6. Project Description

6.1 Introduction

The Project has been developed taking into account the Project objectives, constraints and the risks and impacts identified through the EES process. This has been an iterative process as the proposed alignment has been refined through the EES process as information on environmental values and impacts have progressively become available.

This chapter provides a description of the Project by outlining the physical footprint and relevant design elements, and an indicative construction methodology. The Project description, together with VicRoads standard environment protection measures for construction (refer to Chapter 21 (Environmental Management Framework)), has formed the basis for the impact and environmental risk assessment.

The Project Description also considers the two project stages with initial upgrade proposed to VicRoads Access Management Policy (AMP) road category 3 (AMP3) – divided rural highway standard (interim upgrade) and then ultimately to category 1 (AMP1) – freeway standard (ultimate upgrade).

The objective of the EES is to assess the largest potential impact resulting from the Project, therefore most assessments have focused on the ultimate upgrade of an AMP1 freeway as it would result in a larger footprint and the greatest change to access arrangements.

6.2 Project Timing

Once planning and environmental approvals are obtained, the two main activity sequences which follow are pre-construction and construction. The timing of commencing construction of Section 3 is dependent on the availability of funding, but once available the land acquisition and pre construction activities may commence.

The pre-construction phase would involve detailed site investigations, land acquisition and detailed design, and take around six months to complete. Depending on the method of project delivery, e.g. construct only, or design and construct, detailed design may be undertaken concurrently with land acquisition.

Tendering the contract for construction would take around six months until award. Construction of Section 3 of the Project is expected to take up to three years, subject to project funding and staging.

6.3 Project Stages

The initial duplication of the Western Highway would be to VicRoads AMP3 – divided rural highway - standard, with most local roads and property accesses remaining.

Funding may be provided for upgrading the AMP3 highway to AMP1 freeway standard in the future. The timing for this is unknown and subject to future funding programs, however it is expected to be at least 20 years away.

The ultimate upgrade to an AMP1 freeway would result in a larger footprint with grade-separated interchanges and service roads. It is the ultimate upgrade that would also result in the most amount of change to arrangements for accessing the highway (e.g. it would not allow direct access to the highway to or from adjacent properties). The assessments for the EES have therefore focused on AMP1 as the objective is to assess the largest potential impact resulting from the Project.

The proposed Planning Scheme Amendment is based on the AMP1 footprint to provide the extent of the Public Acquisition Overlay on land required for the ultimate upgrade.

Some specialist studies however consider both the interim upgrade to AMP3 highway as well as the ultimate upgrade of an AMP1 freeway standard configuration as the highway would operate as AMP3 for a number of years. These assessments include traffic and transport, economic and social impact assessments.

6.3.1 Interim Upgrade – Divided Highway

The proposed interim upgrade involves duplication of the Western Highway to AMP3 – divided rural highway standard. Wide median intersection treatments are proposed at:

- The Majors / Main Divide Road
- Petticoat Gully Road
- Garden Gully Road / Military Bypass Road
- Allanvale Road
- Churchill Crossing Road
- Between Panrock Reservoir Road and Harvey Lane
- London Road.

The EES has been based on the proposal that the grade-separated interchanges on either side of Great Western be constructed for the interim upgrade.

Depending on project funding, VicRoads is proposing that Garden Gully Road and London road be grade separated for the interim upgrade, subject to the availability of project funding. The existing highway at Oddfellows Bridge is proposed to become a service road providing southbound access to the highway. Similarly, the existing highway is proposed to become a service road adjacent to the London Road interchange.

The majority of the remaining intersecting roads and property access would be restricted to ‘left-in’ and ‘left-out’ except where local roads are proposed to

be truncated thereby restricting access the highway. In these locations, service roads have been proposed.

The proposed access arrangements for roads that intersect the existing highway are outlined in Table 6-1 which shows intersection and access treatments for the interim and ultimate upgrades.

