Western Outer Ring Main (WORM)

Project Description

FINAL REPORT

Prepared for APA

14 October 2019

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- Client: Jim Fjeldsoe, Ben Schneider, Michelle White
- Sub consultants: Alluvium, Golder Associates

Biosis staff involved in this project were:

- Sally Mitchell (mapping)
- Dave Kazemi (mapping)

Contents

Figures

1 Introduction

1.1 Background

Biosis Pty Ltd (Biosis) was commissioned by APA (Proponent) to coordinate environmental services to support the approvals process for the Western Outer Ring Main (WORM) project (Project). Stage 1 of the services includes the preparation of desktop assessment reports to support referrals under the *Environment Effects Act 1978* (Vic) (EE Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

This report contains a description of the Project and was used as the baseline for desktop assessment reports and referrals. Specifically, this report outlines the Project rationale, location (including the broader Study Area and the preliminary alignment), construction and operational components of the Project and decommissioning activities.

1.2 Project overview

The Project is a proposed 500 millimetre diameter high pressure gas transmission pipeline between APA's existing Plumpton Regulating Station (approx. 38 kilometres north west of Melbourne's CBD) and Wollert (approx. 26 kilometres north east of Melbourne's CBD), which will provide an additional connection between the eastern and western pipeline networks of the Victorian Transmission System (VTS) (Figure 1).

The pipeline will occupy an easement of nominally 20 metres width and be buried for its entire length to a minimum depth of cover of 1200 millimetres. An additional compressor and a regulating station are also proposed as part of the Project at APA's existing gas compressor station located at 365 Summerhill Road, Wollert.

The pipeline and all the associated facilities will be designed, constructed, commissioned and operated in accordance with Australian Standard AS/NZS 2885 series – Pipelines – Gas and Liquid Petroleum (AS2885) and a Pipeline Licence, which would be required pursuant to the *Pipelines Act 2005* (Vic) (Pipelines Act).

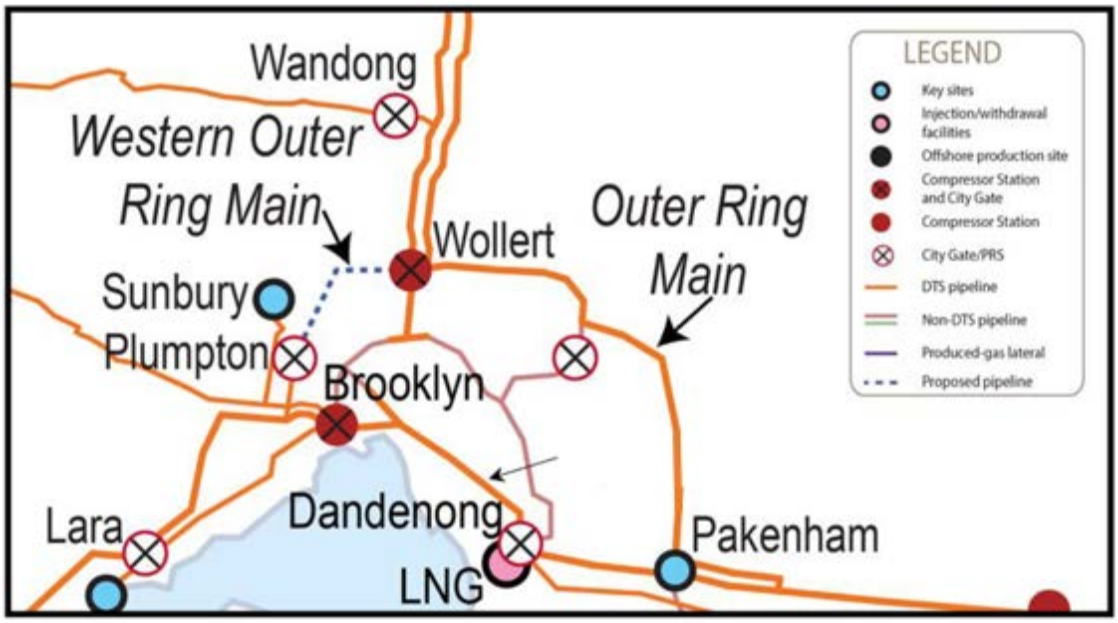


Figure 1 Western Outer Ring Main

2 Project rationale and route selection process

2.1 Project rationale: Addressing capacity constraint

APA is Australia's largest natural gas infrastructure business, owning and/or operating approximately $20 billion of energy assets, with gas transmission pipelines spanning every state and territory in mainland Australia delivering approximately half of the nation's gas usage.

APA currently owns and operates 15,000 kilometres of natural gas transmission pipelines, as well as owning or having interests in gas storage facilities, gas fired power stations and wind/solar farms. In Victoria, the Victorian Transmission System (VTS) is owned and maintained by APA and consists of some 2,267 kilometres of gas pipelines. The VTS serves a total consumption base of approximately 2 million residential consumers and approximately 60,000 industrial and commercial users throughout Victoria. The VTS has three main branches, including:

- The Longford Dandenong Pipeline (LDP) which lies between Dandenong in Melbourne's south east and South Eastern Victoria.
- The Victorian Northern Interconnect (VNI) which lies between Wollert just north of Melbourne and the NSW border.
- The South West Pipeline (SWP) which lies between Brooklyn in Melbourne's west and South Western Victoria.

The LMP and the VNI are linked by the high pressure Outer Ring Main (Pakenham to Wollert Gas Pipeline). This provides the ability to send gas under high pressure between these pipelines. There is no equivalent link between either the VNI and the SWP or the LMP and the SWP. Sending gas between these pipelines involves using the lower pressure Melbourne network, and this limits the amount of gas that can be moved across Victoria in these directions (Figure 2).

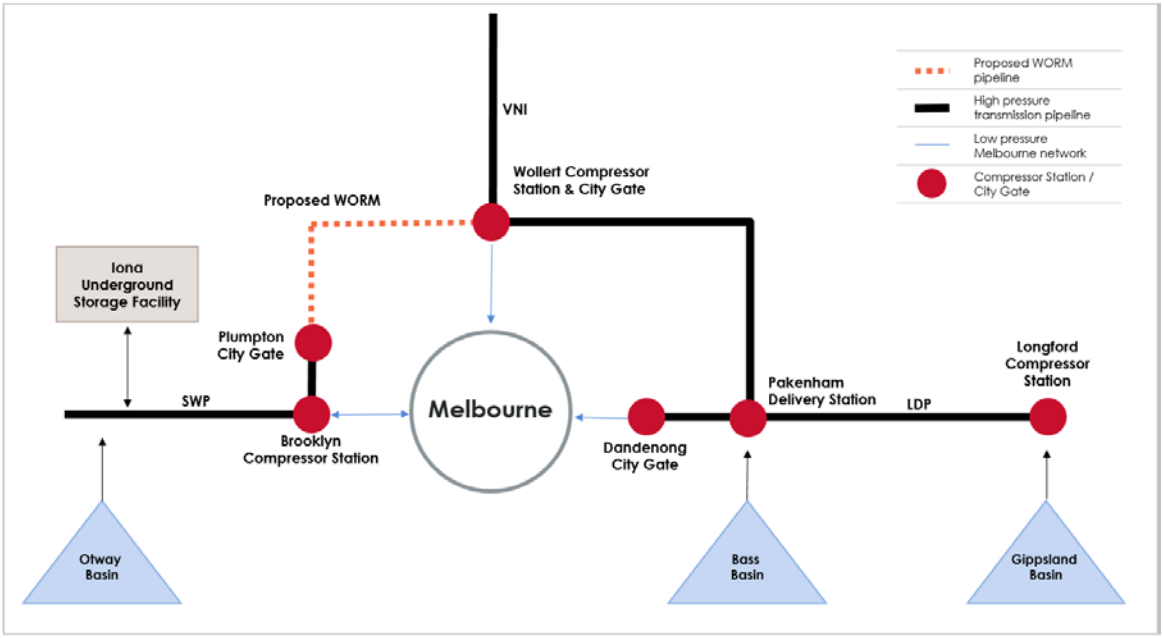


Figure 2 Victorian Transmission System Schematic including the WORM

The Project will deliver significant benefits to the Victorian community by addressing this capacity constraint. The Project will provide a new high pressure link between existing sources of gas supply in the north and east with those in the west of the State. This will provide improved reliability in the network by increasing the amount of gas that can be stored for times of peak demand and ensuring that sufficient volumes of gas can be moved to where it is needed most.

In particular, the Australian Energy Market Regulator (AEMO)[1] has identified that Victoria relies on the Iona Underground Gas Storage (UGS) near Port Campbell to meet winter maximum gas demand. Refilling and withdrawal rates for the Iona UGS are currently limited by capacity on the SWP. The Project will increase the SWP transportation capacity towards Port Campbell (to support Iona UGS refilling) and towards Melbourne to support peak day demand. The Project will therefore play a key role in helping to avoid gas supply shortages that had otherwise been forecast by AEMO from winter 2021.

The Project will also result in a number of other benefits, including:

- Improved system resilience and security of gas supply in the event of planned or unplanned outages at one of the main gas processing facilities.
- Increased capacity to supply existing and potential new gas fired peaking power generation demand for which is increasing as Victoria's reliance on renewable generation sources increases.
- Increased storage capacity within the pipeline system.
- Provides an opportunity for third party energy retailers to install new offtakes from the proposed pipeline, at a later date, for future provision of gas supply for residential and employment growth areas along the route, including Sunbury South, Mickleham and Kalkallo. The establishment of new offtakes would not be undertaken by APA and is not within the scope of the proposed works for the Project.

The Project will help ensure that all Victorians can continue to benefit from a reliable gas transmission system that meets the needs of the community both now and into the future.

2.2 Route selection

Route options for the Project have been under consideration since at least 2007, and the subject of discussion with AEMO since 2012. More recently, in late 2018 APA undertook a comprehensive route selection process, assessing the possible alignments through a multi-criteria assessment aligning with the objectives of the Pipelines Act.

Two of the six objectives of the Pipelines Act specifically relate to the minimisation of social and environmental impacts:

- To protect the public from environmental, health and safety risks resulting from the construction and operation of pipelines.
- To ensure that pipelines are constructed and operated in a way that minimises adverse environmental impacts and has regard for the need for sustainable development.

The route selection process is detailed in APA Route Options Report – Western Outer Ring Main Project, March 19 (available on the APA webpage). The process resulted in a preferred option to be investigated in greater detail as part of additional desktop information, continual discussions with landowners and on-ground assessments.

[1] AEMO, Victorian Gas Planning Report Update, 2019.

3 Project description

3.1 Study Area

A Study Area (Figure 9) has been identified within which the Project will occur. The Study Area is wider than the final disturbance footprint that will be required to construct and operate the pipeline as flexibility in the determination of the final disturbance footprint is required. The Study Area is generally described as follows:

- The Study Area commences at the current termination of the Truganina to Plumpton pipeline located just to the north of Taylors Rd, Plumpton, near the Plumpton Pressure Regulating Station.
- The Study Area then follows the existing Sunbury Pipeline easement north to the Calder Freeway.
- The Study Area then generally follows the proposed Outer Metropolitan Ring (OMR) corridor through Diggers Rest, before deviating to the north and crossing Jacksons Creek, Sunbury Road and Deep Creek.
- The Study Area then re-joins the OMR in Oaklands Junction before following it North East through Mickleham, Merrifield and Kalkallo.
- The Study Area crosses the Hume Highway at the existing intersection with Gunns Gully Road before again following the OMR east to the VNI.
- The Study Area then follows the existing VNI easement south to the Wollert compressor station.

