freeway; the verges along the northern stretch of Calder Park Drive were found to be entirely artificial surfaces; and mechanical grading that took place in 2007 and 2013 appears to have disturbed large areas of ground on both sides of Kororoit Creek.

Nevertheless, there were found to be some areas of intact ground with undisturbed archaeological deposits: on land north of the Calder Freeway and adjacent to Organ Pipes National Park and a small area north of Kororoit Creek. The investigation resulted in defining the extent and nature of sites near Organ Pipes National Park, and reassessing the nature of deposits near Kororoit Creek. The context and material culture at these places allows for interpretation of their past usage which can inform an assessment of their significance in the present day and inform decisions relating to their future management.

Figure 14-2 shows the selection of artefacts recorded on the surface at Jacksons Creek Escarpment (VAHR 7822-3669). Figure 14-3 shows the selection of artefacts recorded on the surface at Rainey's Hotel (VAHR 7822-3670). Both these sites are north of the Calder Freeway.

The Desktop, Standard and Complex Assessments identified twelve sites that are within the Project Area and will be affected (refer to Table 14.1). Six sites were newly registered (two augmenting previously recorded sites, four recorded as 'low density artefact deposits') and three revisions (inspections) of previously recorded sites were made. Additionally, three previously recorded sites that were not rediscovered during the assessments were included.

Table 14-1 Aboriginal cultural heritage sites within the Project Area

VAHR number	Name	Components	Location	Site or location status
7822-0247	Kubis City 18	Surface and subsurface lithic artefact deposits.	South Kororoit Creek (City of Melton)	Previously recorded site, not rediscovered during current investigations
7822-0308	Melton East 4	Single surface artefact	Near Calder Park Drive (City of Brimbank)	Previously recorded site, not rediscovered during current investigations
7822-0310	Melton East 6	Surface artefacts	South Kororoit Creek (City of Melton)	Update/inspection of registered site.
7822-1130	Karmadonna Park 1	Surface and subsurface artefacts.	North of Kororoit Creek (City of Melton)	Update/inspection of registered site.
7822-1306	Organ Pipes Road 3	Surface and subsurface lithic artefacts.	North of Calder Freeway (City of Brimbank)	Update/inspection of registered site.
7822-1858	Thunderdome 2	Surface artefacts	North of Calder Freeway (City of Brimbank)	Previously recorded site, rediscovered during current investigations
7822-3656	Wenden Court Roundabout	Surface artefacts	Near Westwood Drive, north of Western Highway (City of Melton)	New site registered as a 'low density artefact deposit'.
7822-3658	Arroyo Place	Surface artefacts	Near Westwood Drive north of Kororoit Creek (City of Melton)	New site registered as a 'low density artefact deposit'.
7822-3660	Calder Highway Keilor 3	Subsurface lithic artefacts.	North of Calder Freeway (City of Brimbank)	New site registered as a ‘low density artefact deposit’.
7822-3661	Calder Park Drive	Surface artefacts	West of Calder Park Drive (City of Brimbank)	New site registered as a 'low density artefact deposit'.
7822-3669	Jacksons Creek Escarpment	Surface and subsurface lithic artefact deposits.	North of Calder Freeway (City of Brimbank)	New site registration that augments four previously recorded sites (VAHR 7822-0405, -0406, -0894 and -1308).
7822-3670	Rainey’s Hotel	Surface and subsurface lithic artefacts and 19th-century items.	North of Calder Freeway (City of Brimbank)	New site registration that augments one previously recorded site (VAHR 7822-1304).

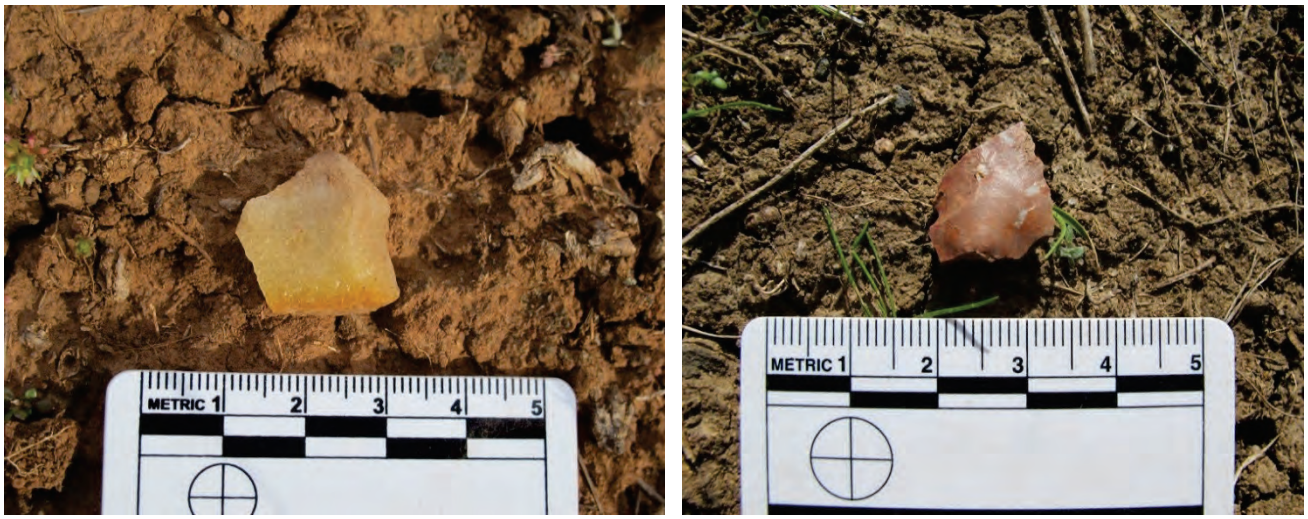


Figure 14-2 Some artefacts recorded on the surface at Jacksons Creek Escarpment (VAHR 7822-3669)

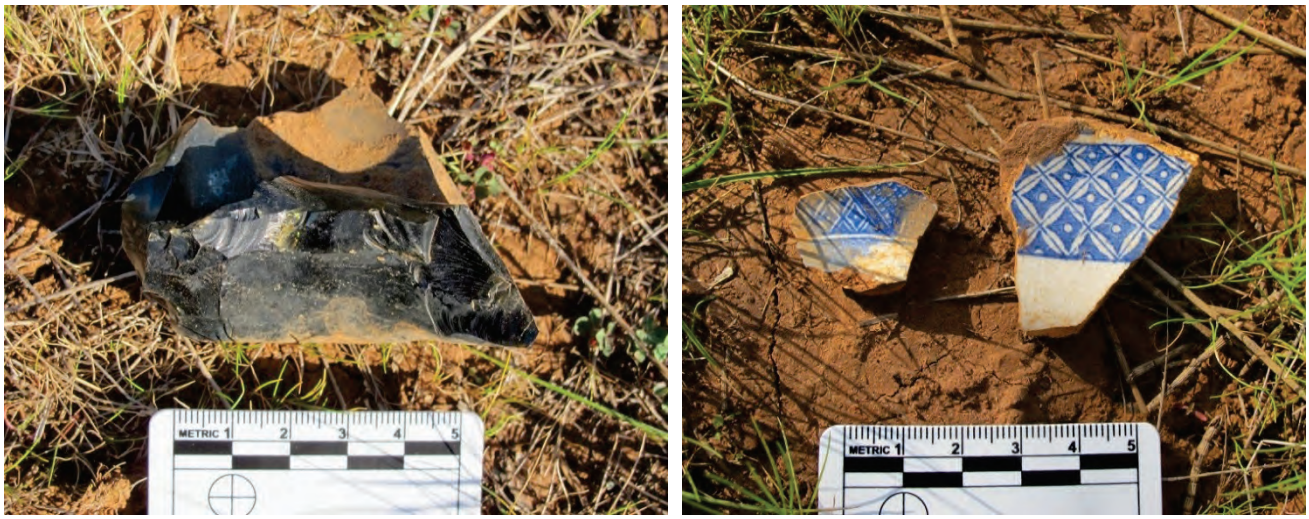


Figure 14-3 Some artefacts recorded on the surface at Rainey's Hotel (VAHR 7822-3670)

14.2.2 Historic Cultural Heritage

Legislation

The purpose of the Heritage Act 1995 is to "provide for the protection and conservation of places and objects of cultural heritage significance and the registration of such places and objects".

There are two levels of protection for cultural heritage places:

- the Victorian Heritage Register (VHR), which is a register for cultural heritage places of State significance
- the Victorian Heritage Inventory (VHI), which is an inventory of archaeological sites (of varying significance).

"Cultural heritage significance" means aesthetic, archaeological, architectural, cultural, historical, scientific or social significance.

A permit is required from Heritage Victoria for damage to any cultural heritage places on either the VHR or VHI. Delisted sites are not protected by the *Heritage Act 1995.* Sites have been delisted because they have fallen into a state of disrepair or have been destroyed by activities such as the construction of housing and roads. Sites may also be delisted because they do not meet the current criteria for inclusion on the VHR or VHI.

The *Planning and Environment Act* 1987 makes provision for the protection of places of State and local heritage significance under Planning Schemes. Heritage Overlays form part of Planning Schemes providing

protection for heritage places of local significance by applying requirements and controls to the use and alterations of heritage places.

Desktop Assessment

The desktop assessment by Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) researched twelve cultural heritage sites that are within the Project Area, or within 200m of it. The desktop assessment identified three sites listed on the Heritage Inventory within the Project Area (H7822-0188, H7822-0160 and H7822-0174), and three within 200m of it (H7822-2270, H7822-2269 and H7822-0321). A further six sites have been delisted (D7822-0158, D7822-0173; D7822-0186; D7822-0215; D7822-0250; D7822-0590). One of these delisted sites, the former Dalgook homestead (D7822-0158) is adjacent to the Project Area and is protected by a Heritage Overlay (HO123) in the Melton Planning Scheme. Dalgook is managed by the City of Melton.

This assessment determined that few historic features or archaeological sites remain in the Project Area, or its immediate vicinity. Overall the assessment found that the majority of sites that had been recorded previously, related to early pastoral activities in the area to the west of Melbourne, and also to the use of the area for the manufacture, storage and transport of explosives by the Australian government up until at least the end of the Second World War.

Some limited urban development began in Sydenham and Deer Park by the late 1970s and through the 1980s but the area remained largely undeveloped until that time. Archaeological surveys of the area began in the 1980s and 1990s, when many of the historical features and historic archaeological sites were identified and recorded. Since that time urban development has increased in pace and now most of the land within and around the Project Area has been significantly altered by the development of new suburbs such as Burnside, Burnside Heights, Caroline Springs, Ravenhall and Sydenham. This has resulted in the destruction and modification of many, if not most, of the recorded historical features and sites in the area.

Results of Surveys

Field surveys were conducted in June and July 2013 to identify the status of historical heritage sites and areas of archaeological significance in the Project Area. The survey was conducted in accordance with the *Heritage Act 1995* (Heritage Victoria Project Number: 4334).

Table 14-2 lists the nine sites surveyed and summarises the survey results. Three of the sites within the Project Area are listed on the Victorian Heritage Inventory but one of these could not be found (H7822-0188 Cobbled Road). Six of the other sites are delisted sites ("D" before site number in column 1) so there is no statutory protection under the *Heritage Act 1995*. One of these delisted sites ("Dalgook" homestead) has some protection since it is affected by a Heritage Overlay in the Melton Planning Scheme.

Table 14-2 Historic Cultural Heritage summary of survey results

Site Number	Site Name	Location Details (Municipality)	Results of the Survey
H7822-0188	CS-H4 Cobbled Road	Along length of Rockbank Middle Rd (City of Melton)	Within the Project Area. It is likely that the cobbled road has been destroyed by the construction of Westwood Drive. It is therefore unlikely that the proposed works will have an impact on the site.
H7822-0174	Ravenhall 2 Magazine and Storage Facility	SW of Riding Boundary Rd and Robinsons Rd. Large area. (City of Melton)	Remains of a World War II magazine. The site was re-discovered during the survey and it is likely that it will be affected by the proposed works.
H7822-0160 (formerly D7822-0160)	Drover's Hut	North bank of Kororoit Creek (City of Melton)	Rediscovered during the survey, and re-listed on the Victorian Heritage Inventory. This site will be affected by the proposed works.
D7822-0173	Ravenhall 1	Robinsons Rd, Riding Boundary Rd (City of Melton)	Rediscovered during the survey, but in a poor state of preservation. Will likely be affected by the proposed works.

Site Number	Site Name	Location Details (Municipality)	Results of the Survey
D7822-0186	CS H3.3 Stone Wall	A series of stone walls N-S across Kororoit Creek. One wall runs along (former) Clarke's Rd (City of Melton)	No trace of the site was found during the survey. It has apparently been destroyed.
D7822-0215	DH1 Stone Walls	West side of SA between Riding Boundary Rd/Melbourne-Ballarat Rwy (City of Melton)	Some traces of this wall still exist beyond the Project Area, but not within it.
D7822-0250	Taylors Road - Cobbled Sections	Along Taylors Rd (City of Melton)	No trace of the site was found. It has probably been destroyed.
D7822-0590	Robinsons Deer Park Wall	East side of SA between Foleys Rd and Melbourne -Ballarat Railway (City of Brimbank)	No trace of the site. It has probably been destroyed.
D7822-0158 and Melton Heritage Overlay HO123	Dalgook Homestead	Cnr Hume Dr and Calder Park Dr (City of Melton)	Site is located immediately adjacent to (but outside) the Project Area.

14.2.3 Built Heritage

No potential built heritage sites were identified during the survey of the project area. Dalgook Homestead is located abutting the project area. This site is delisted so there is no statutory protection under the *Heritage Act 1995*. The Dalgook Homestead has some protection since it is affected by a Heritage Overlay in the Melton Planning Scheme.