6.3.2 Ultimate Upgrade - Freeway

The proposed ultimate upgrade is to AMP1 – freeway standard. Under the ultimate upgrade, access to the freeway would be provided via grade-separated interchanges connected to the local road network by service roads. The grade separated interchanges would be located at:

- Armstrong Interchange (Garden Gully Road)
- Great Western Southern Interchange
- Great Western Northern Interchange / Bests Road
- London Road.

The access arrangements for all other intersections and roads that meet the existing highway are outlined in Table 6-1.

6.4 Design Guidelines and Basic 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 were therefore based on the Austroads Guide to Road Design series and VicRoads Supplements (VicRoads, 2010).

The Project (both the interim and the ultimate upgrade) provides two lanes in each direction and associated intersection upgrades, with sealed road shoulders and a central median. The Project is proposed in order to improve road safety and facilitate the efficient movement of traffic.

Section 3 of the Project commences just north of Pollard Lane, Ararat and extends for approximately 24 kilometres (km) to south of Gilchrist Road, Stawell.

As outlined in Section 6.3, the interim upgrade involves duplication of the Western Highway to AMP3 – divided rural highway standard and the ultimate upgrade is proposed for AMP1 – freeway standard.

The interim upgrade to AMP3 – divided rural highway standard would be undertaken from Pollard Lane to The Majors Road / Main Divide Road, Ararat. The ultimate upgrade to AMP1 – freeway standard would be undertaken from The Majors Road / Main Divide Road, Ararat to Gilchrist Road, Stawell.

The alignment and geometry of the proposed carriageways would be the same for both the interim and ultimate upgrade. The works required for the ultimate upgrade would therefore be primarily associated with changes the intersections and construction of service roads, (Refer Table 6-1).

6.4.1 Posted Speed Limits

The AMP1 section of the highway has been designed to 120 kilometres per hour (km/h) and would have a posted (signed) speed limit of 110km/h on the main carriageways.

The AMP3 sections of the highway has been designed to 110km/h and would have a posted speed is proposed to be 100km/h for the section from Pollard Lane to Main Divide Road in Ararat.

The proposed posted speed limit on exit ramps and crossroads is 90km/h, and 70km/h on service roads. These posted speed limits would apply to both the interim and ultimate upgrade for the Project.

6.4.2 Design for Vehicle Movements

Intersections and turning movements for both the interim and ultimate upgrade have been designed to cater for vehicles legally able to use the Western Highway. This includes provision for a standard B-Double truck configuration (a vehicle consisting of a prime mover and two trailers linked together approximately 25 metres (m) long) to turn into the median without interrupting traffic flow. This was considered by VicRoads and resulted in adopting a typical median width of 30m. It is not anticipated that high performance vehicles (over 30m in length) would need to turn off the highway under AMP3 conditions. Grade separated interchanges under AMP1 conditions would allow for turning movements for high productivity vehicles.

6.4.3 Gradeline

The main carriageways for both the interim and ultimate upgrade have been designed to be 1m above the 1 in 100 year flood level. In some locations the existing highway does not meet this requirement and the existing pavement is not likely to be able to be retained. In these cases fill and new pavement would be required.

6.5 Proposed Alignment

6.5.1 Project Area Conditions

The topography and constraints of the project area have been considered in the development of the alignment assessed in this EES.

The topography is undulating. Apart from the forested Ararat Regional Park, which borders the first 3.5km of the existing Western Highway, and other small remnants, the surrounding land use is predominately agricultural (grazing, cropping, viticulture).

The existing Western Highway crosses the Melbourne to Adelaide railway twice, 10 significant waterways and 28 minor tributaries within the project area that are intersected by the proposed alignment.

The Project Area commences at Pollard Lane, west of Ararat, and extends for a distance of approximately 24 km to Gilchrist Road, east of Stawell. It encompasses a corridor extending up to 1500m either side (east and west) of the existing highway, except around Great Western where it extends up to 1800m.

6.5.2 Consideration of towns

As part of the design development process, it was also necessary to have regard to the existing towns within the Project Area. Key considerations for the proposed alignment included:

- A potential bypass of Ararat;
- Bypass of the Great Western township; and
- Crossing of the Melbourne to Adelaide Railway.