3.2 Preliminary pipeline alignment

A preliminary pipeline alignment (PPA) has been selected and used for the purpose of conducting the desktop impact assessment (Figure 9). The PPA sits wholly within the Study Area and includes the Wollert compressor site. The PPA comprises the alignment of the pipeline itself as well as the construction and operational footprints. The PPA has been refined based on landowner consultation and desktop environmental studies completed to date.

The PPA may be subject to further refinement in response to consultation with landowners or during the detailed design phase. Ongoing refinement of the PPA will be undertaken based on a balanced consideration of landowner preference and environmental and other values and will not increase the overall impacts with the project.

3.3 Study Area relationship with existing assessments and approvals

The Study Area and PPA comprises of the following:

- KP 0 – 3.2 is within the approved MSA area (UGB 2010).
- KP 3.2 - 28.2 is outside the approved MSA areas.
- KP 28.2 – 50.7 is within the approved MSA area (UGB 2010).

Land within the Study Area has been subject to a number of assessment and approval processes under the EPBC Act. Specifically, the following processes have been completed:

- An assessment was conducted under Part 10 of the EPBC Act for all land within the 'Melbourne Strategic Assessment area' (MSA area) in 2009. This assessment involved targeted surveys and detailed assessments of the potential impacts of urban development and associated infrastructure on matters of national environmental significance (MNES), resulting in the timestamped dataset. This dataset is currently relied on for many projects within the MSA area.
- A Part 10 EPBC Act approval was granted on 5 September 2013 allowing actions resulting from urban development and infrastructure in parts of the MSA area.
  These are referred to as the 'approved MSA areas' and approximately 25.7 kilometres of the Project traverses these approved MSA areas within (UGB 2010) between KP 0 – 3.2 and KP 28.2 – 50.7. (Refer to Figure 10)
- The VNI pipeline has been previously constructed by APA in the eastern part of the Study area (located between approx. KP 42 – KP 50.7). The VNI project was an activity associated with urban development and subject to the EPBC - Part 10 approval.

While the MSA was initiated under the EPBC Act, an integrated assessment process was conducted where matters of State ecological significance were also assessed.

The timestamped dataset, is used as the basis for assessing decisions under the *Planning and Environment Act 1987* (PE Act). For example, where PSPs have been approved in the MSA area there has been an amendment to clause 52.17 (Native vegetation) so that proponents can rely on approval conditions under the Part 10 EPBC approval.

APA has adopted a consistent approach by relying on the timestamped dataset as the basis for quantifying the extent of the impact of the Project within the approved MSA areas (UGB 2010) – between KP 0 – 3.2 & KP 28.2 – 50.7.

APA in consultation with both DoEE and DELWP departments (MSA and Port Phillip Region team) have been advised that the approval decision made under Part 10 of the EPBC Act can be applied to sections of the Project within the approved MSA areas (UGB 2010).

Figure 10 illustrates the above information.

4 Project components

4.1 Introduction

This section outlines the key construction, operational and decommissioning activities proposed along the PPA and at the compressor site in Wollert. This includes a description of ancillary components of the Project.

4.2 Construction components of the pipeline

The construction footprint is referred to as the construction Right of Way (ROW) and is a temporary construction zone that will accommodate construction plant and equipment, allow vehicle travel along the route as well as temporary storage of trench spoil and topsoil. The width of the construction ROW also ensures that construction activities can be safely performed with minimum risk of accident or injury to construction personnel. The standard width of the construction ROW is 30 metres (Figure 3). (the centreline of the pipeline is generally offset 10 metres from one side of the ROW), plus additional space in certain sections to accommodate horizontal directional drilling (HDD), truck turnarounds and material storage (generally 50 metres x 50 - 150 metres).

It is also noted that for approximately 18 kilometres the PPA is located within two existing APA easements which have been subject to previous disturbance. The need for additional construction ROW beyond the existing easement in these areas will be limited to between 5m and 15m depending on the specific location.

The construction ROW, all temporary facilities, temporary access tracks and extra work areas will be progressively decommissioned and reinstated on completion of the construction phase. Following construction of the pipeline, landowners will be able to resume use of the land.

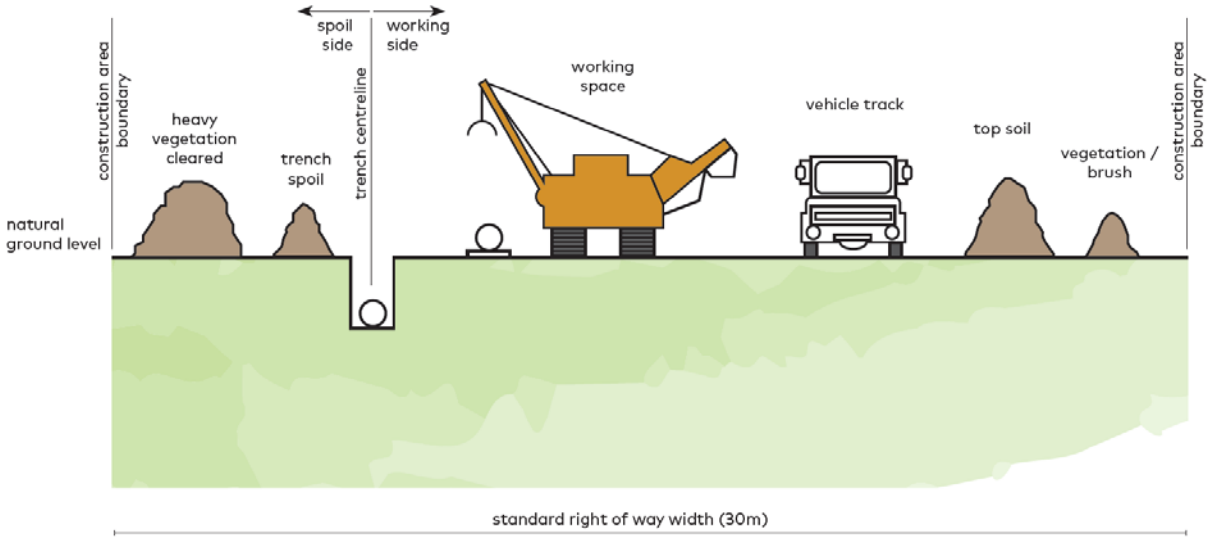


Figure 3 Typical construction ROW

Pipeline construction will comply with all relevant codes and standards, including AS2885 and consider the Australian Pipelines and Gas Association Code of Environmental Practice (APIA, 2013). Construction activities will also be guided by the environmental requirements to be specified in a Construction Environment Management Plan (CEMP) to be prepared in compliance with the Pipelines Act and *Pipeline Regulations 2007* (Vic).

Key pipeline construction activities will include:

- Surveying: Preliminary survey works will be undertaken to mark the extent of the construction footprint. Markers will be placed along the alignment to identify the pipeline centreline, the boundaries of the ROW, any additional work spaces and access roads, if required.
- Site establishment: Preliminary activities will be undertaken to facilitate the construction of the pipeline, including but not limited to establishment of a site depot, proving of existing third party assets, installation of temporary gateways at fence crossings and relocation of any infrastructure within the ROW.
- Clear and grade: Clearing and grading of the ROW is undertaken to provide a safe and efficient area for construction activities. Clearing will be required to remove trees, shrubs and groundcover vegetation. Graders, bulldozers and excavators are generally used to clear and level the ROW.

  Cleared vegetation will be stockpiled on one or both sides of the ROW. Breaks will be left in stockpiled vegetation to allow continued access for stock, fence lines, tracks and drainage lines and continued access for stock.

  Temporary access tracks over watercourses and access points to local roads will be constructed during the clear and grade phase.
- Pipe stringing and bending: Stringing involves distributing pipe segments along the ROW in preparation for welding. Where required, pipe lengths will be bent using a hydraulic bending machine to match changes in either elevation or direction of the alignment.
- Welding: Pipe segments will be welded in strings. All welding is tested to ensure quality. The areas of the weld are cleaned and pipe joints are coated to reduce the possibility of corrosion.
- Trenching: Specialised trenching machines and excavators will be used to excavate the trench to a depth of approximately 2,000 millimetres and approximate width of 800 millimetres. Spoil generated during trench excavation will be stockpiled separate from vegetation and topsoil stockpiled earlier in the construction program.

  Rock breaking processes such as the use of rock saws/hammers and/or blasting may be required to excavate the trench in areas of near surface rock.
- Lowering and Backfilling: The pipe will be lowered into the trench with suitable bedding material. The trench is backfilled with the previously excavated subsoil material. Care is taken to maintain separation between topsoil and subsoil during this process. The subsoils are compacted to limit settlement of the trench through the operational life of the pipeline.
- Horizontal Directional Drilling: HDD will be used in select circumstances to drill beneath waterways and other sensitive features. Drilling is conducted by a specific HDD rig, operated by a specialist contractor. The size of the HDD rig and its associated footprint depends upon the size of the pipe, the nature of the subsurface geology and the length of the section to be drilled.
- Horizontal boring: Boring below sealed bitumen roads will be used to minimise disruption to traffic movements and prevent any reduction in road surface integrity.

Horizontal boring involves excavation of pits either side of the obstacle. The boring machine is located within the entry pit, which uses a hydraulic ram to jack the pipe section, behind a cutting head, in a straight line through the ground to the receiving pit.

Testing and commissioning: The pipeline will be pressure tested (in accordance with AS2885) prior to commissioning to ensure that the pipeline passes strength and leak tests. This is done through a process called hydrostatic testing whereby sections of the pipeline (test sections) are filled with water and then pressurised. The pipeline will be commissioned following completion of hydrostatic testing.

- Rehabilitation: Rehabilitation of the construction footprint will be undertaken in accordance with the APGA Code of Environmental Practice and good pipeline construction principles with view to returning land to its previous use within a reasonable timeframes. Key activities will include:
  - Re-establishing topsoil cover.
  - Reinstating roadways and road reserves in accordance with the requirements of local councils.
  - Reinstating natural drainage patterns.
  - Application of seed, where appropriate.
  - Installing any erosion control measures in prone areas.
  - Reinstating waterways to meeting Catchment Management Authority requirements.

Figure 4 summarises the pipeline construction sequence described above.

1. Clear and Grade
2. Pipe Stringing
3. Pipe bending
4. Welding of pipe joints

5. Trench excavation
6. Lowering pipe into trench
7. Type of backfilling
8. Rehabilitation of ROW

Figure 4 Pipeline construction phase sequence

4.3 Aboveground facilities

The Project will require the construction of aboveground facilities to support the operation of the pipeline, including:

- End of line scraper station.
- Mainline valves.
- Cathodic protection.
- Pipeline marker signs.

The aboveground facilities are discussed in greater detail below.

4.3.1 End of line scraper station

The routine operation of gas pipelines require the periodic running of a pipeline inspection gauge (pig) to clean or inspect the internal wall surface. Scraper stations are required to launch and receive pigs under pipeline pressure. The pig is loaded into an unpressurised launcher vessel at the scraper station. The launcher vessel is closed and pressurised to equal the pipeline pressure. The pig is then sent down the pipeline using the flowing gas as the driving force. The pig is collected by a receiver vessel at a downstream scraper station. The receiver vessel is isolated, depressurised and opened to retrieve the pig.

A new scraper station is required at the Wollert end of the pipeline and will be located within the existing APA facility at Wollert.

Figure 5 shows a typical layout of a scraper station.