14.2.4 Assessment of Likely Effects

This section outlines the potential effects on Aboriginal and historical cultural heritage associated with construction of the Project. An evaluation of compliance and residual impact assessment was completed in response to the relevant draft evaluation objective from the Scoping Requirements (Victorian Government, July 2013).

The evaluation of compliance and residual impact rating guide for Cultural Heritage investigated in this EES are provided in Table 7-11. The outcome of this assessment is summarised in Table 14-4 (Aboriginal heritage) and Table 14-5 (historic cultural heritage).

Table 14-3 Evaluation of compliance and residual impact rating guide – Historic Cultural Heritage

Evaluation Objective	Evaluation criteria	Key legislation, policy and guidelines	Rating				
			Very Well	Well	Neutral	Poor	Very Poor
To avoid or minimise effects on Aboriginal and historic cultural heritage.	Impacts to sites of Aboriginal heritage Impacts to sites of historic cultural heritage	Aboriginal Heritage Act 2006 Heritage Act 1995 Planning and Environment Act 1987 Aboriginal Heritage Regulations 2007 Heritage Overlays in Planning Schemes	Negligible impact to heritage artefacts (artefacts affected of low significance) Strong policy compliance Best practice (incl. mitigation measures	Disturbance or partial removal of a small number of heritage artefacts (artefacts affected of low-moderate significance) Good policy compliance Improved practice (incl. mitigation measures)	Complete removal of one or more heritage artefacts confined to a small number of locations (artefacts affected of moderate significance) Partial policy compliance Standard practice (incl. mitigation measures)	Complete removal of many heritage artefacts across many locations (artefacts affected of moderate to high significance) Policy non-compliance Poor practice (incl. mitigation measures)	Widespread removal of heritage artefacts across the region (artefacts affected of high significance) Major policy non-compliance Very poor practice (incl. mitigation measures)

14.2.5 Aboriginal Cultural Heritage Impacts

The Aboriginal cultural heritage assessment (CHMP 12662) identified 12 Aboriginal cultural heritage sites that would potentially be impacted by the Project. These sites are listed in Table 14-4. The consultant provided the estimates of percentage of site affected and level of significance in the table. Nine of the twelve sites were considered to have a "Low" or "Very Low" significance. Two sites were considered to have a "moderate" significance and one site (Jacksons Creek Escarpment) was considered to have a "Moderate – High" significance.

Potential impacts on Aboriginal cultural heritage would be avoided where possible or otherwise mitigated. Some will be directly affected by the development including areas near the Calder Freeway, the west side of Calder Park Drive (south of the Sunbury railway line) and both sides of Kororoit Creek. More details about mitigation measures are outlined in Table 14-6 and Section 14.3.

The consultant rated the Project as 'Neutral' overall as per the Evaluation Framework in Table 14-3. The "Neutral" rating is predominately due to the moderate or higher significance ratings for Karmadonna Park 1, Jacksons Creek Escarpment and Rainey's Hotel and the other nine sites have a "Low" or "very low" significance rating in Table 14-4.

Table 14-4 Aboriginal sites: Project impact and significance

VAHR number	Name	Location	Impact of Project (estimated % of site affected)	Significance	Rating*
7822-0247	Kubis City 18	South Kororoit Creek	Impacted (<5%)	Very Low	**Very Well**
7822-0308	Melton East 4	Near Calder Park Drive	Impacted (100%)	Very Low	**Very Well**
7822-0310	Melton East 6	South Kororoit Creek.	Impacted (35%)	Very Low	Well
7822-1130	Karmadonna Park 1	North of Kororoit Creek.	Impacted (19%)	Moderate	Neutral
7822-1306	Organ Pipes Road 3	North of Calder Freeway;	Impacted (50%)	Low	Well
7822-1858	Thunderdome 2	North of Calder Freeway	Impacted (100%)	Low	Well
7822-3656	Wenden Court Roundabout	Westwood Drive, north of Ballarat Road.	Impacted (100%)	Very Low	**Very Well**
7822-3658	Arroyo Place	Westwood Drive north of Kororoit Creek.	Impacted (100%)	Low	Well
7822-3660	Calder Highway Keilor 3	North of Calder Freeway.	Impacted (100%)	Low	Well
7822-3661	Calder Park Drive	West of Calder Park Drive.	Impacted (100%)	Very Low	Well
7822-3669	Jacksons Creek Escarpment	North of Calder Freeway	Impacted (32%)	Moderate - High	Poor
7822-3670	Rainey's Hotel	North of Calder Freeway.	Impacted (<5%)	Moderate	Neutral
Overall rating					**Neutral**

Note: *The "rating" provided is according to Dr Vincent Clark and Associates. A "rating" is not included in the Cultural Heritage Management Plan Number: 12662.*

14.2.6 Historic Cultural Heritage Impacts

The historical assessment identified three historic cultural heritage listed sites (VRI) in the Project Area. Table 14-5 summarises the impacts of the Project on historic cultural heritage sites and the ratings according to Dr Vincent Clark & Associates (Heritage Victoria Project Number: 4334).

H7822-0174 (Ravenhall 2 Magazine and Storage Facility)

The north east corner of this site would be affected by the Project so consent from Heritage Victoria will be required.

Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) rate the Project's impact as 'Well' as per the Evaluation Framework in Table 14-4, due to the negligible impact on the site of low local significance.

H7822-0188 (CS-H4 Cobbled Road)

Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) consider that this site is unlikely to be affected by the Project. There does not appear to be anything remaining of the part of the site that is within the Project Area.

Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) rate the Project's impact as 'Very Well' as per the Evaluation Framework, due to the negligible impact on a site of very low local significance.

H7822-0160 (Drover's Hut)

This site was re-listed by Heritage Victoria in July 2013. This site would be affected by the Project. Recent site inspections show that none of the Drover's Hut exists above surface level. An archaeological investigation conducted in 2014 by Green Heritage Compliance and Research for the City of Melton has been considered as part of this assessment.

Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) rate the Project's impact as 'Well' as per the Evaluation Framework. The Drover's Hut site is of "moderate" significance, because it is a relatively rare example of a preserved structure associated with the early pastoral occupation of this area.

Table 14-5 Non-Aboriginal heritage registered sites in Project Area impact and rating

Heritage Site	Significance	Impact	Rating
H7822-0174 Ravenhall 2 Magazine & Storage Facility	Low	The north-east corner of the site will be affected by works, and Consent from Heritage Victoria will be required	Well
H7822-0188 CS-H4 Cobbled Road	Very Low	Unlikely to be affected by works.	**Very Well**
H7822-0160 Drover's Hut	Moderate	This site will be affected by works, and Consent from Heritage Victoria will be required.	Neutral
Overall rating			**Well**

14.3 Mitigation Measures

14.3.1 Aboriginal Cultural Heritage Mitigation Measures

The Project would be undertaken in accordance with an approved CHMP that would specify appropriate mitigation measures. The CHMP would be integrated in design and in the CEMP. Table 14-6 outlines the mitigation measures recommended by the consultant for Aboriginal heritage sites in the Project Area.

Near Calder Freeway:

- Jacksons Creek Escarpment (VAHR 7822-3669) north side
- Rainey's Hotel (VAHR 7822-3670) north side
- Organ Pipes Road 3 (VAHR 7822-1306) north side
- Calder Park Drive (VAHR 7822-3661) south side

Near Kororoit Creek:

- Karmadonna Park 1 (VAHR 7822-1130) north side
- Arroyo Place (VAHR 7822-3658) north side
- Melton East 6 (VAHR 7822-0310) south side

North of Western Highway near Burnside Shopping Centre:

- Wenden Court Roundabout (VAHR 7822-3656)

Table 14-6 Proposed mitigation measures for Aboriginal sites impacted by Project

VAHR number	Name	Significance*	Proposed mitigation measures
7822-0247	Kubis City 18	Very Low	No
7822-0308	Melton East 4	Very Low	No
7822-0310	Melton East 6	Very Low	Collection and recording of surface artefacts.
7822-1130	Karmadonna Park 1	Moderate	• Archaeological salvage excavations to be undertaken • Collection and recording of surface artefacts
7822-1306	Organ Pipes Road 3	Low	• Archaeological salvage excavations within affected parts of the site; collection and recording of surface artefacts • Fencing off part of site which lies outside of activity area to avoid during construction works
7822-1858	Thunderdome 2	Low	No
7822-3656	Wenden Court Roundabout	Very Low	Collection and recording of surface artefacts.
7822-3658	Arroyo Place	Low	Collection and recording of surface artefacts.
7822-3660	Calder Highway Keilor 3	Low	No
7822-3661	Calder Park Drive	Very Low	Collection and recording of surface artefacts.
7822-3669	Jacksons Creek Escarpment	Moderate - High	• Fencing parts of the site within the Project Area that will not be impacted and carrying out archaeological salvage excavations in the affected parts of the site. • Eastern part of the site within the Project Area can be avoided and this area will be fenced and marked as a 'no go zone' before construction works commence • Parts of the northwest of the site will be impacted by the activity, where road batters are being built. Manual and mechanical excavations will be required within these areas.

VAHR number	Name	Significance*	Proposed mitigation measures
7822-3670	Rainey's Hotel	Moderate	• Fencing parts of the site along the edge of the Project Area and marking as a 'no go zone' before construction works commence • Archaeological salvage excavations along the strip of land which forms the southern boundary of the site, south of the boundary fence of Organ Pipes National Park • Construction of an access road parallel with the Calder Freeway. Manual and mechanical excavations will be required along this stretch of land.

***Note**: The "rating" provided is according to Dr Vincent Clark and Associates. A "rating" is not included in the Cultural Heritage Management Plan Number: 12662.*

14.3.2 Historic Cultural Heritage Mitigation Measures

The Project will be undertaken in accordance with appropriate mitigation measures which will be integrated in the design and in the CEMP. Below are the mitigation measures recommended by Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) for the three historic cultural heritage sites listed on the Victorian Heritage Inventory.

H7822-0174 (Ravenhall 2 Magazine and Storage Facility)

The north east corner of this site would be affected by works. Consent is required from Heritage Victoria, under the *Heritage Act* 1995 before undertaking any works that would cause an impact upon this site. Mitigation measures proposed by Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) to address potential impacts are as follows:

- archaeological test excavations would be conducted in the part of the Project Area bounded to the north by Riding Boundary Road and to the east by Robinsons Road
- if test excavations identify any significant archaeological deposits or features, further investigation would be undertaken to determine their nature, extent and significance and conducted in accordance with the Guidelines for Conducting Archaeological Surveys (Heritage Victoria, 2008)
- all artefacts recovered from excavations would be collected, analysed and catalogued
- a report of the excavation and its results would be prepared and lodged with Heritage Victoria at the conclusion of the investigation
- the archaeological investigation would be supervised by an appropriately qualified archaeologist.

Figures 14-4 shows the location of Ravenhall 2 Magazine and Storage Facility and the area recommended for investigation. Figure 14-5 is a photo of the site taken by the consultant.

H7822-0188 (CS-H4 Cobbled Road)

Consent is required from Heritage Victoria, under the *Heritage Act* 1995 before undertaking any works that would cause an impact upon this site. Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) consider that this site is unlikely to be affected by the Project. So no mitigation measures were proposed for this site.

H7822-0160 (Drover's Hut)

This site would be affected by works. Consent is required from Heritage Victoria, under the *Heritage Act* 1995 before undertaking any works that would cause an impact upon this site. Mitigation measures proposed by Dr Vincent Clark and Associates (Heritage Victoria Project Number: 4334) to address potential impacts are as follows:

- further archaeological test excavations would be conducted of the structural remains to recover data and to determine the nature and significance of the remains
- test excavations to identify and assess any other surviving features of the immediate surrounds, including the secondary location of bluestone to the west of the hut

- if test excavations identify any significant archaeological deposits or features, further investigation would be undertaken to determine their nature, extent and significance and conducted in accordance with the *Guidelines for Investigating Historical Archaeological Artefacts and Sites* (Heritage Victoria, 2012)
- all artefacts recovered from excavations would be collected, analysed and catalogued
- a report of the excavation and its results would be prepared and lodged with Heritage Victoria at the conclusion of the investigation
- the archaeological investigation would be supervised by an appropriately qualified archaeologist.

Figures 14-6 shows the location of the Drover's Hut and the area recommended for further investigation. Figure 14-7 is a photo of the site taken by the consultant. Recent inspections of the Drover's Hut site area indicate the remains of the Drover's Hut are no longer visible.