Figure 5 Typical layout of a scraper station

4.3.2 Mainline valves

Mainline valves (MLVs) are in-line buried block valves fitted with actuators. MLVs can be remotely activated (closed) to isolate sections of the pipeline for maintenance or during emergency conditions. Up to 4 MLVs are proposed for the length of the pipeline, spaced at intervals of approximately 15 kilometers. MLVs are located

on areas of hardstand and fenced to exclude members of the public. All MLVs will be fully accommodated within the proposed easement.

Potential sites for MLVs are subject to confirming design requirements and ongoing consultation with landowners. A typical MLV is shown in Figure 6.

Figure 6 Typical layout of a mainline valve

4.3.3 Cathodic protection

The pipeline's primary corrosion protection system will be its external coating. Each pipe length will be coated with dual layers of fusion bonded epoxy for corrosion protection purposes except at each end to allow welding. Post welding, the uncoated weld margins will be cleaned and coated with spray applied epoxy. 100% testing will be undertaken on the coating in both the factory and just prior to being installed in the trench to ensure the integrity of the coating. Following the completion of construction the integrity of the pipeline coating will be tested by a Direct Current Voltage Gradient (DCVG) survey which involves traversing over the top of the pipeline on foot measuring the voltage gradient in the soil using a pair of probes.

As a secondary protection, an impressed current cathodic protection system (CP system) will be employed to protect the pipeline from corrosion. Upstands for monitoring of the CP system will be required at approximately 2 kilometres to 4 kilometres spacing along the pipeline. The upstand consists of a small metal box on a post which contains a terminal for monitoring the CP system Figure 7. Upstands are typically installed at marker posts and at other key features such as paved roads and fence crossings.

Depending on the final detailed design of the CP system, anode beds may also be required at points along the alignment.

4.3.4 Pipeline marker signs

Pipeline marker signs Figure 7 will be installed along the length of the pipeline, to indicate the pipeline location in accordance with AS2885. The markers will be placed at a frequency to ensure continual line of sight along the alignment and will also be located at any bends, at property boundary fences and either side of crossings, such as roads, railways or watercourses. Text on the signs will describe the presence of a high pressure gas pipeline and provide the name and contact details of the operator.

Figure 7 Typical pipeline marker sign with co-located cathodic protection test point

4.4 Wollert compressor station upgrade

The PPA terminates at APA's existing gas compression station located at 365 Summerhill Rd, Wollert. The existing site comprises:

- Wollert City Gate: Four regulator runs that reduce the gas pressure from the 7000 kPa country pipeline system to the 2800 kPa metropolitan system, with a 3MW gas fired water bath heater.
- Compressor Station: Two Solar Centaur 50 and three Solar Saturn 10 gas turbine driven compressor units with one fin fan gas cooler and one lube oil cooler per unit, a gas engine generator, an instrument air compressor, a station vent and two pressure regulation valves.

The Project includes the addition of one Solar Centaur 50 compressor to the site, along with associated valves and pipework. Figure 8 shows the existing layout of the compressor station with an indicative location of the additional compressor. All works will be undertaken within the existing APA property at Wollert.

The following describes the construction methodology specific to the installation of the Solar Centaur compressor.

- Surveying: Preliminary survey works will be undertaken to mark the extent of the construction footprint.
- Site establishment: Preliminary activities will be undertaken to facilitate the construction of the compressor, including but not limited to establishment of a site depot, proving of any existing assets, installation of any temporary roads within the APA site.
- Bulk Earthworks: Will include excavation and removal of existing soil material or rock from the construction footprint.
- Slab Construction: Excavations will be undertaken to cut into the existing surface material to facilitate construction of a concrete slab and footings to provide a firm base for the compressor.

- Compressor: Various components of the compressor are assembled offsite. When delivered to site the various components are assembled together onsite. Cranes are used to lift the compressor into place with all connecting pipework fitted.
- Hydrostatic testing and commissioning: The pipeline will be pressure tested (in accordance with AS2885) prior to commissioning to ensure that the pipeline passes strength and leak tests. This is done through a process called hydrostatic testing whereby sections of the pipeline (test sections) are filled with water and then pressurised.
- Site Completion & fencing: A hardstand area will be established around the compressor site. Installation of permanent fencing will be required around the facility to maintain ongoing site security.

Figure 8 Existing Wollert compressor site with proposed location of additional compressor

4.5 Operational components

4.5.1 Pipeline

Once commissioned, the pipeline will be owned and maintained by APA. The operational footprint will be delineated by an easement, with a standard width of 20 metres.

The pipeline will be buried for its entire length and limited on ground activities will be required to operate and maintain the pipeline. A routine inspection and maintenance program will be implemented during pipeline operation. Inspection of the easement for issues such as erosion, weeds, subsidence, revegetation (see clean-up and rehabilitation section above) and unauthorised third party activity will be undertaken on a regular basis by ground patrols. Ground patrols of the easement will be generally undertaken by travelling along accessible sections of the easement in light vehicles.

Ongoing activities to maintain pipeline integrity will include mainline valve inspection and maintenance, cathodic protection surveys and scheduled internal pipeline inspections. Monitoring of mainline valves will typically occur monthly, or more frequently where required.

Inspection of the CP system will typically be undertaken annually in accordance with AS2832.

Regular contact will be maintained with landholders of all properties traversed by the pipeline during the pipeline operation in accordance with the requirements of AS2885.

4.5.2 Wollert compressor site

The existing Wollert Compressor site is maintained by APA. Ongoing inspection and maintenance activities occur to ensure all equipment and physical operational equipment is managed. AEMO operate the facility for the distribution of gas in Victoria under agreement.

4.6 Ancillary components

In terms of temporary facilities, access to the proposed construction ROW will utilise existing roads as much as possible and, subject to landowner approval, existing access tracks within private land. A temporary construction site depot will be required to facilitate the construction of the pipeline as well as a laydown area for the storage of pipe sections prior to them being delivered to the construction ROW.

Areas will be approved for use under relevant local planning schemes (where not already part of the final disturbance footprint) and not increase the environmental impacts of the Project. Any ancillary areas utilised as part of the Project will be currently approved sites for the proposed use or will be restored to previous land uses and condition once construction is complete.

Due to the proximity to populated areas, construction personnel are planned to be accommodated in existing local accommodation.

4.7 Decommissioning

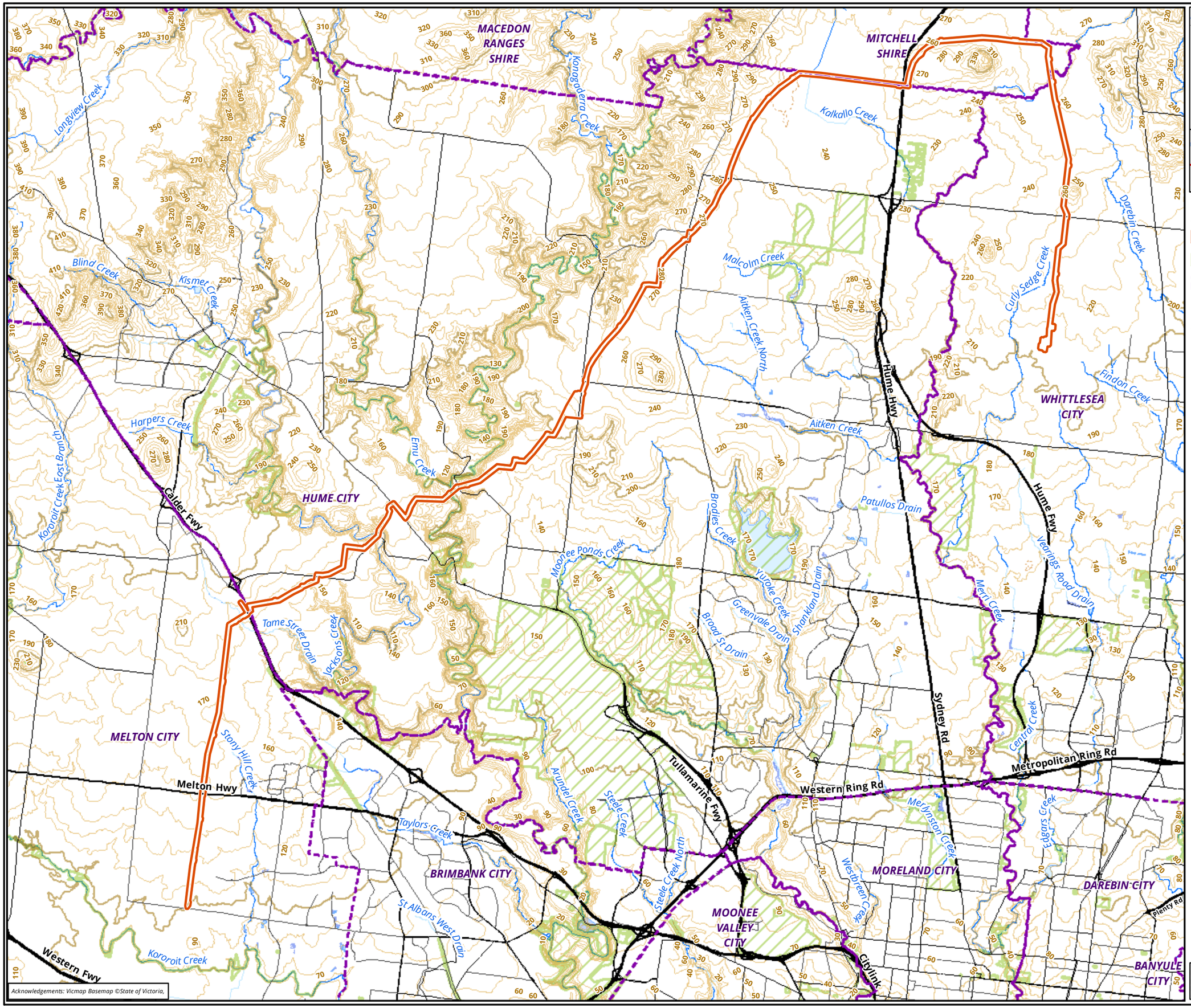
4.7.1 Pipeline

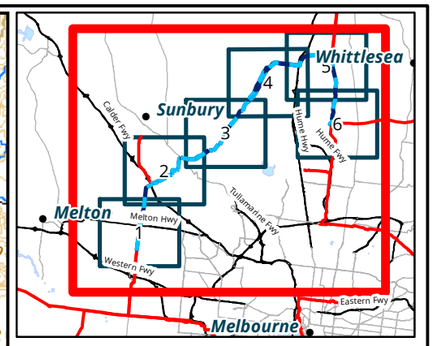
The pipeline is expected to have a physical life of at least 60 years. When required, decommissioning of the pipeline will be undertaken in accordance with the regulatory requirements of the day. Currently, the (Pipelines Act) requires the preparation of a decommissioning plan for approval by regulatory authorities. At the present time, the preferred strategy for decommissioning is likely to involve capping of the pipeline and filling it with an inert gas ('mothballing'). The cathodic protection system, however, would be continued in perpetuity to maintain the integrity of the pipeline. Removal of the pipeline would result in significant disturbance and environmental impacts and is therefore not preferred.

Decommissioning of the pipeline would result in small scale disturbance and environmental impacts. Upon decommissioning, APA would remain responsible for addressing any subsidence, which may occur above the pipeline. It is anticipated that relinquishment of the applicable Pipeline Licence (and associated easement) would not be possible until such time as any issues are resolved.

4.7.2 Wollert compressor station

The existing Wollert compressor station contributes to the ongoing supply of gas within Victoria. When required, decommissioning of the facility will be undertaken in accordance with the current regulatory requirements.





Legend

- Study area
- Crown Land
- Local government area

Contour

- Major
- Minor
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Figure 9. Overview Study area, Western Outer Ring Main - Preliminary alignment

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Kilometres
Scale: 1:100,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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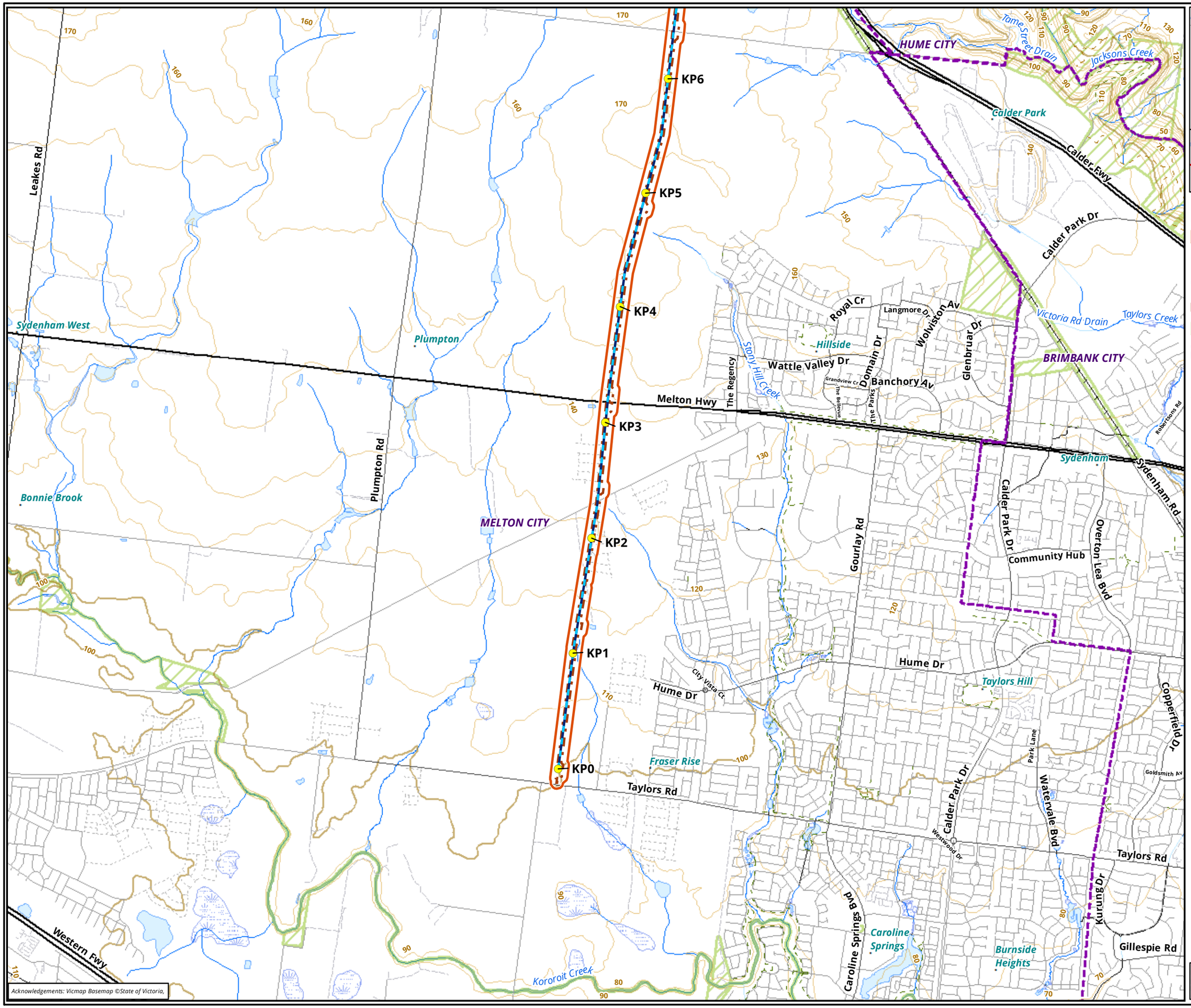

Legend

- Study area
- Kilometre Point
- Preliminary Pipeline Alignment
- Construction footprint
- Crown Land
- Local government area

Contour

- Major
- Minor

Figure 9.1 Study area, Western Outer Ring Main - Preliminary alignment

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Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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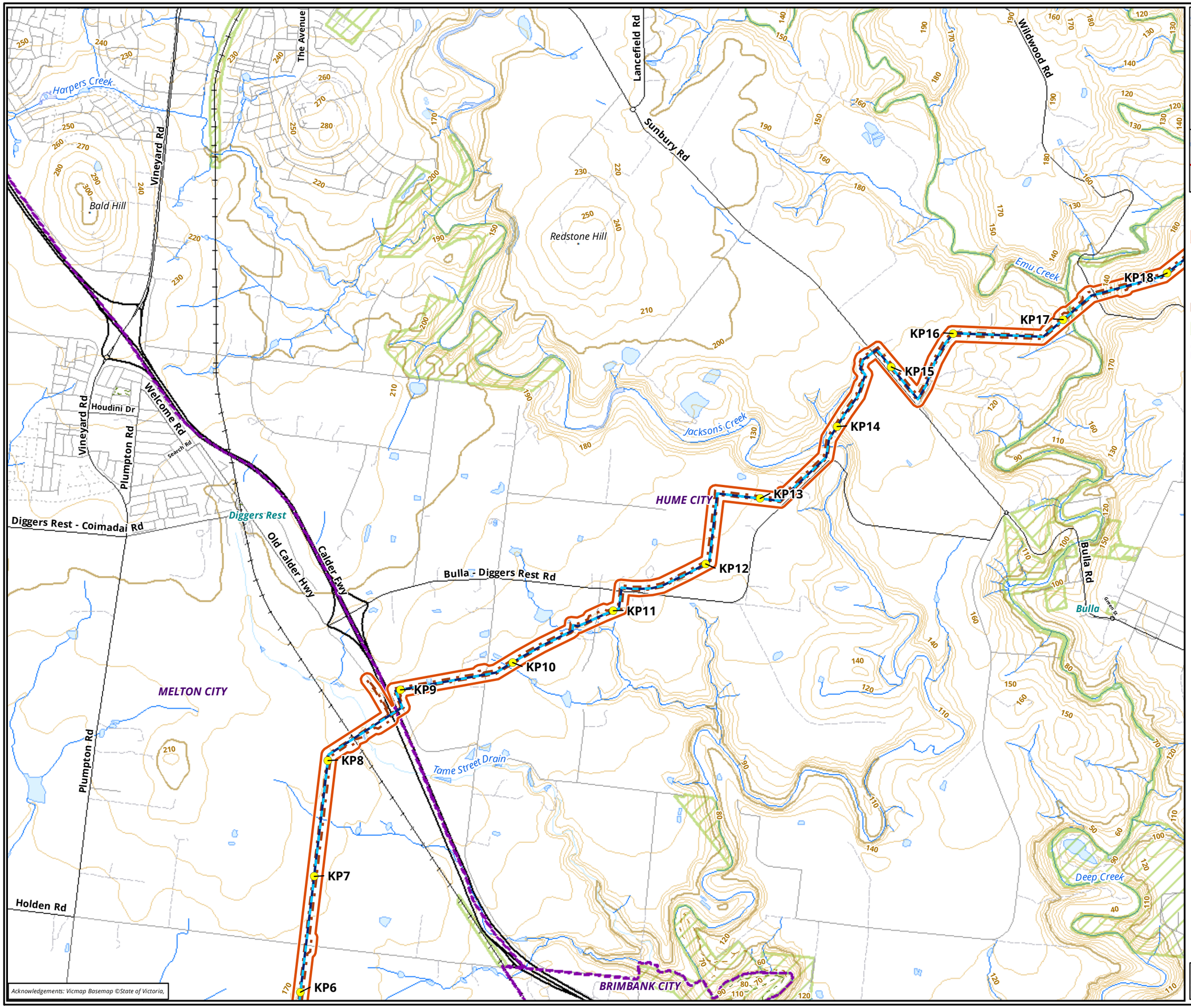

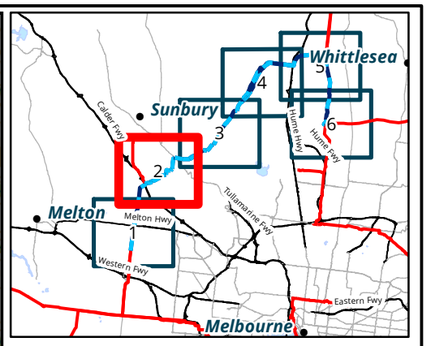

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Figure 9.2 Study area, Western Outer Ring Main - Preliminary alignment