Figure 14-4 Ravenhall 2 Magazine and Storage Facility location (H7822-0174)

Figure 14-5 Ravenhall 2 Magazine and Storage Facility (H7822-0174)

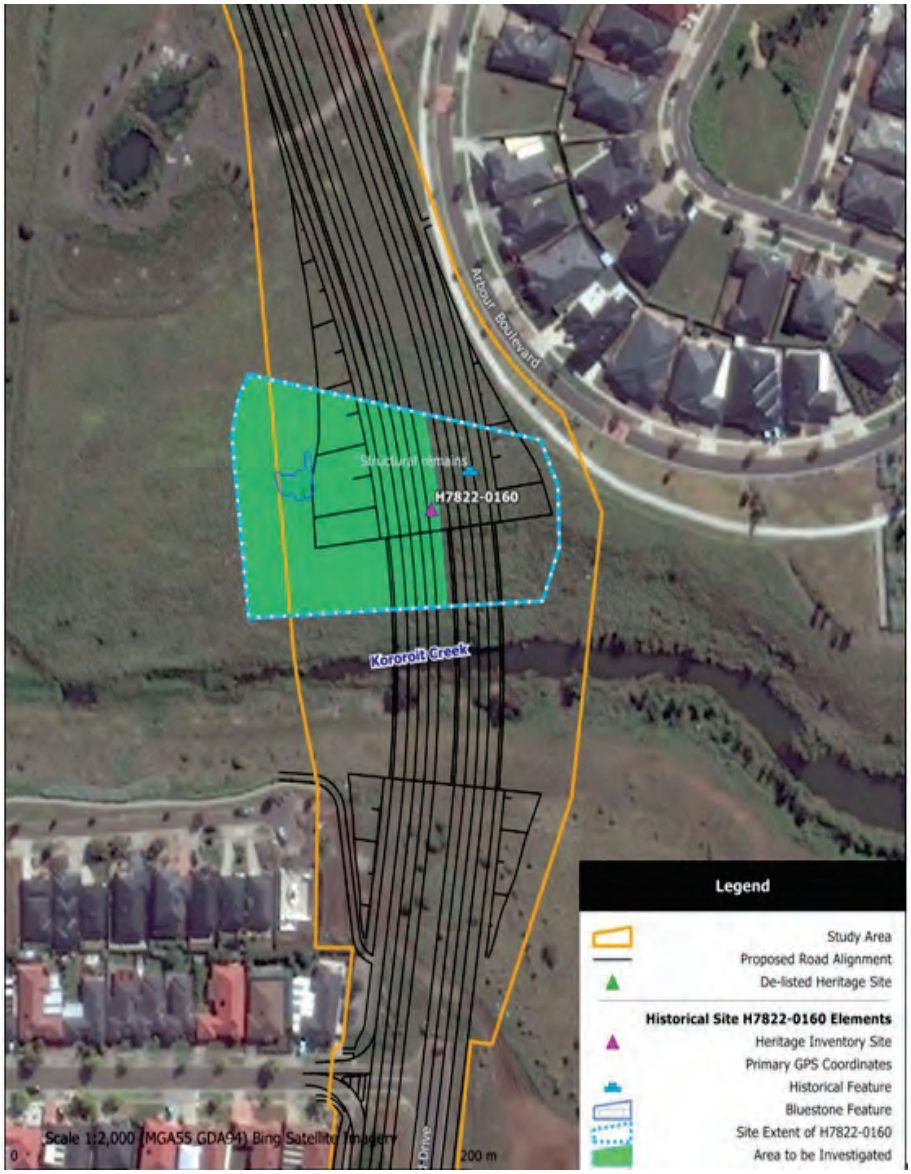


Figure 14-6 Drover's Hut location (H7822-0160)

Figure 14-7 Drover's Hut photo (H7822-0160)

14.4 Conclusion

The Project Area includes several large areas of Aboriginal cultural heritage sensitivity. Most of the known cultural heritage is in association with waterways. The project cannot avoid all impacts to Aboriginal cultural heritage due to the nature of road and bridge construction. Where harm cannot be avoided specific measures will be required. These measures are being developed through the CHMP process in consultation with the Wurundjeri, the RAP for the section north of the Melbourne-Bendigo rail line crossing and the OAAV and for the remainder of the Project Area.

There are no heritage overlays directly affecting the Project Area and no heritage places of State cultural significance (VHR listed places) within the Project Area. There are three sites listed on the Victorian Heritage Inventory within the Project Area. One of these sites no longer seems to exist (VHI7822-0188 CS-H4 Cobbled Road). Mitigation measures have been proposed for the Ravenhall 2 Magazine and Storage Facility (H7822-0174) Robinsons Road, Ravenhall and Drover's Hut (H7822-0160) north of Kororoit Creek.

Overall, based on the evaluation undertaken, the Project has been rated "Neutral" in relation to the following cultural heritage evaluation objective *'to avoid or minimise effects on Aboriginal and historic cultural heritage'* (refer to Table 14-7).

Table 14-7 Cultural Heritage evaluation of sites in Project Area

Evaluation Criteria	Rating
Impacts to sites of Aboriginal cultural heritage (Table 14-4)	Neutral
Impacts to sites of historic cultural heritage (Table 14-5): • H7822-0174 Ravenhall 2 Magazine & Storage Facility (Well) • H7822-0188 CS-H4 Cobbled Road (Very Well), • H7822-0160 Drover's Hut (Neutral)	Well
Overall rating Cultural Heritage	**Neutral**

Note: *The "rating" for Aboriginal cultural heritage is according to Dr Vincent Clark and Associates. A "rating" is not included in the Cultural Heritage Management Plan Number: 12662.*

15 INTEGRATED AND SUSTAINABLE TRANSPORT

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.10 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – *Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.*

Key issues

- The balance of economic, social and environmental outcomes from the project needs to be beneficial over the short and long-term.

Assessment of likely effects

- Provide an integrated assessment of the economic, social and environmental performance of the project proceeding, drawing on the findings of the specific assessments set out above, including the proposed approaches to avoiding, mitigating, managing and offsetting potential adverse effects.
- Evaluate the overall implications of the project in the context of key aspects of legislation and statutory policy, as well as the principles and objectives of ecologically sustainable development and environment protection.

The following discussion presents a summary of the assessments presented in Chapters 8 to 14. Each of those chapters identifies and evaluates the potential impacts of the Project, while this chapter draws those findings together into an integrated discussion that outlines the overall implications and benefits of the Project.

15.1 Transport Integration Act 2010

The purpose of the Transport Integration Act 2010 is to create a framework for the provision of an integrated and sustainable transport system. The Act outlines transport system objectives and decision-making principles to achieve the vision of driving an integrated and sustainable transport system, and provides guidance as to how the Project can achieve positive economic, social and environmental outcomes. The project considers and addresses the objectives and decision making principles in the Transport Integration Act 2010.

15.1.1 Transport System Objectives

Social and economic inclusion - The upgraded road will provide facilities for a range of transport modes, including drivers, pedestrians and cyclists.

Economic prosperity - The proposed road upgrade will provide efficient access to employment, markets and services along the route and better access to the Calder Freeway and the Western Freeway to the wider region.

Environmental sustainability – Planning for the road upgrade has included comprehensive environmental investigations and assessments of the impacts of the Project. Where necessary these studies have recommended measures to minimise its impact on the natural environment.

Integration of transport and land use - Transport and land use integration has been planned in advance through Precinct Structure Plans (e.g. Robinsons Road North Employment PSP), Strategy Plans (e.g. Melton East Strategy Plan 1997), Growth Area Plans (e.g. Melton-Caroline Springs 2006 in Planning Schemes) and Growth Corridor Plans (e.g. West Growth Corridor Plan 2012).

Efficiency, coordination and reliability - The Project will provide efficient and reliable traffic movement across a variety of modes and will result in reduced journey times.

Safety and health and wellbeing - A high level of safety would be achieved for users of the corridor with separated carriageways, dedicated off road cycle and pedestrian paths and controlled crossing facilities at all signalised intersections. Two level crossings (with the Melbourne-Ballarat and Melbourne-Bendigo rail lines) would be removed.

15.1.2 Decision Making Principles

The Project addresses these principles by:

- Ensuring coordination between VicRoads, Councils, other agencies and landowners;
- Considering the economic, environmental and social factors that affect the Project. The investigations and assessments undertaken for this Project satisfy the principles of triple bottom-line assessment and take account of economic, social and environmental costs and benefits;
- Ensuring equity for the existing and future community through the resolution of any access and amenity issues prior to construction;
- The upgraded road will provide for a range of transport options;
- The precautionary principle has been followed in the development of the project design through careful evaluation to avoid serious or irreversible damage to the environment wherever practicable;
- Community and stakeholder consultation has been undertaken at various stages of the project. Key design changes have occurred as a result of community and stakeholder consultation. Consultation will continue as part of the exhibition of the EES and the Inquiry Hearing process; and
- There is transparency in relation to the Project as the road upgrade has been identified in the Melton Planning Scheme, the Brimbank Planning Scheme and in subdivision plans.

15.2 Ecologically Sustainable Development

Australia's National Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992) defines Ecologically Sustainable Development (ESD) as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased". More simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations.

The assessment process has adopted ESD principles as set out in Section 3A of the EPBC Act including the integration of long-term and short-term economic, environmental, social and equitable considerations.

From an early project development stage, the economic, social and environmental benefits and implications of the Project have been investigated, evaluated and documented by VicRoads culminating in the preparation of this EES.

A staged approach to impact assessment has been undertaken with the Project being refined based on the results of constraints identified during technical studies and consultation processes. The EES has identified the likely residual impacts on environment and social considerations following application of mitigation measures.

15.3 Assessment of Likely Effects

Economic, social and environmental effects for both the immediate and surrounding communities would be experienced in both the short and long term. A summary of economic, social and environmental evaluations presented in Chapters 8 to 14 is provided in Table 15-1. These evaluations are based on the assessments undertaken by consultants for VicRoads.

Based on the evaluation of the assessments discussed throughout this EES, the proposed upgrade of the Palmers Road corridor is rated "well" in relation to achieving a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term.

Table 15-1 Summary of evaluations

Evaluation Objective	Rating
Road safety and capacity	**Very Well**
Amenity and environmental quality	**Neutral**
Social	**Well**
Land use	**Very Well**
Visual and landscape	**Well**
Biodiversity and habitat	**Well**
Catchment values	**Neutral**
Cultural Heritage	**Neutral**
Overall	**Well**

15.3.1 Economic

The key economic outcomes of the project are both short and long term. The short term direct benefits would be realised during construction activities, through the creation of jobs in the local area and multipliers associated with spending at local businesses.

The longer term benefits are reductions in traffic volumes in local streets and reduced congestion on major roads. These aspects translate into economic benefits to the broader community and businesses through reduced travel times, that subsequently result in greater fuel efficiency; and improved arterial access between freeways and residential and employment areas. Improved access may also encourage greater investment in the area. For instance, there is potential for increased industrial and office development near the Calder Freeway which is currently vacant land to the east of Calder Park Drive. Near the Western Freeway there is also vacant industrial land which would be developed and benefit from better north south access.

15.3.2 Social

Amenity impacts are expected through increased traffic noise levels at adjacent residences and in relation to the ecological and heritage characteristics of the Project Area, especially north of the Calder Freeway and near Kororoit Creek. However, in the short and longer term there would also be significant benefits to the community and the overall transport network as a result of the Project.

No residential dwellings or commercial buildings will be acquired for the Project. However, acquisition of some parts of vacant residential land is required. Some businesses along Westwood Drive, the Calder Park Motor Sports Complex (situated on the western side of Calder Park Drive) and vacant industrial land (situated on the eastern side of Calder Park Drive) would be affected by property acquisition.

The social benefits, derived from safety and efficiency outcomes, would benefit both local residents and the wider region. Specifically, this would be achieved through the connection of Westwood Drive over Kororoit Creek, connecting the north south route. Further, the six-lane arterial would attract traffic from adjacent corridors, enabling those corridors to better serve public transport and improve safety around community facilities such as schools. It should be noted that community facilities have been predominantly developed away from the Project. The Project includes an off-road shared path that would enhance and encourage walking and cycling activity in the local area.

The social impact assessment presented in Chapter 10, considers that the Project would achieve a net social benefit for the local community when considering planning policy, road safety and efficiency and access to community infrastructure.

15.3.3 Environmental

Construction of the Project within the proposed reservation would achieve the overall project objectives with limited impact on private properties and amenity. The Project would be designed to minimise environmental impacts and mitigation measures would be implemented during construction and operation to further minimise residual impacts.

For the large majority of residences along the Project, modelling of the 2-lane road (with Westwood Drive connection) to a duplicated 6-lane road in 2046, showed that the traffic noise levels potentially change by -1 to +9dB(A). With the majority of residences predicted to experience an increase of between +1 to +3 dB(A). A 3 dB(A) change in road noise is just perceptible.

The Project would not impact significantly upon the Organ Pipes National Park or on the main attractions in the Park. Potential effects would be managed through mitigation measures such as retention of remnant vegetation, planting adjacent to the Organ Pipes National Park, the use of planting to screen the interchange and other elements of the road. The proposed bridge over Kororoit Creek would impact on the Kororoit Creek valley and visual amenity, through the introduction of built infrastructure into a valley with natural values. These impacts can be mitigated somewhat by providing maximum open, light spaces beneath the bridge structures and planting indigenous vegetation on the embankments.

Impacts have been avoided and minimised on native vegetation, listed flora and fauna species and ecological communities throughout the planning and design process. Given that the Project area has been relatively disturbed and that mitigation measures and offset requirements would be implemented, adverse impacts would be limited.

Potential impacts on Aboriginal cultural heritage would be avoided where possible or otherwise mitigated through the use of a CHMP. Mitigation measures have been proposed for two historic heritage sites, Ravenhall 2 Magazine and Storage Facility (H7822-0174) Robinsons Road, Ravenhall and the Drover's Hut (H7822-0160) north of Kororoit Creek.

Overall, the Palmers Road Corridor meets the EES Scoping Requirements for the Project, as the potential environmental effects of the proposed road development for amenity and environmental quality, social, landscape and visual, biodiversity and cultural heritage would be appropriately managed through design measures and implementation of the Environmental Management Framework (EMF) for the Project. The EMF is outlined in chapter 16.

Further discussions around these outcomes are provided in Chapter 9 'Amenity and Environmental Quality', Chapter 11 'Visual and Landscape', Chapter12 'Biodiversity and Habitat', Chapter 13 'Catchment Values' and Chapter 14 'Cultural Heritage'.

15.4 Summary of Net Community Benefits

The benefits and disbenefits from the Project in the short and long term are provided in Table 15-2. These have been derived from the relevant EES impact assessment chapters 8 to 14.