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Kilometres
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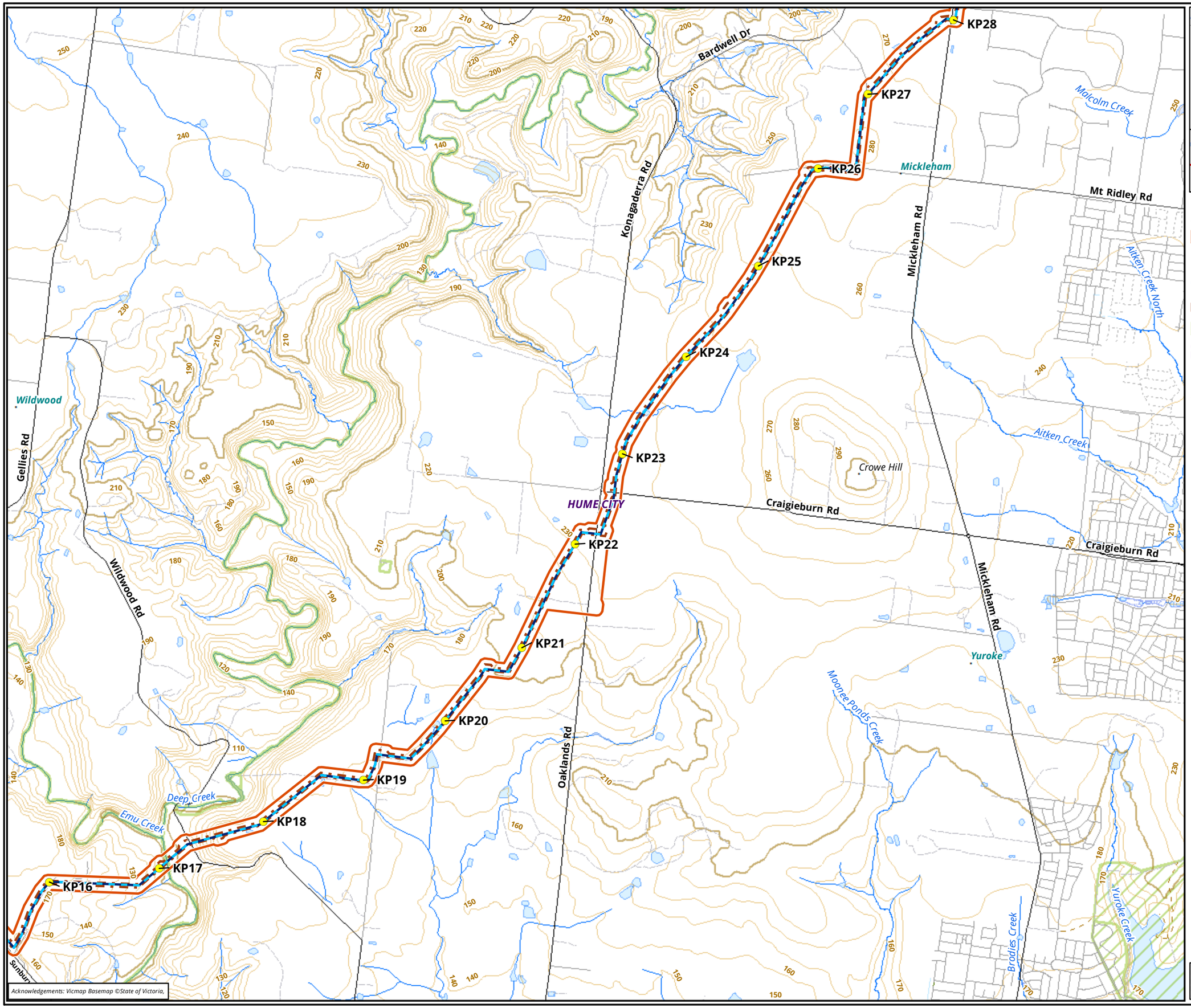
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KP27
KP26
KP25
KP24
KP23
KP22
KP21
KP20
KP19
KP18
KP17
KP16
Bardwell Dr
Konagaderra Rd
Mickleham Rd
Mt Ridley Rd
Craigieburn Rd
Craigieburn Rd
Mickleham Rd
Oaklands Rd
Wildwood Rd
Gellies Rd
Sunbury
HUME CITY
Wildwood
Mickleham
Yuroke
Crowe Hill
Malcolm Creek
Aitken Creek North
Aitken Creek
Moonee Ponds Creek
Brodies Creek
Yuroke Creek
Deep Creek
Emu Creek
Whittlesea
Sunbury
Melton
Melbourne
Calder Fwy
Western Fwy
Melton Hwy
Hume Hwy
Tullamarine Fwy
Eastern Fwy
Legend
Study area
Kilometre Point
Preliminary Pipeline Alignment
Construction footprint
Crown Land
Local government area
Contour
Major
Minor
Figure 9.3 Study area, Western Outer Ring Main - Preliminary alignment
0 0.3 0.6 0.9 1.2 1.5
Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55
N
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Date: 06 June 2019,
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Location:P:\29800s\29802\Mapping\29802_F2_Study_area.mxd
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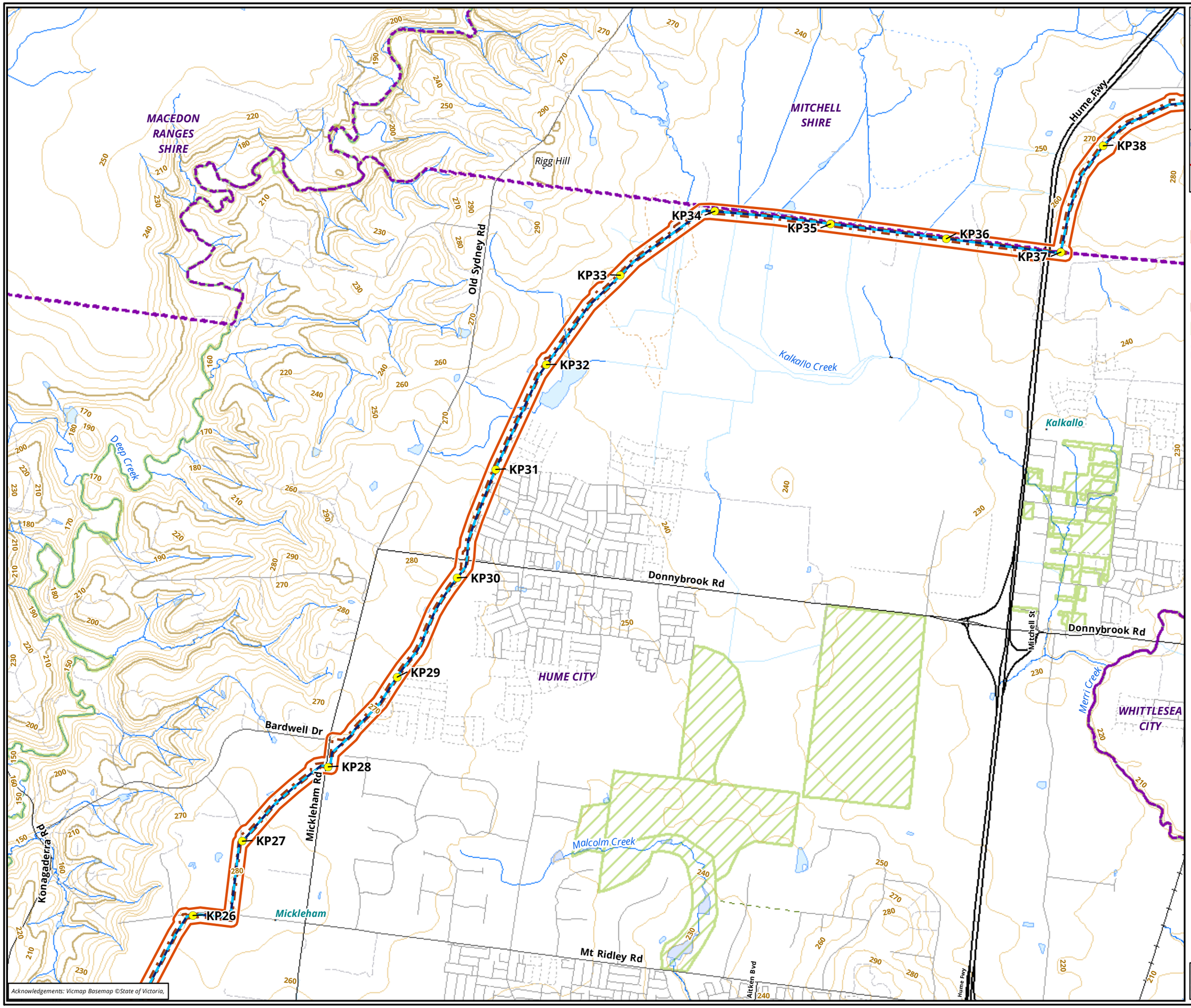

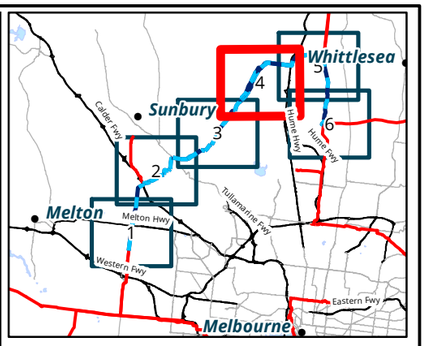

Legend

- Study area
- Kilometre Point
- Preliminary Pipeline Alignment
- Construction footprint
- Crown Land
- Local government area

Contour

- Major
- Minor
- contour_dep

Figure 9.4 Study area, Western Outer Ring Main - Preliminary alignment

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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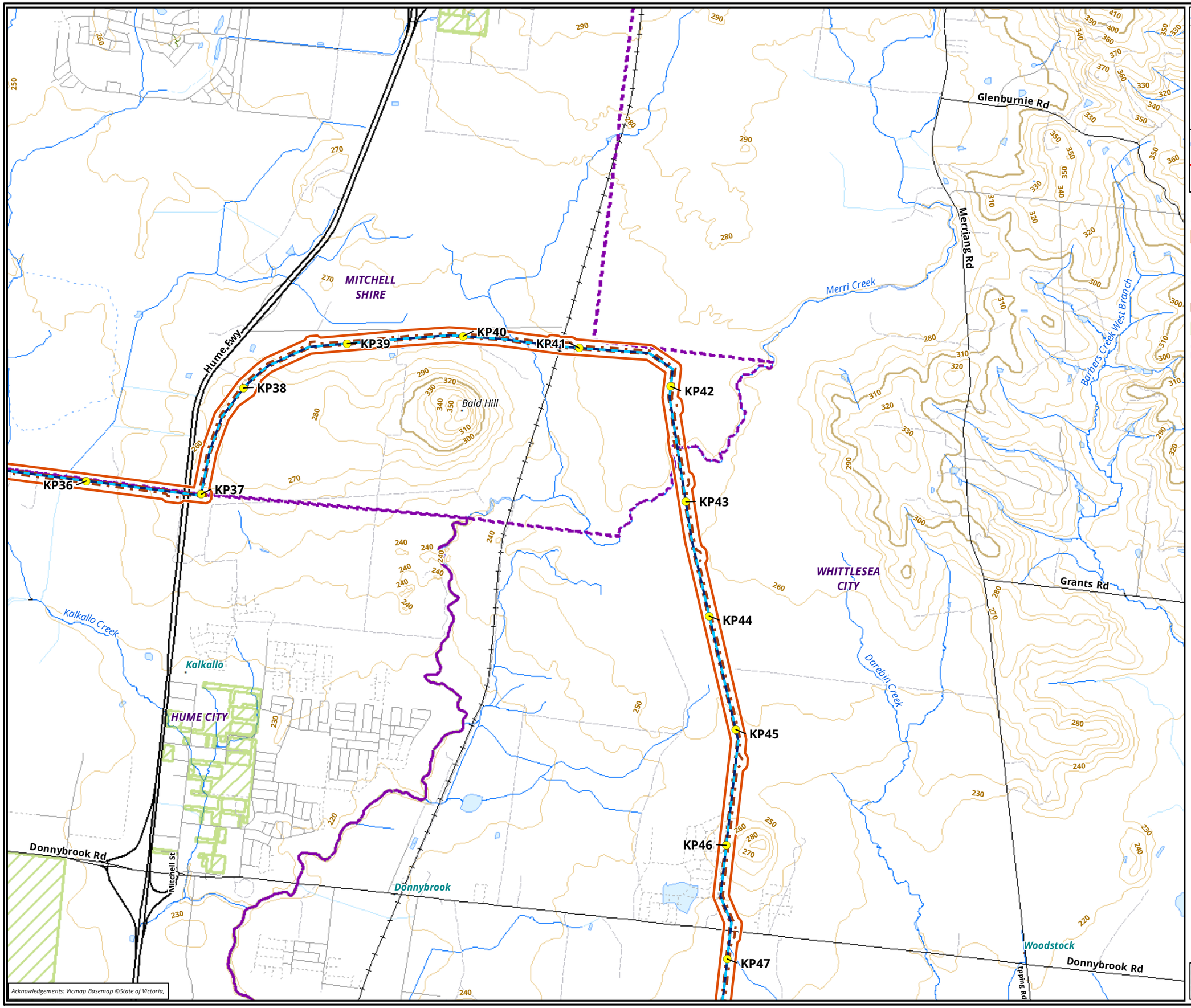

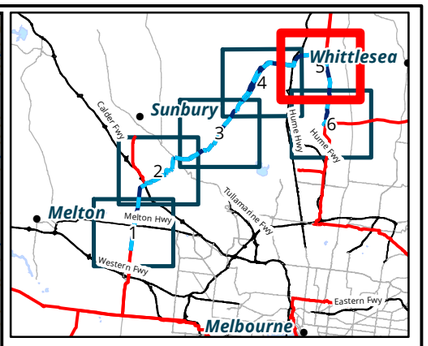

Legend

- Study area
- Kilometre Point
- Preliminary Pipeline Alignment
- Construction footprint
- Crown Land
- Local government area

Contour

- Major
- Minor

Acknowledgements: Vicmap Basemap ©State of Victoria,

Figure 9.5 Study area, Western Outer Ring Main - Preliminary alignment

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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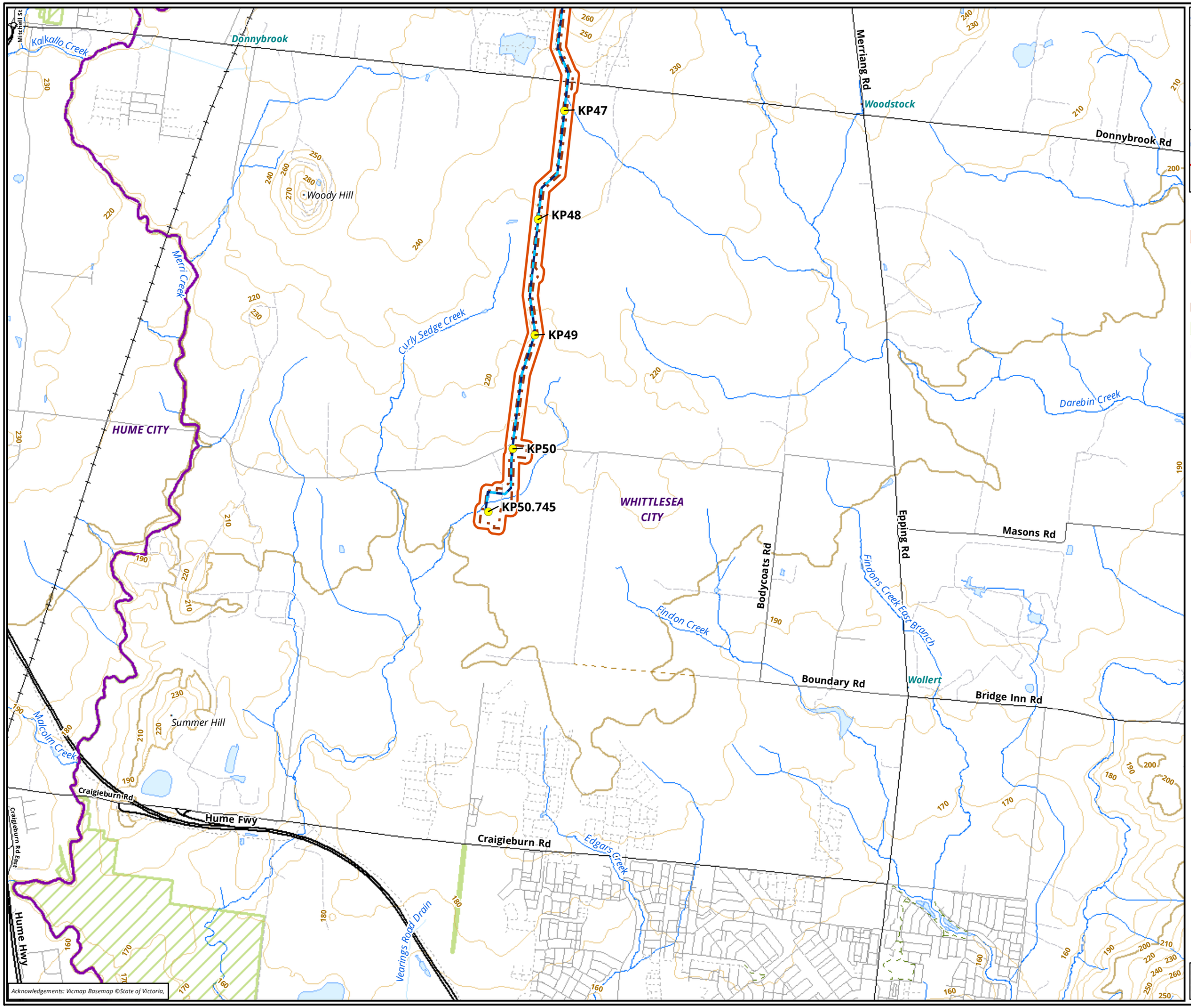

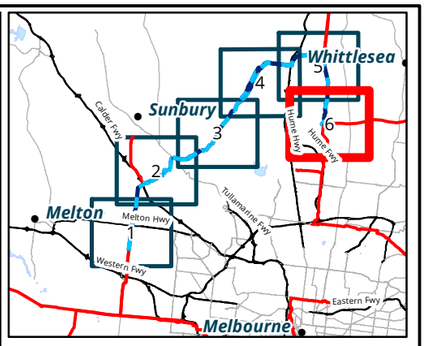

Legend

- Study area
- Kilometre Point
- Preliminary Pipeline Alignment
- Construction footprint
- Crown Land
- Local government area

Contour

- Major
- Minor

Figure 9.6 Study area, Western Outer Ring Main - Preliminary alignment

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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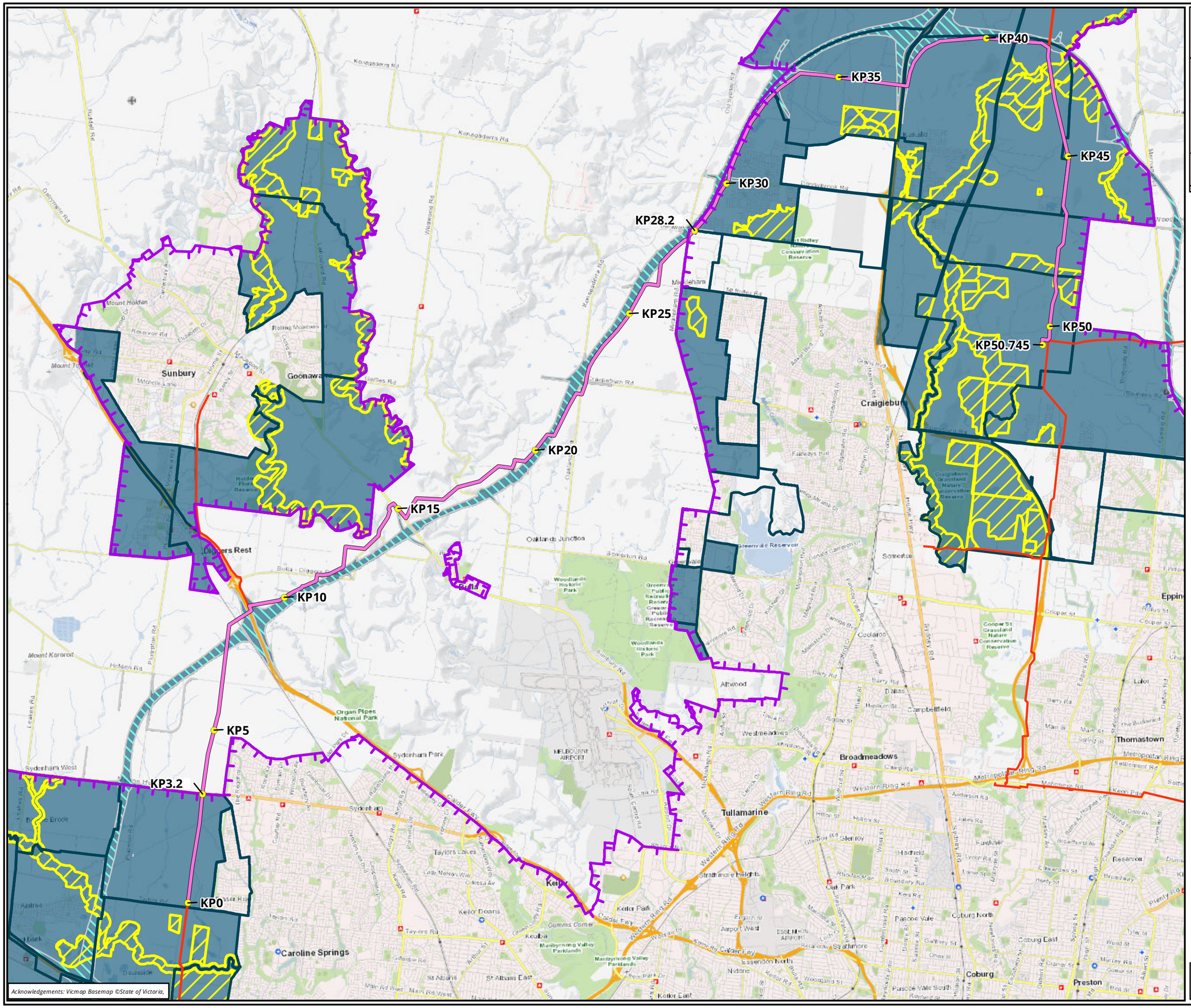

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Legend

- Preliminary Pipeline Alignment
- Existing pipeline
- Kilometre Point
- Melbourne Strategic Assessment extent
- Conservation Area
- Urban growth boundary
- Public Acquisition Overlay Outer Metropolitan Ring/ E6 Transport Corridor
- PSP Boundaries

Figure 10. Overview Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent

0 1 2 3 4 5

Kilometres
Scale: 1:100,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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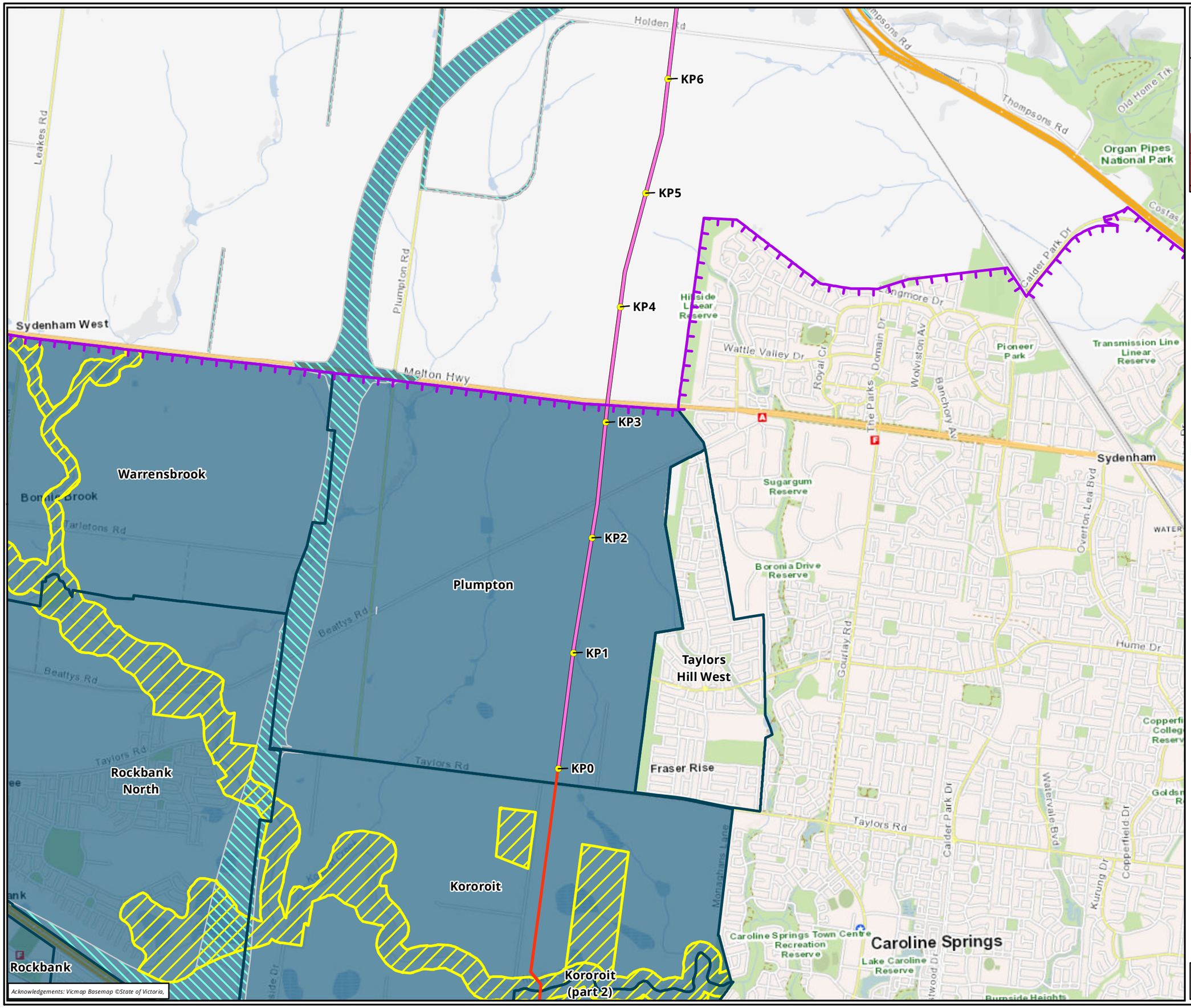