Overall, the Project would result in a net community benefit, primarily resulting from road safety and capacity benefits, which include improved network performance, reduced congestion, improved safety and better access to community facilities and employment.

The disbenefits relating to the Project due to environmental effects would be partially mitigated due to management measures to be implemented during construction and operation. VicRoads would compensate affected landholders in accordance with the *Land Acquisition and Compensation Act 1986* (Vic). Native vegetation losses would be offset in accordance with current Commonwealth and State policies. In addition, a CHMP would be implemented to manage impacts to Aboriginal cultural heritage. Impacts during the operation phase would be generally limited to changed visual conditions, changes to some property accesses and traffic noise impacts. Construction impacts identified would be temporary and managed to minimise effects on the environment, landowners and the local community in accordance with the EMF.

Table 15-2 Benefits and disbenefits of the Project

Benefits
Improved network performance and facilitation of north-south traffic movements (long term)
Improved public transport services on adjacent corridors and Project route (long term)
Reduced levels of congestion and higher levels of service (long term)
Improved transport connections in the Cities of Brimbank and Melton (long term)
Improved safety through separated carriageways, dedicated off road and pedestrian paths, controlled crossing facilities and removal of two level crossings (long term)
Improved access to community facilities, employment and other attractors (long term)
Disbenefits
Temporary alterations to access arrangements during construction (short term)
Increase in noise levels at residences in the vicinity of the upgraded roads (long term)
Acquisition of open space and land from properties and businesses (long term)
Impact on visual amenity of the Kororoit Creek valley in the vicinity of the proposed bridge (long term)
Removal of native vegetation (long term)
Potential impact on Aboriginal cultural heritage sites and historical heritage sites (long term)

15.5 Conclusion

The Project would deliver a safe and efficient arterial road that would improve connectivity through the west of Melbourne. The improved connectivity would benefit residents and businesses alike, attract investment and improve the safety and amenity of activity centres on adjacent corridors.

Based on the evaluation of the assessments discussed throughout this EES, the proposed upgrade of the Palmers Road corridor is rated “well” in relation to the following evaluation objective: *’Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term’*.

16 ENVIRONMENTAL MANAGEMENT FRAMEWORK

16.1 EES Objectives and Scope

This chapter responds to the draft evaluation objective and addresses the requirements set out in Section 4.9 of the EES Scoping Requirements for the Project, which are as follows:

Draft Evaluation Objective – *To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.*

Key issues

- Weak management of environmental effects during project construction and operation could result in failure to meet statutory requirements and sustain community confidence.

Priorities for characterising the existing environment

- Outline the means by which a register of environmental risks associated with the project will be developed and maintained (including matters identified in preceding sections in these Scoping Requirements as well as other pertinent risks).

Design and mitigation measures

- Provide a proposed framework for managing the risks of adverse environmental effects, including:
  - the context of required approvals and consents;
  - the environmental management system (EMS) to be adopted, including organisational responsibilities and accountabilities;
  - a summary of environmental management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes;
  - proposed objectives, indicators and monitoring requirements, including for managing:
    - social outcomes
    - traffic
    - waste including potentially contaminated materials
    - environmental quality (including for dust)
    - surface runoff, water quality and groundwater
    - construction noise and vibration
    - disruption of and hazards to existing infrastructure;
  - outline of any relevant Environmental Management Plans (EMP) for construction and operational phases.

Assessment of likely effects

- Evaluate the likely effectiveness of the proposed EMF in controlling adverse effects.

Approach to manage performance

- Procedures for:
  - monitoring environmental performance and verifying compliance with requirements; and
  - review of the effectiveness of the EMF for continuous improvement.
- Arrangements for management of, and access to, baseline and monitoring data, to ensure the transparency and accountability of environmental management as well as to contribute to the improvement of environmental knowledge.

16.2 Introduction

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

16.3 Environmental Management System

The environmental management requirements detailed in this chapter primarily applies to the construction of the project in accordance with VicRoads' Environmental Risk Management Guideline. The Guideline outlines the management system that addresses the principles of ISO 1400.1 2004 *Environmental Management Systems.*

VicRoads environmental management system addresses the matters specified in the EES Scoping Requirements, and describes requirements for:

- **Risk assessment**: development and maintenance of a register of environmental risks associated with the project during project implementation (refer section 16.5.1)
- **Design and mitigation measures**: the framework for managing risks of adverse environmental effects, including:
  - The context of required approvals and consents, including consideration of specific approvals that may be required (refer section16.5.2)
  - Project delivery, would be implemented by VicRoads, in accordance with the organisational responsibilities and accountabilities (refer section 16.4)
  - A summary of environmental management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes, as well as proposed objectives, indicators and monitoring requirements (refer section 16.6)
  - An outline of a program for community consultation, stakeholder engagement and communications during the construction and operation of the project. (refer section 16.5.7)
- **Assessment of likely effects**: process for evaluating the effectiveness of the proposed environmental management framework in controlling adverse effects (refer section 16.5.5)
- **Approach to managing performance**: procedures and arrangements for:
  - monitoring environmental performance and verifying compliance with requirements (refer section 16.5.5)
  - review of the effectiveness of the EMF for continuous improvement (refer section 16.5.5)
  - management of and access to baseline and monitoring data to ensure the transparency and accountability of environmental management as well as to contribute to the improvement of environmental knowledge (refer section 16.5.6)

16.4 Project Delivery Roles and Responsibilities

VicRoads as the Victorian statutory authority for arterial roads (including highways and freeways) is responsible for the overall delivery and operation of the Project. VicRoads would appoint one or more construction contractor(s) who would be responsible for construction works for the Project.

VicRoads would be responsible for on-going management of the Project post-construction, with key activities comprising ongoing road maintenance. VicRoads may appoint contractors to complete specific maintenance tasks on an as required basis during operation. These contracts would be managed in accordance with VicRoads' practices and standards.

The key roles and responsibilities for the construction and operational phases of the Project are listed in Table 5-1.

Table 16-1 Roles and tasks/responsibilities for environmental management

Organisation	Tasks/Responsibilities
VicRoads Project Director (Superintendent)	Check that VicRoads' Project Environment Protection Strategy (PEPS) (refer section 16.5.3) is developed, approved and implemented in accordance with VicRoads requirements. Check that VicRoads staff are appropriately trained in environmental awareness. Approve standard and specific environmental clauses in contract specification Endorse or delegate Environmental Incident Reports for investigation, the identification of Preventative Actions and the closure of Incident Reports.
VicRoads Manager – Project Delivery	Check that the required actions identified in the PEPS are undertaken. Ensure that the Table of Commitments is updated as required. Check that the PEPS is regularly reviewed and updated as required. Check that relevant stakeholders are consulted and provide input into the development of the PEPS where appropriate. Check that non-contractual environmental commitments are actioned. Ensure that all necessary permits are obtained.
VicRoads Project Engineers / Surveillance Officers	Prepare the PEPS in accordance with VicRoads internal environmental management guidelines. Check that the requirements in the PEPS are incorporated into the contract specification for construction. Check that the requirements of the PEPS and contract specification are addressed by the contractor's Environmental Management Strategy (EMS) and Environmental Management Plan(s) (EMPs). Log environmental incidents in VicRoads incident reporting system. Prepare surveillance plans for construction contract(s) and complete regular assessment/review of the environmental risks and amend the surveillance plan as necessary to reflect the risks. Conduct surveillance of works to check compliance with the contract specification and the contractor's EMS and EMP(s). Engage an independent, suitably qualified and experienced auditor to conduct audits of implementation of the contract specification. Record environmental surveillance in the VicRoads Surveillance and Management System (SuMS).
Construction contractor(s)	Develop an EMS and EMP(s) to the satisfaction of VicRoads Project Director. Effectively implement and manage the EMS and EMP(s) to the satisfaction of VicRoads Project Director. Monitor and audit the implementation and effectiveness of the EMS and/or EMP(s) and report their effectiveness to VicRoads Project Director. Engage specialist environmental advice where required. Verify that all contractual commitments including requirements as described in the contract specification are honoured. Report environmental incidents to VicRoads Project Director. Notifiable incidents are reported to relevant statutory authorities. Document actions taken to rectify the situation. Inform VicRoads Project Director of any queries from statutory agencies and respond accordingly. Ensure that Contractor's staff and subcontractors have been appropriately trained in environmental awareness.

16.5 VicRoads Environmental Risk Management Guideline

VicRoads has established Environmental Risk Management Guideline to aid the implementation of its Environmental Management System for construction projects. The Guideline has been developed to assist VicRoads staff in the management of the environment in relation to the planning, development and delivery of the road construction project. The Project would be delivered in accordance with VicRoads' Environmental Management System and Environmental Risk Management Guideline. The process for implementation of VicRoads' Environmental Management System is shown in Figure 16-1. Key elements of the system are described in more detail in the following sub-sections of this chapter.

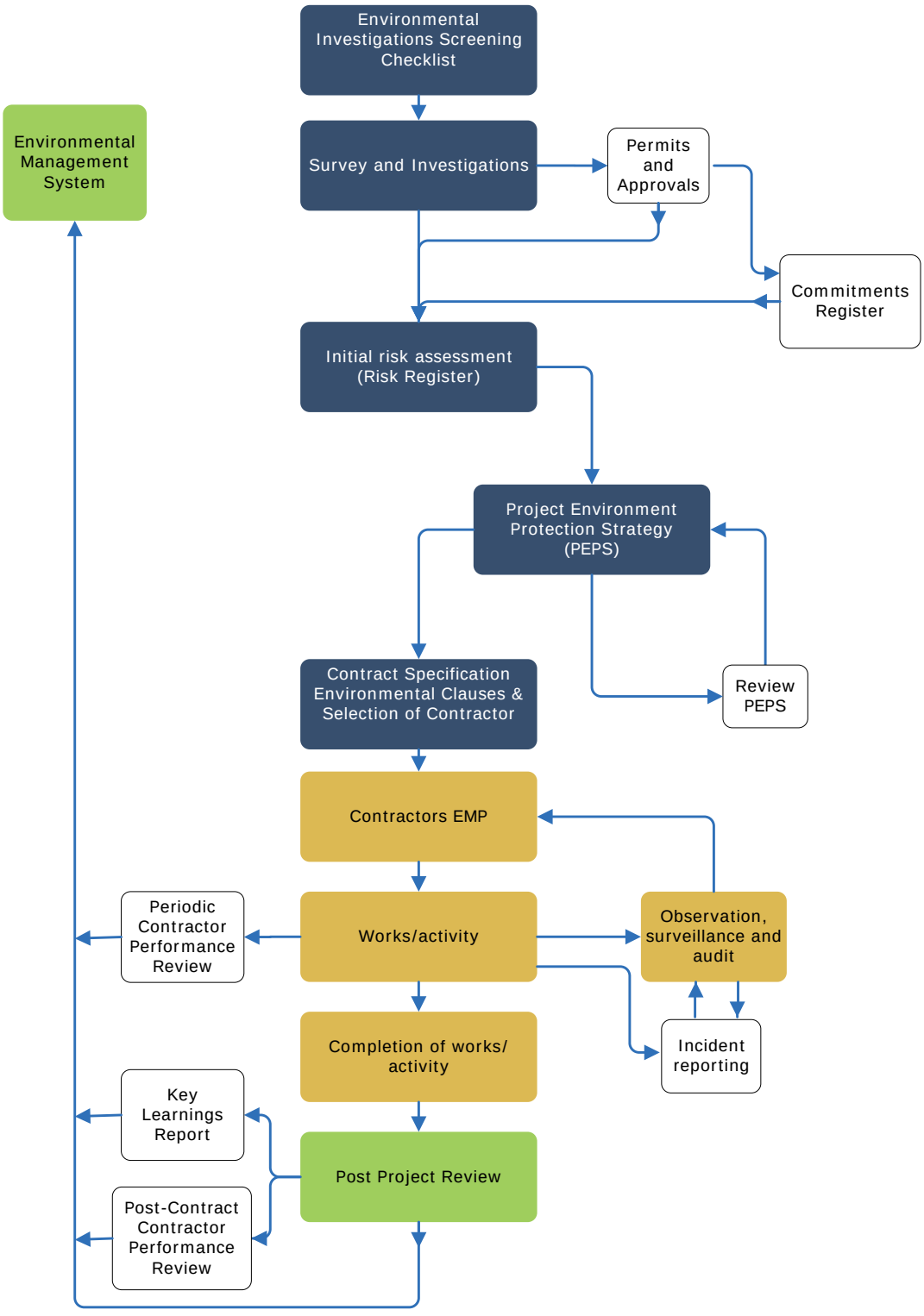


Figure 16-1 VicRoads Environmental Management System

16.5.1 Risk Identification and Assessment

16.5.1.1 Environmental Investigations Screening Checklist

As part of the planning process, VicRoads completed an Environmental Investigations Screening Checklist to gain an understanding of the environment in which the Project is taking place. The checklist assisted VicRoads in identifying what environmental surveys and investigations were required to identify and better understand environmental risks.

16.5.1.2 Surveys and Investigations

VicRoads engaged external consultants to undertake specialist surveys and investigations and prepare reports, including those required to support this EES. These specialist studies identified potential environmental impacts and risks, permit and approval requirements and detailed mitigation measures for the Project. Relevant surveys and investigations are presented in Technical Appendices to this EES.

16.5.1.3 Risk Assessment

Environmental sensitivities and potential impacts have been identified and assessed through the specialist assessments for the EES. As described in Chapter 7, the risk assessment process for the EES aimed to identify significant environmental, heritage, social and traffic risks and impacts associated with the project. Objectives were developed with consideration to the EES scoping requirements, relevant environmental legislation and potential impacts associated with the project. Management measures have been proposed to address these risks and are presented in this EMF. EES Technical Appendix A contains a copy of the risk register developed for this EES.