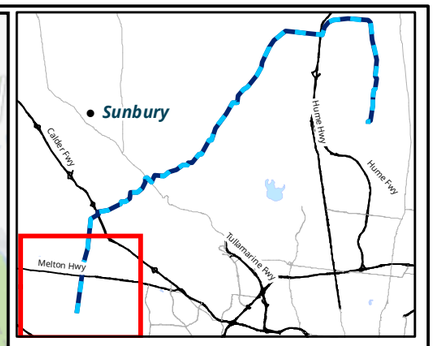

Legend

- Preliminary Pipeline Alignment
- Existing pipeline
- Kilometre Point
- Melbourne Strategic Assessment extent
- Conservation Area
- Urban growth boundary
- Public Acquisition Overlay Outer Metropolitan Ring/ E6 Transport Corridor
- PSP Boundaries

Figure 10.1 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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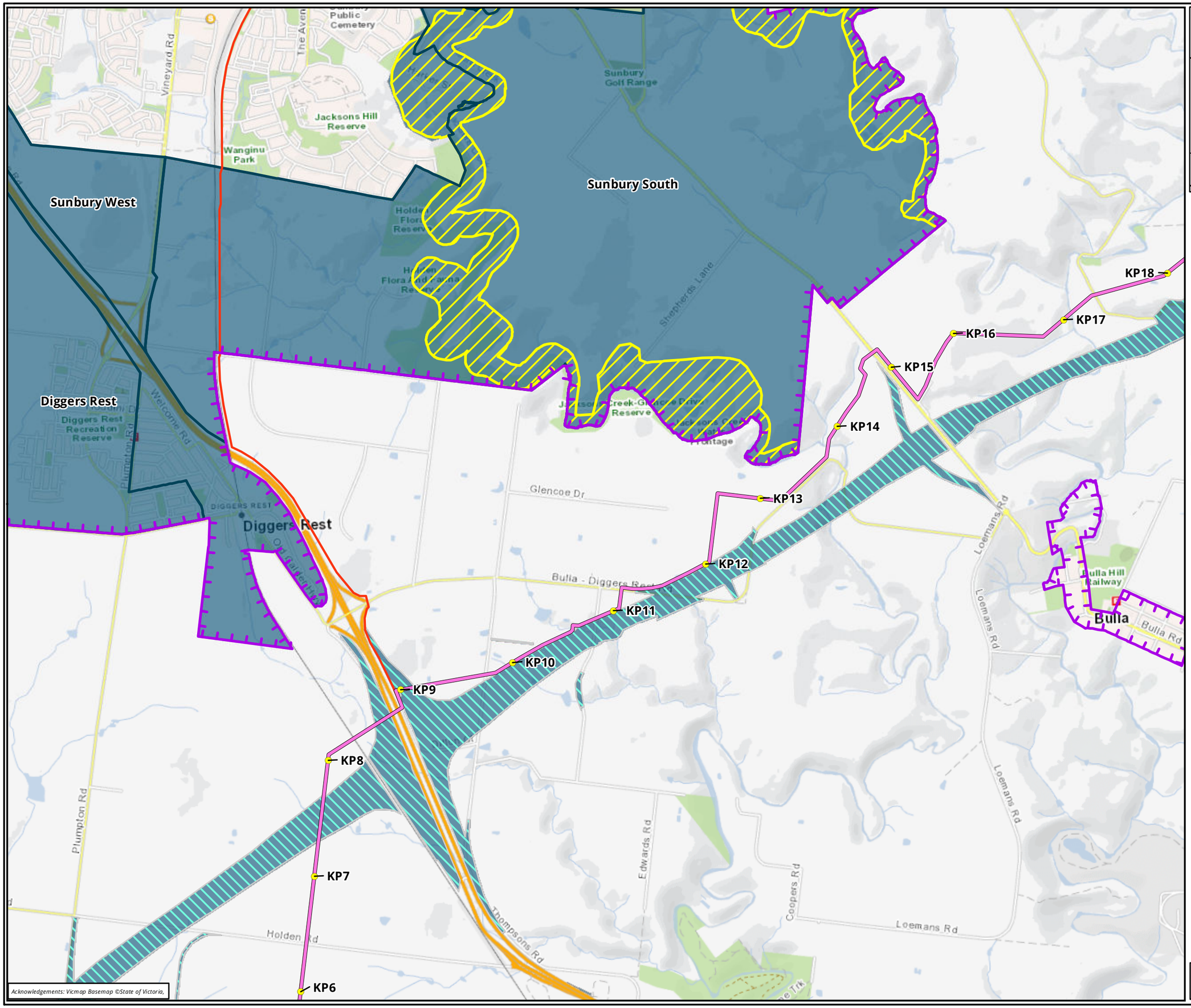

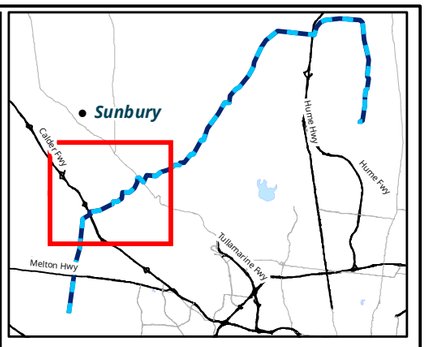

Legend

- Preliminary Pipeline Alignment
- Existing pipeline
- Kilometre Point
- Melbourne Strategic Assessment extent
- Conservation Area
- Urban growth boundary
- Public Acquisition Overlay Outer Metropolitan Ring/ E6 Transport Corridor
- PSP Boundaries

Figure 10.2 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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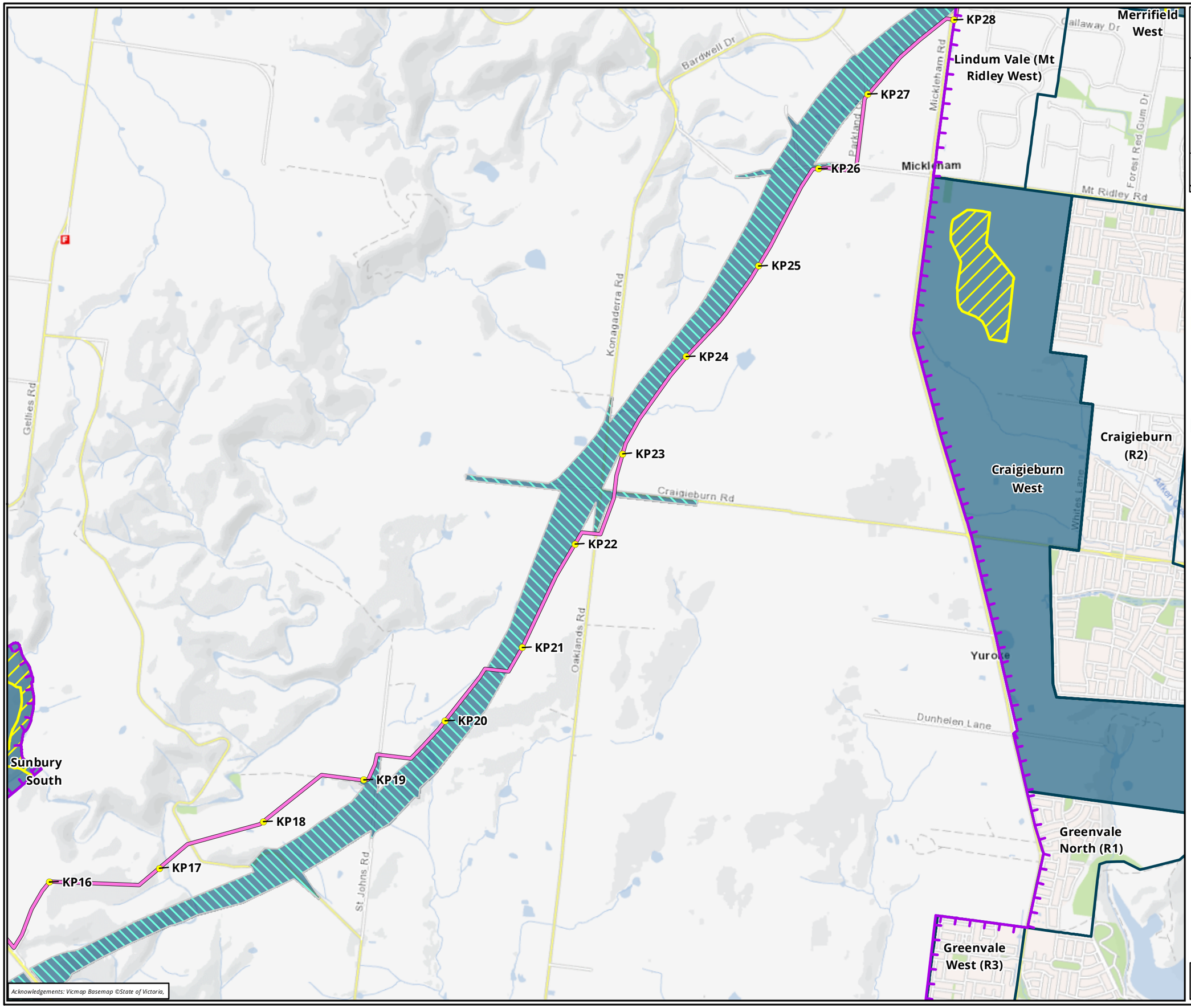

Legend

- Preliminary Pipeline Alignment
- Kilometre Point
- Melbourne Strategic Assessment extent
- Conservation Area
- Urban growth boundary
- Public Acquisition Overlay Outer Metropolitan Ring/ E6 Transport Corridor
- PSP Boundaries

Figure 10.3 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
Coordinate System: GDA 1994 MGA Zone 55

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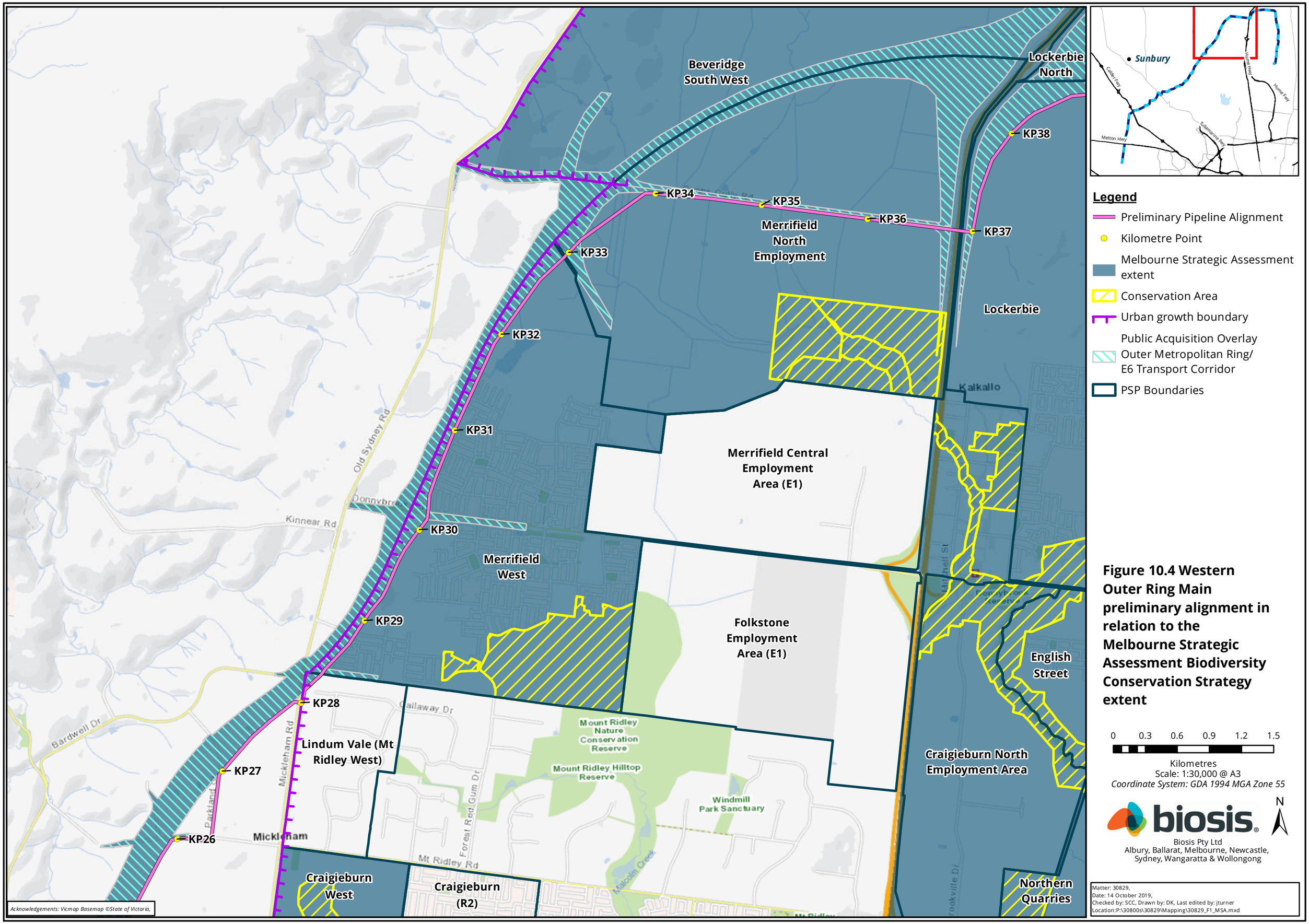
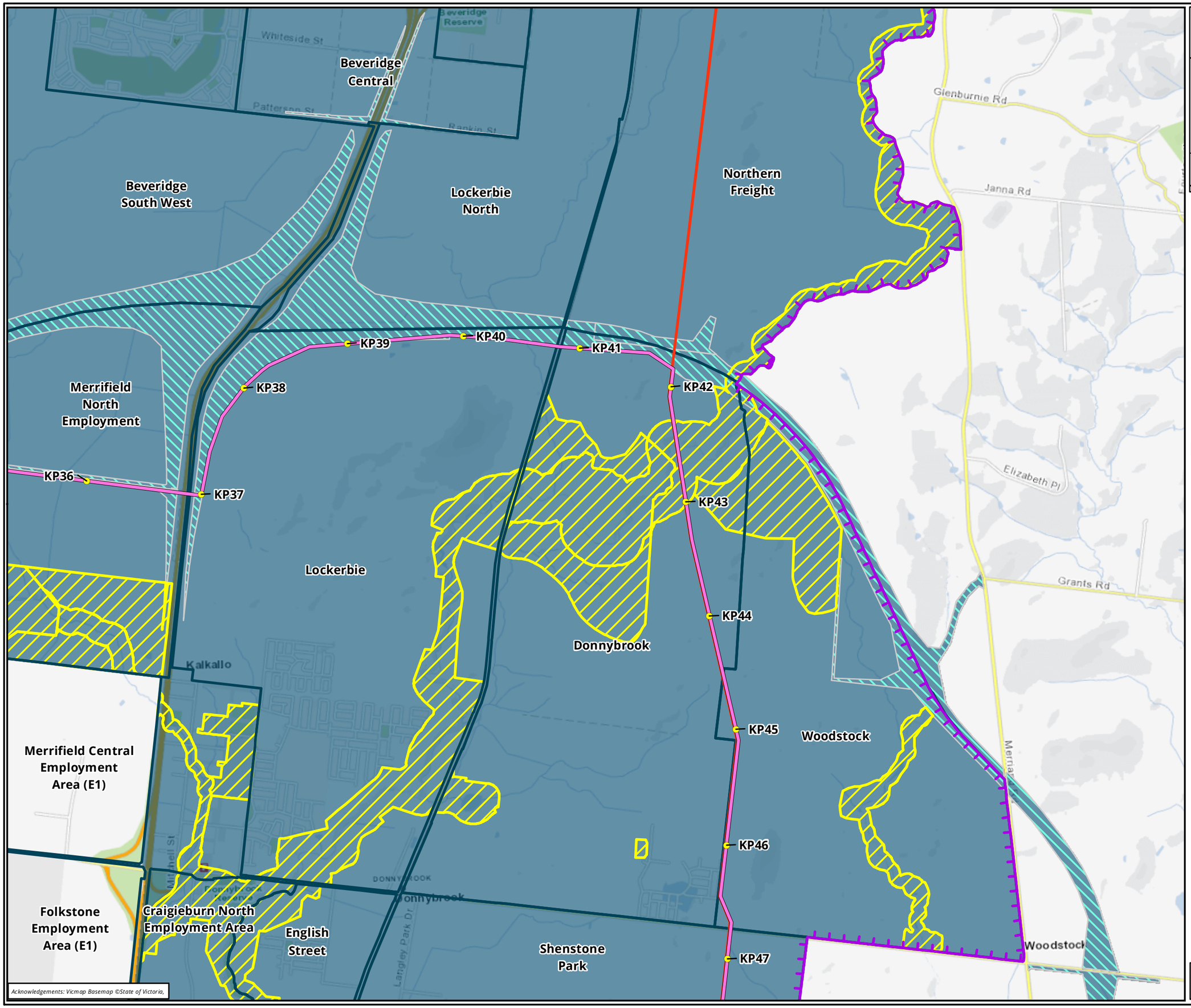
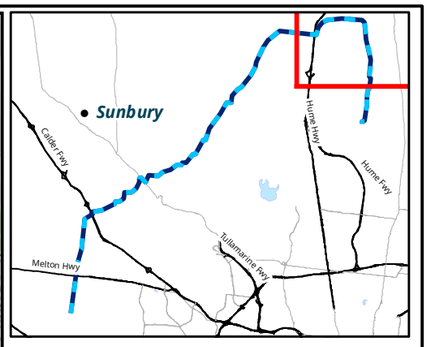


Figure 10.4 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent





Legend

- Preliminary Pipeline Alignment
- Existing pipeline
- Kilometre Point
- Melbourne Strategic Assessment extent
- Conservation Area
- Urban growth boundary
- Public Acquisition Overlay Outer Metropolitan Ring/ E6 Transport Corridor
- PSP Boundaries

Figure 10.5 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent

0 0.3 0.6 0.9 1.2 1.5

Kilometres
Scale: 1:30,000 @ A3
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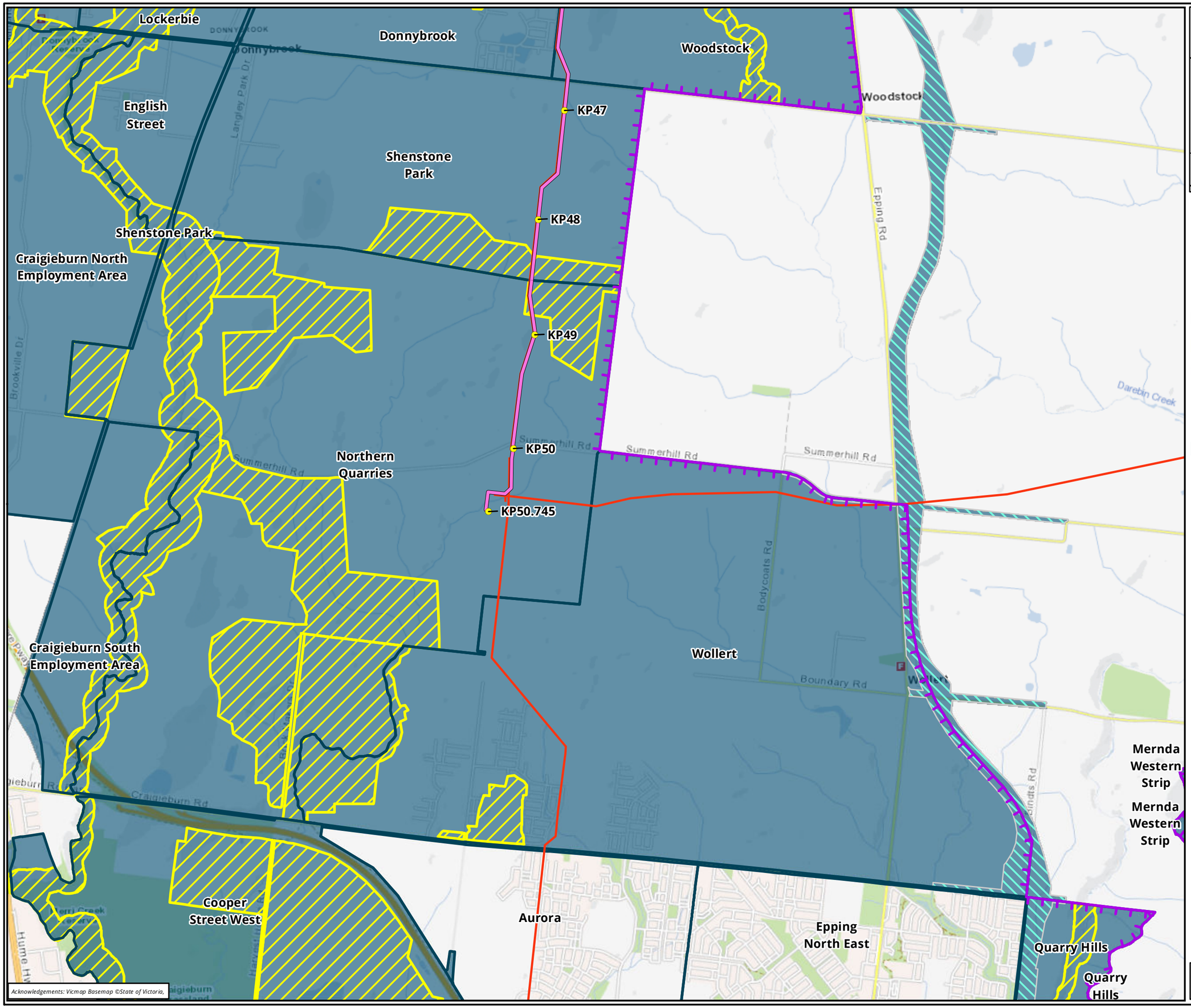

Figure 10.6 Western Outer Ring Main preliminary alignment in relation to the Melbourne Strategic Assessment Biodiversity Conservation Strategy extent