The EES risk assessment would inform the contract risk register developed by VicRoads as part of the PEPS for project implementation. This contract risk register would be regularly reviewed and updated during delivery of the project to reflect the Project status and inform environmental management requirements.

16.5.2 Permits and Approvals

VicRoads is responsible for coordinating and obtaining statutory approvals for the Project and ensuring the requirements of these approvals are implemented. VicRoads would require the construction contractor(s) to comply with the conditions of these approvals and obtain any additional licences or permits that may be required for construction. Key regulatory approvals required for the Project are described in detail in Chapter 3 ‘Project Approval Requirements’.

16.5.3 Project Environment Protection Strategy

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

The PEPS would include the contract risk register and commitments register as well as containing the environmental management measures and objectives described in this EES. The PEPS Commitments Register would be updated to reflect permit and approval conditions and any other measures or commitments identified through the Minister’s assessment and conditions of subsequent approvals and consultation.

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

16.5.4 Construction Environmental Management

16.5.4.1 Contract Specification Environmental Clauses

VicRoads would prepare a construction contract specification(s) for the Project to articulate the project requirements to the construction contractor(s). VicRoads has standard contract specifications that contain environmental management clauses developed to address ‘best practice’ environmental management principles and legislative requirements. The specification clauses would be further developed to address specific risks, objectives and mitigation measures for this project that are not already addressed by the standard clauses.

16.5.4.2 Contractors Environmental Management Plan

The construction contractor(s) would be required, as a condition of the contract, to prepare an EMP for construction. The EMP would be required to address the range of environmental risks and impacts and proposed management/mitigation measures identified in this EES and in the contract specification. The EMP would incorporate the following:

4. a statement of scope and purpose and the environmental objectives;

5. a schedule of environmental assets and values that are expected to be affected by the works under the Contract including an outline of proposed mitigation treatments and proposed timeframes;

6. the identification of work activities and an assessment of their potential impacts and associated risks to onsite and offsite environmental receptors (e.g. community, land uses, waterways, flora and fauna, cultural heritage, etc.) including times when the Contractor is not on site, including but not limited to matters covered in this specification;

7. processes and responsibilities for:

   - the preparation and implementation, of the EMP;
   - reporting and investigation of environmental incidents or complaints relating to any environmental issue under the Contract;
   - implementing an adaptive approach for the review and update of the EMP in conjunction with the assessment of the adequacy of the onsite implementation of controls and procedures as works progress and/or following non-conformances, complaints, or previously unidentified issues; and
   - after hours response including arrangements for containing environmental damage and attendance on site in the event of an emergency;

8. legal and other requirements - details of approvals, licences and permits necessary and their associated conditions to meet statutory requirements;

9. competence, training and awareness - an induction and training plan so that all site personnel (including subcontractors) understand the EMP and are aware of how the EMP is to be implemented in relation to the works, including any possible emergency response procedures;

10. operational control – the EMP shall document environmental procedures to avoid or mitigate identified environmental impacts. The procedures shall address the environmental protection requirements, including standard contract requirements, and any project specific environmental requirements. These procedures shall include inspection and monitoring;

11. scaled drawing(s) that clearly show the location and extent of environmental controls, modifications to existing control devices and monitoring locations;

12. emergency preparedness and response - an emergency response procedure shall include processes for managing any environmental emergency on site, such as contacting relevant stakeholders and clean-up of the site;

13. nonconformity, environmental incidents and corrective and preventative action procedures;

14. audit - a documented process for audit of the EMP against the contract requirements, including the effectiveness of onsite environmental protection measures.

16.5.4.3 EMP Revisions

Revisions to the construction contractor(s) environmental documentation may be required as a result of reviews, changes in activities and work practices, legislation, aspects and impacts, or as a result of internal or external audit findings, incidents or complaints.

VicRoads ensures that regular audits of the contractors EMP verify that it is maintained and reviewed to address the environmental risk as the work activities and associated risk vary. (Refer to Section 16.5.5).

16.5.5 Observation, Surveillance and Audit

16.5.5.1 Contractor Monitoring

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

16.5.5.2 VicRoads Surveillance

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

- observation of project activities on a day-to-day basis
- periodic risk based surveillance of the effectiveness of environmental controls and processes implemented on site
- audit of the implementation and effectiveness of the EMS and/or EMP and the effectiveness of the controls and processes implemented on site.

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

16.5.5.3 External Audit

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

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

16.5.5.4 Reporting

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

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

16.5.5.5 Contractor Performance Reviews

Contractor performance reviews would be periodically completed throughout the delivery, and at the completion, of a project in accordance with VicRoads Procurement procedures. The reviews assess the contractor's performance for both the administration and implementation of its EMP for compliance with VicRoads contract specification and legislative requirements.

A contractor's pre-qualification status may be reviewed if performance is demonstrably below the requirements and if appropriate corrective actions are not implemented.

16.5.5.6 Post Project Review

VicRoads would carry out a post project review following practical completion of the contract. This would be attended by both VicRoads and the contractor(s) and a 'Project Key Learnings Report' prepared summarising the performance on the project as well as actions to be taken to advise others of the learnings.

16.5.6 Management and Access to Baseline and Monitoring Data

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

16.5.7 Community Consultation, Stakeholder Engagement and Communications

Chapter 6 describes community consultation, stakeholder engagement and communication activities conducted as part of the EES and planned activities during public exhibition of the EES.

Post-EES, VicRoads would develop a Community Engagement Plan to maintain/enhance key strategic external relationships. The plan would address VicRoads continued consultation to inform landowners, stakeholders and the broader community about the project so that people are kept up to date, and provided with information and the opportunity to ask questions.

16.6 Environmental Management Measures

Environmental management measures proposed to address environmental risks for each specialist study area that would be implemented for the project are provided in Table 16-2 to Table 16-8. The management measures have been primarily based on relevant standards, guidelines and policies, investigations and technical studies and discussions with regulatory agencies.

Table 16-2 Project environmental performance objectives and management measures – road safety and capacity

Road safety and capacity		
Objective: To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes.		
Issue	**Phase**	**Management Measure**
Road safety	Design	Upgraded corridor to be designed in accordance with Austroads Guidelines for Category 2A or 2B roads. Dual three-lane carriageways, divided by a central median with intersection improvements designed to maximise safety outcomes. Shared off-road cycle/footpath to be constructed in the verges on both sides of the corridor, and connect into other off-road shared trails in the area. In some locations cycle paths may be provided on-road (requiring consideration when designing intersections).
Access arrangements and connectivity for construction	Construction	A Traffic Management Plan (TMP) would be developed by the construction contractor in consultation with relevant stakeholders to minimise the potential impacts of construction. The TMP would manage disruption to pedestrian movements, bicycle connectivity, public transport and motor vehicle traffic.
Capacity	Design	Higher levels of service are realised by a six-lane scenario along the length of the corridor and also results in improved modelled travel times.

Table 16-3 Project environmental performance objectives and management measures – amenity and environmental quality

Amenity and environmental quality		
Objective: To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable		
Issue	**Phase**	**Management Measure**
Noise associated with construction activities	Construction	Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996).
Changes in noise levels at properties	Operation	Comply with Traffic Noise Reduction Policy (VicRoads, 2005).
Decreased air quality	Construction	Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996). Implementation of measures consistent with 'Doing it Right on Subdivisions- Publication 960' (EPA Victoria, 1996). Implementation of measures to achieve compliance with State Environment Protection Policy (Air Quality Management).
Construction activities contributing to the contamination of soil	Construction	Storage and handling procedures for chemicals and other hazardous materials should be developed and implemented, including procedures for preventing spills, and rapidly and effectively responding to incidents and emergencies. Refueling of equipment and vehicles to be an appropriate distance away from drainage and water courses. Designated storage facilities and containers for fuels, lubricants and chemicals in accordance with 'Bunding Guidelines' (EPA Victoria, 1992) Publication 347. Spill kits and safety procedures to be in place should a spill or leak occur.
Pollution of the environment and danger to health and safety of site staff and the public	Construction	Apply EPA's Waste management hierarchy in accordance with the *Environment Protection Act 1970.* Classification of all soils to be removed from the site against *EPA Industrial Waste Resource Guidelines - Waste Categorisation* (Publication IWRG600.2) prior to excavation. Storage of litter, particularly litter that is able to be wind-blown or is putrescible, in a lidded bin from which material cannot escape. Emptying bins regularly to ensure litter does not overflow and vermin are not attracted. Containment of washing residues, slurries and other contaminated water within designated areas. Consideration of the acid generating potential of the soil prior to waste disposal. Creation and maintenance of a dangerous goods register. Training of staff in emergency action procedures.

Table 16-4 Project environmental performance objectives and management measures – social, land use and infrastructure

Social, land use and infrastructure		
Objective: To minimise adverse social and land use effects, including impacts on existing infrastructure.		
Issue	**Phase**	**Management Measure**
Social Impact	Design	Investigations into pedestrian access to be undertaken at the time of construction to determine location, frequency and type of pedestrian crossing points. The Project would improve traffic flow, reduce congestion, re-direct traffic from valued community areas and improve road safety. Grade separated intersections with the Calder Freeway, the Melbourne-Bendigo Rail Corridor and the Melbourne-Ballarat Corridor (improving safety and efficiency outcomes for road and rail transport users). Investigate signalised crossing at Community Hub to manage large volume of students. Erect suitable signage advising drivers of entrance for Organ Pipes National Park. Landscaping to screen the proposed Calder Freeway Interchange from the Organ Pipes National Park. Continue to consult with businesses and residents to ensure that reasonable access can be retained to the extent possible.
	Construction	Continue to consult with businesses and residents to ensure that reasonable access can be retained to the extent possible. Traffic Management Plan will be developed by the contractor to minimise the potential impacts of construction on access to community facilities and valued places.
Land use	Design	Minimise the need for property acquisition as far as practicable. The road reservation be pursued immediately to ensure that the reservation is formalised and that land uses are not inadvertently developed within the proposed reservation.

Table 16-5 Project environmental performance objectives and management measures – visual and landscape values

Visual and landscape values		
Objective: To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas		
Issue	**Phase**	**Management Measure**
Visual amenity, recreational and natural landscape values of the Organ Pipes National Park	Design	Minimise vegetation removal and replant vegetation to screen the interchange adjacent to the Organ Pipes National Park and other elements of the road. Plantings to comprise local indigenous species consistent with the Ecological Vegetation Communities known to occur in Organ Pipes National Park.
Visual amenity, cultural heritage and natural landscapes of the volcanic plains	Design	Reconstruct drystone wall as a paving band along the original alignment where possible. Within the road reserve fill gaps with crushed rock to Banchory Grove Nature Conservation Reserve boundary to prevent weed infestations of the grassland.
Visual amenity, recreational, cultural heritage and natural landscape values of the Kororoit Creek corridor	Design	Minimise vegetation removal and replant indigenous vegetation where possible on the ramp embankments and between the interchange and road reserve boundary to screen the interchange from areas within the creek corridor. Display visual integration of the bridge structure with the road and landform. Ensure lines that delineate elements of the bridge structure are smooth and unbroken in both the horizontal and vertical planes. Surface treatments are in harmony with the structural shape and scale of the bridge such that visual clutter is avoided. Provide maximum open, light spaces beneath the bridge structures.
	Construction	Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996). Implementation of measures consistent with 'Construction Techniques for Sediment Pollution Control' (EPA Victoria, 1991) Publication 275. Stabilise embankments through revegetation with appropriate local indigenous plant species. Batters should be planted and mulched to reduce the risk of erosion.
Visual amenity and recreational values of open space reserves	Design	Planting between the road and the right of way boundary to screen adjacent areas where possible. Additional planting within the reserves. Encouraging indigenous planting to the road reserve boundary to strengthen the extent of the landscape character where relevant. Provide for connections with shared paths and ensure the existing bicycle and pedestrian network is integrated with the Project.
	Construction	Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996) Implementation of 'Construction Techniques for Sediment Pollution Control' (EPA Victoria, 1991) Publication 275
Existing networks that provide cycling and walking accessibility and connectivity	Design	Provision of off-road shared paths in both directions and connections to most of the existing shared path networks

Table 16-6 Project environmental performance objectives and management measures – biodiversity and habitat

Biodiversity and habitat		
Objective: To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.		
Issue	**Phase**	**Management Measure**
Species of state significance	Design	Detailed design measures of the bridge crossing of Kororoit Creek to mitigate from loss of connectivity, shading, runoff, scour and placement of piers and abutments. Ancillary infrastructure should be designed and located to avoid further impacts to species of state significance.
	Construction	Pre-clearing surveys and salvage/translocation where required and practicable. Sensitive areas such as those containing fauna habitat would be surveyed and cleared of fauna prior to construction activities or marked to avoid unnecessary vegetation or habitat removal prior to commencing works by a trained ecologist or environmental officer. Construction in the vicinity of Kororoit Creek during major rainfall events should be avoided Ensure that fish passage is maintained during construction Implementation of appropriate vegetation clearing protocols. Implementation of appropriate weed hygiene protocols. Staff and contractor inductions to address the location of sensitive ecological values and their roles and responsibilities regarding the protection and/or minimisation of impacts to all ecological values. Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996). A permit to remove fauna will be required under either the *Wildlife Act 1975* or the *Wildlife Regulations 2002.* Following completion of the final design and confirmation of project clearing requirements, DEPI should be contacted regarding the permit process. Where feasible, bridge piers should be sited outside of the main waterway area of Kororoit Creek. Fencing no-go zones to protect significant fauna habitat and creekline values along the Kororoit Creek.
Native vegetation communities	Design	Ancillary infrastructure should be designed and located to avoid further impacts to native vegetation communities. Detailed design should be undertaken to avoid dissecting areas of native vegetation where possible, to minimise impacts on significant habitat.

Biodiversity and habitat		
Objective: To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy.		
Issue	**Phase**	**Management Measure**
	Construction	Areas outside of Functional Design Footprint, in particular those deemed to be ecologically sensitive such as native vegetation that is in moderate to good condition or provides suitable habitat for threatened species would, be protected from direct and indirect disturbance where practicable. Ensure compliance with the Australian Standard for Protection of Trees on Development Sites (AS 4790-2009). Revegetation of disturbed areas to recreate pre-existing vegetation communities, including the planting of locally occurring native shrubs, trees and groundcover plants where possible. Implementation of appropriate weed hygiene protocols. Removal of weed infested topsoil from site and disposed of at an appropriate waste facility. Meet offset obligations based on the provisions of the Permitted clearing of native vegetation – Biodiversity Assessment Guidelines (the Guidelines) (DEPI, 2013).
Sites of significance	Design	Ancillary infrastructure should be designed and located to avoid impacts to sites of significance such as biosites and managed conservation reserves.
	Construction	Minimise indirect impacts on reserves/biosites (such as Banchory Grove Grasslands, Ravenhall Reserve and Organ Pipes National Park and Pioneer Park) with appropriate implementation of 'no-go zones'.

Table 16-7 Project environmental performance objectives and management measures – catchment values

Catchment values		
Objective: To maintain the functions and values of surface water and floodplain environments.		
Issue	**Phase**	**Management Measure**
Flooding risk	Design	Assessment of flood levels should be incorporated into project design to ensure that existing flood levels are maintained and where there are potential adverse impacts to flood levels, risks to neighbouring private property are minimised. Where possible, piers within the waterways should be avoided. The design of the Project to comply with Melbourne Water requirements regarding floodplain protection.
	Construction	Consideration would be given to the position of temporary work offices and storage of materials in relation to identified floodplains. Restrictions or requirements regarding cutting and filling activities and volumes within floodplains. Prior to undertaking any works on or near a Melbourne Water waterway, obtain a permit to work and licence to construct works under Section 67 of the *Water Act 1989* from Melbourne Water. Consider staging of works – i.e. avoiding seasonal times of typically high rainfall at Kororoit Creek.
	Operation	The potential impact of runoff from the road surface to the receiving waterway would be reduced by integrating Water Sensitive Road Design (WSRD) measures. Practical WSRD as set out in the 'Urban Stormwater - Best Practice Environmental Management Guidelines' (CSIRO, 1999) will be considered at the detailed design stage.
Risk to water quality	Construction	Implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996), 'Construction Techniques for Sediment Pollution Control - Publication 275' (EPA Victoria, 1991) and 'Bunding Guidelines - Publication 347' (EPA Victoria, 1992). Prepare a CEMP that addresses best practice principals that is consistent with 'Doing it Right on Subdivisions- Publication 960' (EPA Victoria, 1996).
	Operation	The potential impact of runoff from the road surface to the receiving waterway would be reduced by integrating Water Sensitive Road Design (WSRD) measures. Practical WSRD as set out in the 'Urban Stormwater - Best Practice Environmental Management Guidelines' (CSIRO, 1999) would be considered at the detailed design stage.

Table 16-8 Project environmental performance objectives and management measures – cultural heritage

Cultural heritage		
Objective: To avoid or minimise effects on Aboriginal and historic cultural heritage values		
Issue	**Phase**	**Management Measure**
Sites of Aboriginal heritage	Design	Implementation of measures outlined in approved CHMP.
	Construction	Implementation of measures outlined in approved CHMP (site specific management measures including archaeological salvage excavations, surface artefact survey and collection and protective fencing and contingency for possible discovery of Aboriginal cultural heritage during works).
Sites of historical heritage (non-Aboriginal)	Design	Archaeological excavations of any remaining undisturbed parts of Drover's Hut and Ravenhall 2 Magazine and Storage Facility sites to recover data and to determine the nature and significance of the remains. If test excavations identify any significant archaeological deposits or features, further investigation would be undertaken to determine their nature, extent and significance and conducted in accordance with the Guidelines for Conducting Archaeological Surveys (Heritage Victoria, 2012). All artefacts recovered from excavations would be collected, analysed and catalogued. A report of the excavation and its results would be prepared and lodged with Heritage Victoria at the conclusion of the investigation.
	Construction	Erect temporary fences around historical heritage sites that are to be retained. Relocation of historical heritage as required (i.e. Heritage Victoria de-listed dry stone wall).

17 CONCLUSION

This EES has investigated the potential environmental and social impacts associated with the proposed upgrade to the Palmers Road Corridor. The assessment process involved determining existing environmental conditions, evaluation of effects using an assessment framework developed for the Project, and proposing mitigation measures where required.

The Project has been assessed in relation to specific evaluation objectives. The project evaluation objectives identified within the EES Scoping Requirements reflect legislation and government policy and take into account the key environmental and social issues relevant to the proposal. The results of the assessment in relation to the evaluation objectives are summarised below.

17.1 Road Safety and Capacity

Transport modelling of future travel demand has demonstrated a need for upgrade of the Palmers Road Corridor to six lanes. Without the upgrade, traffic conditions on the existing road network in the Cities of Brimbank and Melton (and the surrounding wider road network) would deteriorate, thus inhibiting accessibility and mobility for local residents, visitors and the business sector.

Construction of the bridge over Kororoit Creek and the new Calder Park Drive interchange with the Calder Freeway would provide significant improvements in connecting road users within and beyond the Cities of Brimbank and Melton. The Palmers Road Corridor would become the primary north-south arterial between the Western Ring Road to the east and the proposed Outer Metropolitan Ring Road to the west. The upgrade would provide sufficient capacity to attract traffic away from adjacent corridors providing for public transport routes, and would improve efficiency and reliability of services along these corridors. Surrounding residents would also experience more efficient access to the wider transport network.

A high level of safety would be achieved for users of the corridor with separated carriageways, dedicated off road cycle and pedestrian paths and controlled crossing facilities at all signalised intersections. Additionally, two level crossings (with the Melbourne-Ballarat and Melbourne-Bendigo rail lines) would be removed.

Although temporary alterations to access are likely to occur during construction, a traffic management plan would be developed by contractors to minimise the potential impacts of construction.

Taking into account the proposed management measures for road safety and capacity, the Project has been rated “Very Well” for the six-lane configuration in relation to the evaluation objective ‘*To improve the road-based transport capacity and connectivity in western Melbourne, by developing a six-lane dual carriageway arterial road along the Palmers Road Corridor between Western Freeway and Calder Freeway, while maintaining the connectivity of the existing local transport routes’*.

17.2 Amenity and Environmental Quality

Noise modelling has indicated that changes to traffic noise levels would vary during operation along the corridor. The construction of the Westwood Drive connection (in the Kororoit Creek environs) would result in a potential increase in noise levels from +4 to 15dB(A) at 20 residences in the vicinity of the connection, while the noise level at 24 residences would potentially increase by more than 15 dB(A). This change is due to the introduction of traffic into an area that currently does not have traffic noise impacts. For the large majority of residences along the Palmers Road Corridor, modelling of the 2-lane road (with Westwood Drive connection) to a duplicated 6-lane road in 2046, showed that the traffic noise levels potentially change by -1 to +9dB(A). With the majority of residences predicted to experience an increase of between +1 to +3 dB(A). A 3 dB(A) change in road noise is considered not noticeable.

A number of parks are located near the Palmers Road Corridor. Modelling predicts that amenity in these parks would not be noticeably impacted by the changes in traffic noise levels associated with the Project.

Application of the VicRoads Traffic Noise Reduction Policy (2005) to the proposed Calder Park Drive realignment on the approach to the interchange with the Calder Freeway, found that noise levels would be less than the threshold (63 dB(A)) and therefore no noise attenuation measures are required at residences in this area. Elsewhere along the Corridor, the Policy indicates that noise attenuation would not be required.

An air quality assessment using the VicRoads Air Quality Screening Tool predicted that the concentrations of key air pollutants associated with vehicle emissions are within the requirements of the State Environment Protection Policy (Air Quality Management) using the predicted traffic volumes in 2046.

Noise and air quality issues associated with construction activities will be managed through the implementation of measures consistent with 'Environmental Guidelines for Major Construction Sites - Publication 480' (EPA Victoria, 1996) and 'Guidelines for Noise Control - EPA Publication 1254' (EPA Victoria, 2008).

Taking into account the proposed management measures for amenity and environmental quality, the project has been rated "Neutral" in relation to the evaluation objective '*To minimise adverse noise and other amenity effects on nearby residents and land uses, to the extent practicable'.*

17.3 Social, Land Use and Infrastructure

The Melton East Strategy Plan (GHD, 1997) has influenced the land use and development along the corridor, allowing a 40–60m wide corridor with no direct access to the future arterial road. As development has occurred, land for the Palmers Road Corridor has been reserved. The corridor is largely protected and only very limited additional areas of land would require property acquisition.

No residential dwellings would be acquired as part of the project. However, acquisition of some small parts of vacant residential land is required. No commercial buildings would be acquired, however, some businesses along Westwood Drive would be affected by property acquisition. This would be concentrated along the western side of Westwood Drive and affect land owned by businesses such as a petrol station, warehouses, a pool store and a truck driver education centre. Land is also required from the Calder Park Motor Sports Complex (situated on the western side of Calder Park Drive) and vacant industrial land (situated on the eastern side of Calder Park Drive).

North-south connectivity in the Study area would be substantially improved for motorists, cyclists and pedestrians when the Kororoit Creek Bridge is developed. Pedestrian safety would be increased when existing roundabouts are replaced with signalised crossing points, encouraging east-west and north-south pedestrian movements. These changes would increase access and mobility for residents of the study area. The use of open courts and other less informal opportunities for east west pedestrian and cyclist movements across the corridor would become impractical over time as traffic volumes increase or when the road is widened.

Taking into account the proposed management measures for social, land use and infrastructure values, the Project has been rated "Well" in relation to the evaluation objective '*To minimise adverse social and land use effects, including impacts on existing infrastructure'*.

17.4 Visual and Landscape Values

The Project would not impact significantly upon the Organ Pipes National Park or on the key visitor destinations in the park including the Visitors Centre, Organ Pipes, Rosette Rock and Tessellated Pavement. Potential effects would be managed through mitigation measures such as retention of remnant vegetation, planting adjacent to the Organ Pipes National Park, the use of planting to screen the interchange and other elements of the road.

The proposed bridge over Kororoit Creek and associated road infrastructure would impact on the Kororoit Creek valley and visual amenity, through the introduction of built infrastructure into a valley with natural and heritage values. These impacts can be mitigated somewhat by providing maximum open, light spaces beneath the bridge structures and planting indigenous vegetation on the embankments. The Drover's Hut would be impacted as part of the Kororoit Creek works. Possible mitigation measures include the relocation of the Drover's Hut remains, their removal, or being buried under the future road reserve. Minor acquisition of the Banchory Grove Nature Conservation Reserve is proposed and the Ravenhall Magazine and Storage Facility will be impacted. Mitigation measures include the reconstruction of the drystone wall as a paving band along the original alignment where possible. Crushed rock will be used to fill gaps within the road reserve to the Banchory Grove Nature Conservation Reserve boundary to prevent weed infestations of the grassland.

The provision of off-road shared paths in both directions and the connections to most of the existing shared path networks would be a significant landscape benefit of the Project. The design of bridge structures would integrate with the existing road and landform where practicable and appropriate surface treatments would be considered.

Taking into account the proposed management measures for visual and landscape values, the Project has been rated "Well" in relation to the evaluation objective '*To avoid adverse effects on the landscape and recreational values of the Organ Pipes National Park and minimise visual effects on open space areas'*.

17.5 Biodiversity and Habitat

The upgrade of the Palmers Road Corridor is not expected to have a significant impact on listed flora or fauna species listed under the FFG and EPBC Acts. The project would require minimal removal of native vegetation. Assuming all vegetation within the Functional Design Footprint is removed, a general offset of 2.425 Biodiversity Equivalence Units is required to compensate for removal of 2.64 habitat hectares of native vegetation and two scattered trees.

The Project has the potential to impact on ecological values within the Project Area, such as through the loss of vegetation/ habitats, habitat fragmentation and edge effects, noise and dust pollution, increases in fauna mortality and aquatic disturbance. Impacts have been avoided and minimised on native vegetation, listed flora and fauna species and ecological communities throughout the planning and design process. The Project will be managed in accordance with a Contractor Environmental Management Plan (CEMP). Given that the Project Area has been relatively disturbed and that mitigation measures and offset requirements would be implemented, adverse impacts would be limited.

Taking into account the proposed management measures for biodiversity and habitat values, the Project has been rated "Well" in relation to the evaluation objective *'To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, and address opportunities for offsetting potential losses consistent with relevant policy'*.

17.6 Catchment Values

Potential impacts to surface water and catchment values, identified during construction and operation of the Palmers Road Corridor include activities that affect the function and quality of waterways and flood plains, such as increased flood levels at waterway crossings and reduced water quality due to contaminants entering the waterway. These potential impacts would be managed under a CEMP.

Waterway crossings would be designed in accordance with Melbourne Water requirements (channel profile, floodplain and revegetation) and construction would be undertaken in accordance with VicRoads Environmental Risk Management Guidelines (2012) and the State Environment Protection Policy (Waters of Victoria) requirements for receiving waterways. To further protect waterways and floodplain function appropriate design standards including Water Sensitive Road Design measures would be implemented.

Taking into account the proposed management measures for catchment values, the Project has been rated "Neutral" in relation to the evaluation objective '*To maintain the functions and values of surface water and floodplain environments'*.

17.7 Cultural Heritage

There are no heritage overlays directly affecting the Project Area and no heritage places of State cultural significance (VHR listed places) within the Project Area. There are three sites listed on the Victorian Heritage Inventory within the Project Area. One of the sites no longer seems to exist (H7822-0188 CS-H4 Cobbled Road). Mitigation or management measures have been proposed for the Ravenhall 2 Magazine and Storage Facility (H7822-0174) Robinsons Road, Ravenhall and the Drover's Hut (H7822-0160) north of Kororoit Creek.

The Project Area includes several large areas of Aboriginal cultural heritage sensitivity. Most of the known cultural heritage is in association with waterways. The project cannot avoid impacts to Aboriginal cultural heritage due to the nature of road and bridge construction. Where harm cannot be avoided specific measures will be required. These measures are being developed through the cultural heritage management plan process in consultation with the Wurundjeri registered Aboriginal party for the section north of the Melbourne-Bendigo rail line crossing and the Office of Aboriginal Affairs Victoria and appropriate Traditional Owners for the remainder of the Project Area.

Taking into account the proposed management measures for cultural heritage values, the Project has been rated "Neutral" in relation to the evaluation objective "*To avoid or minimise effects on Aboriginal and historic cultural heritage values'*.

17.8 Environmental Management Framework

The EMF for the Project outlines the process and procedures proposed for managing the environment during design, construction and operation.

VicRoads would develop a Project Environment Protection Strategy (PEPS) and contract specification(s) which would incorporate environmental management measures as described in the EMF chapter of the EES report and other requirements identified through the Minister's Assessment and conditions of subsequent

approvals. The management measures included in the EMF have primarily arisen from the technical studies carried out for the EES, relevant best practice guidelines and discussion with regulatory authorities.

These documents would inform the detailed design and construction of the Project, including the development of the Contractor(s) Environmental Management Plan (EMP). The implementation of VicRoads procedures would ensure that construction activities undertaken would be consistent with the EMP.

17.9 Integrated and Sustainable Transport

The Project directly supports and delivers, a key feature of planning policies including the Melton East Strategy Plan (GHD, 1997), which underpins the layout and development of the land in and around the Palmers Road Corridor. The project considers and addresses the objectives and decision making principles in the Transport Integration Act 2010.

The Project would deliver a safe and efficient arterial road that would improve connectivity through the west of Melbourne. The improved connectivity would benefit residents and businesses alike, attracting investment and improving the safety and amenity of activity centres.

On the basis of integrated and sustainable transport, the project has been rated “Well” in relation to the evaluation objective ‘*Overall, to demonstrate that the project would achieve a balance of economic, social and environmental outcomes that contribute to ecologically sustainable development and provide a net community benefit over the short and long-term’*.

17.10 Summary

A significant amount of residential, industrial and commercial development has occurred in Melbourne’s west in recent years. The implementation of a six-lane divided arterial road (i.e. three-lanes in each direction) along the Palmers Road Corridor is an integral part of transport planning in the western growth corridor, to enable the development of a connected and efficient community. The future upgrade of the Palmers Road Corridor would improve accessibility and mobility within and beyond the Cities of Brimbank and Melton with limited impact on private properties and amenity.

The potential amenity and environmental quality, social, landscape and visual, biodiversity and cultural heritage effects of the proposed road development would be appropriately managed through design measures and implementation of the EMF for the Project.

Overall, the Palmers Road Corridor was rated as “Well” by specialist consultants, having good policy compliance and minor adverse effects.

GLOSSARY

Term	Definition
Aboriginal Cultural Heritage	Aboriginal places, Aboriginal objects and Aboriginal human remains.
Activity area	Under the Aboriginal Heritage Regulations 2007, an 'activity area' means the area or areas to be used or developed for an activity. Refer to Section 14.2.2 for a definition of the activity area relevant to this Project.
Afflux	The rise in water level on the upstream side of an obstruction caused when the effective waterway flow area is reduced by an obstruction.
Ambient Noise	The all-encompassing noise associated within a given environment. It is the composite of sounds from many sources, both near and far.
Archaeological site	A collection of tools, bones etc. together in a small area that are the product of human activities.
Archaeology	The methodological process by which archaeologists collect information about the location, distribution and organisation of past human cultures across an area of land.
Artefact	Any moveable object that has been utilised, modified or manufactured by humans.
Artefact scatter	A surface scatter of cultural material. Aboriginal artefact scatters are defined as being the occurrence of five or more items of cultural material within an area of 100 sq. metres (AAV 1993:1j). Artefact scatters are often the only physical remains of places where people have lived, camped, prepared and eaten meals and worked.
Average Recurrence Interval (ARI)	The average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. It is implicit in this definition that the periods between exceedances are generally random.
At grade crossing	A crossing of a rail line and roadway at one level, without an overpass or underpass.
Australian Heritage Places Inventory	Online database that contains summary information about places listed in State, Territory and Commonwealth Heritage Registers.
AustRoads Guidelines	A standard set of guidelines for all aspects of road design in Australia and New Zealand including planning, design, construction, operation, maintenance, and for arranging research and testing.
Background noise	The underlying level of noise present in the ambient noise, measures in the absence of the noise under investigation, when extraneous noise is removed.
Best practice	The combination of techniques, methods, processes or technology used in an industry sector or activity that demonstrably minimises the environmental impact of that industry sector or activity.
Biodiversity	The variety of all life forms – the different plants, animals and micro-organisms, the genes they contain and the ecosystems of which they form a part.
Biodiversity Assessment Guidelines	A set of guidelines established by the Victorian Department of Environment and Primary Industries (DEPI) to direct how impacts on biodiversity should be considered when assessing an application for a permit to remove, lop or destroy native vegetation.
Bioregion	A geographical area defined by ecological criteria. The bioregions and sub-regions are the reporting unit for assessing the status of native ecosystems, their protection in the national reserve system and for use in monitoring and evaluation framework in the Federal Government's current Natural Resource Management initiatives.
Catchment	An area of land where run-off from rainfall goes into one river system.

Term	Definition
Chainage	The linear distance as measured from a known starting point.
Clear zones	An area which is kept clear of hazards (or within which unmovable hazards are shielded). A clear zone is within a recovery area beside a traffic lane required for run-off-road vehicles to stop safely or be brought under control.
Complex assessment	A complex assessment undertaken as part of a Cultural Heritage Management Plan means an evaluation of an activity area by means of subsurface testing and excavation with a view to identifying and recording buried Aboriginal cultural heritage.
Construction area	The area defined for the Project that will be directly impacted by construction activities.
Contaminants	Substances that, when present in the environment, have the potential to cause adverse biological effects.
Contaminated land/site	Contamination of land as a result of current or historical activities that have taken place at a site, or adjacent to it including: industry, mining, agriculture, the storage of chemicals, gas, wastes or liquid fuel, or contamination from surrounding landfill using contaminated soil.
Contrast	The degree to which the Project or a component of the Project differs visually from its landscape backdrop.
Critically endangered species	A threatened native species listed in the EPBC Act is critically endangered if it is facing an extremely high risk of extinction in the wild in the immediate future.
Crown Land	Land that is vested in the Crown and dedicated for public use.
Cultural Significance	Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present of future generations (Australia ICOMOS Burra Charter Article 1.2.).
dB	Unit used to measure sound level.
dB(A)	Unit used to measure ‘A-weighted’ sound pressure levels.
Ecological communities	Any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationship and relatively independent of other groups. Ecological communities may vary in size, and larger ones may contain smaller ones. In the Environment Protection and Biodiversity Conservation Act 1999 they are defined as assemblages of native species that inhabit particular areas in nature.
Ecological Vegetation Classes	One or a number of floristic communities or associations confined to a particular ecological setting (e.g. soil type, topography or climate zones) as defined in Victoria’s Native Vegetation Management: A Framework for Action.
Ecology	Study of organisms’ relations to one another and their surroundings.
Ecosystem	A dynamic complex of plant, animal, fungal, and micro-organism communities and the associated non-living environment interacting as an ecological unity.
Environment	For the purpose of the EES, environment incorporates physical, biological, cultural, economic and social aspects.
Environment Effects Statement	A report prepared in accordance with the requirements of the Environment Effects Act 1978 investigating the potential environmental, social and economic effects of a proposal.
Fauna	The assemblage of animal species within a defined collection or area.
Floodplain	Lands subject to overflow during flood events. Often valuable for their ecological assets.
Flora	The assemblage of plant species within a defined collection or area.

Term	Definition
FFG-listed species	Any flora and fauna species on the Flora and Fauna Guarantee (FFG) Act 1988 listing of taxa and communities of flora and fauna which are threatened or potentially threatened.
Freehold land	Privately owned land.
Geology	General term referring to all geological materials including surficial geology and consolidated rock. Includes the composition, age and origin of mineral and non-mineral components and their structural characteristics.
Gradeline	A longitudinal reference line or slope to which a highway is built.
Groundwater	All subsurface water, generally occupying the pores and crevices of rock and soil.
Habitat	Specific place where plants or animals live or could live.
HEC-RAS	A hydraulic analysis program developed by the United States Department of Defence, used in the modelling the hydraulic effects of one-dimensional flow through a series of defined cross sections
Heritage	Things, places, practices that make up Australia's identity and should be preserved for prosperity.
Heritage Place	Aesthetic, historic, scientific or social value for past, present or future generations.
Hydrology	The science dealing with surface waters and groundwaters of the Earth; their occurrence, circulation and distribution; their chemical and physical properties; and their reaction with the environment.
Indigenous	Existing, growing, or produced naturally in a region.
Landscape Character	The distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people.
Intermittent noise	The level suddenly drops to that of the background noise several times during the period of observation.
Landscape Character Types	Distinct types of landscape that are relatively homogeneous in a character….generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur they share broadly similar combination of geology, topography, drainage patters, vegetation and historical land use and settlement pattern.
Landscape Condition	Based upon judgements about the physical state of the landscape in terms of intactness, from visual, function, and ecological perspectives. It also reflects the state of repair of individual features and elements which make up the character in any one place.
Landscape Integration	Refers to the extent to which the proposed development or component of the proposed development can be blended into the existing landscape.
Landscape Sensitivity	Related to landscape character and how vulnerable this is to change. Landscapes which are highly sensitive are at risk of having their key characteristics fundamentally altered, leading to a different landscape character.
Land Severance	Where land is divided into two or more parts that are no longer connected.
Landscape Value	The relative value or importance attached to a landscape (often as a basis for designation or recognition), which expresses national or local consensus, because of its quality, special features including 'perceptual aspects such as scenic beauty, tranquility, cultural associations etc.
LA10	Noise level which is exceeded for 10 per cent of the sample period. It is a common noise descriptor for environmental noise and road traffic noise.
LA10 (18hr)	Noise level which is exceeded for 10 per cent of the 18 hr sample period.
LA10 (12hr)	Noise level which is exceed for 10 per cent of the 12 hr sample period.
LAN	Statistical sound measurement recorded on the 'A' weighted scale.

Term	Definition
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10 (Time)	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90 (Time)	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
Leq	The 'equivalent noise level' is the summation of noise events and integrated over a selected period of time.
Lmax	The maximum sound pressure level measured over a given period.
Lmin	The minimum sound pressure level measured over a given period.
Lot	A land allotment as defined by a title or the State cadastre.
Mitigation	Measures, including any process, activity or design to avoid, reduce, remedy or compensate for adverse landscape and visual effects of a development.
Native Vegetation	Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses.
Overlay	An overlay is a planning provision, but one which is in addition to the zone provision. Overlays ensure that important aspects of the land are recognised (such as areas of significant vegetation or special heritage significance). Overlays indicate the type of development and/or protection that may be appropriate in that area. When land has more than one important aspect, multiple overlays can be applied.
Previously recorded site	Aboriginal cultural heritage site located as part of previous unrelated fieldwork.
Project Area	The Project Area is defined as the area within which physical changes are planned to occur. For the Palmers Road Corridor Project, this comprises Robinsons Road, Westwood Drive and Calder Park Drive between the Western Freeway (Deer Park Bypass) and Calder Freeway.
Planning Scheme	A statutory document for each local government area that sets our policies and provisions for use, development and protection of the land. The relevant Planning Scheme for this EES is the Mitchell Planning Scheme.
Property	An allotment or group of allotments in a single landownership.
Public Land acquisition	Acquiring privately held land for a public purpose by a public authority through the provisions of the Land Acquisition and Compensation Act 1986.
Road reserve	All the area of land that is within the boundaries of the road.
Remnant vegetation	Vegetation remaining after an area has been cleared.
Reserve	Land set aside for a special purpose under the Crown Land (Reserves) Act 1978, i.e. recreation reserve, nature reserve etc.
Risk assessment	The chance of something happening that will have an impact; measured in terms of consequences and likelihood.
Sensitive Receptor Category A (noise)	VicRoads policy defines Category A sensitive receptors as residential dwellings, aged person homes, hospitals, motels, caravan parks and other buildings of a residential nature. The noise level objective is 63 dB(A) L10 (12hr), and this is measured between 6 am and midnight.
Sensitive Receptor Category B (noise)	VicRoads policy defines Category B sensitive receptors as schools, kindergartens, libraries and other noise sensitive community buildings. The noise level objective is 63 dB(A) L10 (12hr), and this is measured between 6 am and 6 pm.
Severance	Where land is divided into two or more parts that are no longer connected.
Spoil	Dirt or rock removed from its original location and destroying the composition of the soil in the process.

Term	Definition
Standard assessment	A standard assessment undertaken as part of a Cultural Heritage Management Plan is an evaluation of an activity area by means of a survey with a view to identifying and recording Aboriginal cultural heritage and/or determining the probability that buried Aboriginal cultural heritage may be present.
Study Area	The area used for a specialist assessment. This may be different to the Project Area for some studies e.g. the Visual Assessment looks at an area defined by topographic features. The study area for each assessment is defined in each report.
Surface waters	All waters whose surface is naturally exposed to the atmosphere, for example, rivers, lakes, reservoirs, streams, seas, estuaries.
Swale	A swale is a type of drain, usually a broad, shallow earthen channel with vegetation covering the side slopes and base, designed to manage water runoff, filter pollutants, and increase rainwater infiltration. Swales are used instead of conventional piped systems, as an effective stormwater treatment technique for long lengths of road as they require minimal maintenance, enhance biological diversity and habitat, as well as improve visual aesthetics.
Threatened ecological communities	The EPBC Act lists threatened ecological communities as: critically endangered; endangered; or vulnerable.
Threatened species	Any species that is likely to become an endangered species within the foreseeable future, throughout all or a significant part of its range. A species of wildlife or plants listed as 'threatened' in a specific Act (in this EES, the EPBC Act and/or the FFG Act).
Total Suspended Solids	Total suspended particles; or all particles that are suspended in the atmosphere at a particular time. In practice this will refer to particles up to 30 µm, but may include particles up to 50 µm in aerodynamic diameter under extreme (higher wind speed) conditions.
Victorian Heritage Register	A comprehensive listing of Victoria's most significant historic places, objects and shipwrecks.
Visual amenity	The composite of basic terrain, geological features, hydrological features, vegetation patterns, and land use effects that typify a land unit and influence the visual appeal that the unit may have for visitors.
Water quality	A description of the condition of water in the context of one or more beneficial uses. Usually described in terms of water quality indicators (such as pH, temperature and concentrations of nutrients or contaminants).
Waterway	A general term for any stream, river or watercourse, either flowing or dry. Also includes artificial cuts, canals and channels.
Zone	A zone is a planning provision. Zones reflect the primary character of land (such as residential, industrial or rural), and indicates the type of use and development that may be appropriate in that zone.

ABBREVIATIONS

Abbreviation	Expanded Term
AAV	Aboriginal Affairs Victoria (now OAAV)
AH Act	Aboriginal Heritage Act 2006
AQST	Air Quality Screening Tool
AQM	Air Quality Management
BEU	Biodiversity Equivalence Units
CALP Act	Catchment and Land Protection Act 1984
CEMP	Contractor Environmental Management Plan
CFA	Country Fire Association
CHMP	Cultural Heritage Management Plan
CMA	Catchment Management Authority
dB	Decibel
dB(A)	Unit of Measurement for Sound Pressure Level
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Environment and Primary Industries
DDO	Design and Development Overlay
DoT	Department of Transport
DPC	Department of Premier and Cabinet
DPCD	Department of Planning and Community Development
DPI	Department of Primary Industries
DSDBI	Department of State Development, Business and Innovation
DSE	Department of Sustainability and Environment
DTPLI	Department of Transport, Planning and Local Infrastructure
EE Act	Environment Effects Act 1978
EES	Environment Effects Statement
EMF	Environmental Management Framework
EMO	Environmental Management Overlay
EMP	Environmental Management Plan
EMS	Environmental Management Strategy
EPA	Environment Protection Authority
EP Act	Environmental Protection Act 1994
EPBC	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ESD	Ecologically Sustainable Development

Abbreviation	Expanded Term
ESO	Environment Significance Overlay
EVC	Ecological Vegetation Class
FFG Act	Flora and Fauna Guarantee Act 1988
GAA	Growth Areas Authority (now GAA)
GCP	Growth Corridor Plans (2012)
GVW	Goulburn Valley Water
ha	Hectares
HI	Heritage Inventory
HO	Heritage Overlay
HV	Heritage Victoria
IRC	Index of River Condition
km	Kilometres
km/h	Kilometres per hour
LGA	Local Government Area
LPPF	Local Planning Policy Framework
LSIO	Land Subject to Inundation Overlay
m	Metres
m2	Square metres
MESP	Melton East Strategy Plan
MNES	Matters of National Environmental Significance
MPA	Metropolitan Planning Authority (formerly GAA)
MSS	Municipal Strategic Statement
NCR	Nature Conservation Reserve
NES	National Environmental Significance as defined by the Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
NGIS	National Groundwater Information System
NTGVVP	Natural Temperate Grasslands of the Victorian Volcanic Plains
OBEM	Objectives Based Evaluation Matrix
OD	Origin Destination
OMR	Outer Metropolitan Ring Road proposed in west of Melbourne
PAO	Public Acquisition Overlay
PCRZ	Public Conservation and Resource Zone
PEPS	Project Environment Protection Strategy
PM10	Particular Matter up to 10 micrometres in size
PPTN	Principal Public Transport Network
PPWCMA	Port Phillip and Westernport Catchment Management Authority

Abbreviation	Expanded Term
Project	Palmers Road Corridor (Western Freeway to Calder Freeway) Project
PSA	Planning Scheme Amendment
PTV	Public Transport Victoria
P&E Act	Planning and Environment Act 1987
RAP	Registered Aboriginal Party
ROW	Right Of Way
SEPP	State Environment Protection Policy
SES	State Emergency Service
DSEWPaC	former Commonwealth Department of Sustainability, Environment, Water, Population and Communities (now Commonwealth Department of the Environment)
RDV	Department of Regional Development Victoria
SBO	Special Building Overlay
SEPP	State Environmental Protection Policies
SIA	Social Impact Assessment
SLO	Significant Landscape Overlay
SPPF	State Planning Policy Framework
SuMS	Surveillance and Management System
TMP	Traffic Management Plan
TRG	Technical Reference Group
UFZ	Urban Floodway Zone
VAHR	Victorian Aboriginal Heritage Register
VBA	Victorian Biodiversity Atlas (DSE 2011)
VCR	Volume-Capacity Ratio
VHI	Victorian Heritage Inventory
VHR	Victorian Heritage Register
VITM	Victorian Integrated Transport Model
vpd	Vehicles Per Day
VPO	Vegetation Protection Overlay
WSRD	Water Sensitive Road Design
WoV	Waters of Victoria

REFERENCES

Reference List

AECOM (2013a) Palmers Road Corridor (Western Freeway to Calder Freeway) Preliminary Assessment of Alternatives and Draft Study Program.

AECOM (2015b) Palmers Road Corridor Western Freeway to Calder Freeway Transport Modelling Report.

AECOM (2015c) Palmers Road Corridor EES Access Management (Western Freeway to Calder Freeway).

AECOM (2015d) Palmers Road Corridor EES Western Freeway to Calder Freeway Traffic Noise Assessment.

AECOM (2014e) Palmers Road Corridor (Western Freeway to Calder Freeway) EES and PSAs Social Impact Assessment.

AECOM (2014f) Palmers Road Corridor (Western Freeway to Calder Freeway) EES and PSAs Land Use Planning Report.

AECOM (2013g) Palmers Road Corridor Environment Effects Statement (EES) (Western Freeway to Calder Freeway) Surface Water Desktop Assessment.

Australian Bureau of Statistics (2008) 3218.0 Regional Population Growth, Australia.

Australian Bureau of Statistics (2011) Census of Population and Housing.

Austroads (2014) Guide to Traffic Management Part 5: Road Management.

City of Brimbank (2007) Brimbank Integrated Transport Strategy.

Commonwealth Scientific and Industrial Research Organisation (1999) Urban Stormwater: Best Practice Environmental Management Guidelines.

Department of Environment and Primary Industries (2011) Victorian Biodiversity Atlas.

Department of Environment and Primary Industries (2013a) Biodiversity Conservation Strategy for Melbourne's Growth Corridors.

Department of Environment and Primary Industries (2013b) Biodiversity Interactive Maps.

Department of Environment and Primary Industries (2013c) Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines.

Department of Infrastructure (2001) Outer Western Suburbs Transport Study.

Department of Natural Resources and Environment (2002) Victoria's Native Vegetation Management: A Framework for Action.

Department of Population and Community Development (2007) The Environmental Effects Advisory Note: Aboriginal cultural heritage and the environment effects process.

Department of Sustainability, Environment, Water, Population and Communities (2012) Environmental Offsets Policy.

Department of Sustainability, Environment, Water, Population and Communities (2013) Protected Matters.

Department of Sustainability and Environment (2004) Vegetation Quality Assessment Manual.

Department of Sustainability and Environment (2005) Advisory List of Rare or Threatened Plants in Victoria.

Department of Sustainability and Environment (2006) Ministerial guidelines for assessment of environment effects under the Environment Effects Act 1978 (Seventh edition).

Department of Sustainability and Environment (2006) Growth Area Framework Plans.

Department of Sustainability and Environment (2009) Advisory list of Environmental weeds of Inland Plains Bioregions of Victoria.

Reference List

Department of Sustainability and Environment (2011) Victorian Biodiversity Atlas. Sourced from: 'VBA_FAUNA25' and 'VBA_FAUNA100'.

Dr Vincent Clark & Associates (2014a) Palmers Road Corridor (Western Freeway to Calder Freeway), Desktop, Standard and Complex Assessment Report, Draft Cultural Heritage Management Plan Number 12662, VicRoads sponsor.

Dr Vincent Clark & Associates (2014b) Palmers Road Corridor (Western Freeway to Calder Freeway) Historic Archaeology and Cultural Heritage, Heritage Victoria Project Number: 4334, VicRoads Sponsor.

Ecology Partners (2007) Palmers Road Corridor and Calder Park Interchange: Flora and Fauna Assessment, and Net Gain Analysis, West Melbourne, Victoria.

Ecology Partners (2009) Palmers Road Corridor and Calder Park Interchange: Flora and Fauna Assessment, and Net Gain Analysis, West Melbourne, Victoria.

Ecology Partners (2010) Palmers Road Corridor and Calder Park Interchange: Targeted Flora Survey.

Ecology Partners (2011) Palmers Road Corridor Upgrade: Conservation Management Plan for Matters of National Ecological Significance.

Ecology and Heritage Partners (2014) Flora and Fauna Assessment and Biodiversity Offset Analysis Palmers Road Corridor Western Freeway to Calder Freeway.

Environment Protection Authority (1991) Construction Techniques for Sediment Pollution Control.

Environment Protection Authority (1992) Bunding Guidelines Publication 347-1992.

Environment Protection Authority (1996a) Environmental Guidelines for Major Construction Sites, Publication 480-1996.

Environment Protection Authority) (1996b) Doing it Right on Subdivisions Publication 960-1996.

Environment Protection Authority (2001) State Environment Protection Policy (Air Quality Management).

Environment Protection Authority (2003) State Environment Protection Policy (Waters of Victoria).

Environment Protection Authority (2008) Noise Control Guidelines, Publication 1254-2008.

Environment Protection Authority (2010) Industrial Waste Resource Guidelines – Waste Categorisation (Publication 1 WRG 60002).

GHD (1997) Melton East Strategy Plan.

Green Heritage Compliance and Research Pty Ltd (2014) Permit Report VAHR 7822-1130 Westwood Drive Road and Bridge Cultural Heritage Permit: 13/007556.

Growth Areas Authority (2013) Precinct Structure Planning Guidelines.

Growth Areas Authority & Victorian Government (2012) Managing Melbourne's Growth.

Heritage Victoria (2012) Guidelines for Conducting Archaeological Surveys.

International Organization for Standardisation (2004) ISO1400.1 2004 Environmental Management Systems.

Lead West, Western Transport Alliance, AECOM (2012) Western Melbourne Transport Strategy.

Melbourne Water (2004a) Index of River Condition – Lower Kororoit Creek.

Melbourne Water (2004b) Index of River Condition – Taylors Creek.

Melbourne Water (2013) Draft Healthy Waterway Strategy.

Spiire (2014) Palmers Road Corridor Western Freeway to Calder Freeway EES Landscape and Visual Impact Assessment.

Standards Australia (1981) Australian Standard 2436-1981: Guide to Noise Control on Construction, Maintenance and Demolition Sites.

Reference List

Standards Australia (1984) Australian Standard 2702-1984: Acoustics-Methods for the Measurement of Road Traffic Noise.

Standards Australia (2009) Australian Standard 4970-2009: Protection of Trees on Development Sites.

VicRoads (1999) Traffic Engineering Manual Volume 1 – Traffic Management.

VicRoads (2005) Traffic Noise Reduction Policy.

VicRoads (2007) Technical Noise Guidelines – Construction and Maintenance Works.

VicRoads (2007) Water Sensitive Road Design Guidelines (within Integrated Water Management Guidelines).

VicRoads (2011) SmartRoads: Connecting Communities.

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

VicRoads (2013) Air Quality Assessments –Palmers Road Corridor (Western Freeway, Ravenhall to Calder Freeway, Calder Park) Memorandum.

VicRoads (2013) Draft Consultation Plan Palmers Road Corridor – Western Freeway to Calder Freeway.

VicRoads (2013) Integrated Water Management Guidelines.

Victorian Government (2013) Victoria – The Freight State.

Victorian Government (2013) Victoria's Road Safety Strategy 2013-2022.

Victorian Government (2014) Plan Melbourne.

Victorian Government (2014) Victoria in Future – Population and Housing Projections to 2051.

Victorian Government (2014) Victoria's Road Safety Strategy – Safe Roads for all Victorians 2013-2022.

Viridans (2011) Flora Information System. Viridians Biological Databases.

Viridans (2013) Atlas of Victorian Wildlife. Viridians Biological Databases.

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