6.5.3 Consideration of Infrastructure

Existing and future private and public infrastructure and utilities in the vicinity of the Western Highway Project corridor were considered as part of the design development process.

Relocation and/or protection of utilities such as electricity and telecommunications services has been allowed for within the construction area identified for the Project, as described in Section 6.6.

6.5.4 Proposed Alignment

The alignment is shown in Figure 6-1, and shown in more detail together with associated construction areas in Technical Appendix A to the EES:

- Mapbook A – Proposed alignment
- Mapbook B – Constraints that have been considered for refinement of the proposed alignment.

Following selection, the alignment has been refined through the EES assessment process. Further information about the refinement can be found in Section 6.16.

The alignment is approximately 24km in length and commences north of Pollard Lane, Ararat.

The alignment duplicates the existing Western Highway (partly on the south-west side and partly on the north-east side) before following the Armstrong Deviation, bypassing Armstrong. This would require a new railway crossing (for the two new lanes) adjacent to the existing rail overpass.

A new dual carriageway is proposed to provide a north-eastern bypass of the township of Great Western, starting from just north-west of Delahoy Road and crossing part of the former Great Western landfill and the adjacent quarry, to re-join the existing Western Highway near Briggs Lane.

From Briggs Lane to Hurst Road, the alignment duplicates the existing Western Highway on the south-west side. Two new carriageways over the railway line and Oddfellows Bridge at Harvey Lane would revert to on-ramp for southbound traffic. Section 3 finishes south of Gilchrist Road, Stawell.

6.6 Construction Area

A construction area has been defined for the Project, which is the potential area of direct impact for the initial highway and ultimate freeway upgrade.

The width of the construction area varies, reflecting the need for variable median widths between the carriageways, location of service roads and intersection treatments. Table 6-3 outlines the basis for the proposed alignment and refinements that have influenced the construction footprint.

The construction area is contained within the project area.

The construction area includes the following areas:

- Existing and new carriageways and medians.
- Grade-separated intersections and wide median intersections.
- Service roads and rest areas/truck stops.
- Clear zones extending a minimum 10m either side of the edge of the traffic lanes (except where constraints are located).
- Construction buffers beyond the clear zone, which have been included to accommodate relocated services and potential changes to batter slopes.

Refer to Figure 6-2, Figure 6-3 and Figure 6-4 for typical cross sections of the proposed alignment including the carriageways, median and clear zones.

Where sections of the proposed alignment utilise the existing road, the objective has been to convert the existing two-way road to two lanes in one direction, and a new parallel carriageway would be constructed to serve traffic in the other direction.

In some cases however, the alignment has been selected to minimise impacts on vegetation and/or landowners, so whilst the alignment follows the existing highway it is unlikely that the pavement can be retained.

The following generally applies to the construction area:

- The construction area required for a new dual carriageway is approximately 110m wide. This includes the pavement, clear zone and construction buffer areas identified. Depending upon topography, in some instances a wider area may be required.
- Where the existing roadway is utilised, depending on the condition of the existing roadway and its gradeline, pavement rehabilitation might be required. Otherwise, where the existing pavement can be utilised, the only construction works on the existing roadway would involve drainage improvement, shoulder construction and removal of hazards within the clear zone. For the

purposes of the EES, the same construction corridor has been assumed for areas where the new carriageway alignment follows the existing highway to allow for these works. This is conservative, but it at least accounts for potential impacts which could be reduced through the detailed design process and management during construction.

The construction area does not include space for construction site compounds as these are typically determined by the construction contractor. However, the EES has considered areas where site compounds should not be located due to environmental or cultural sensitivity. Refer Section 6.17.8.

6.6.1 Refinements through Detailed Design

At this stage of the Project, a full survey of the land features and detailed design of the Project has not been completed. A conservative yet reasonable approach has been taken to the design so that the final design, in most instances, should be able to be retained within the construction area defined for the Project.

Conservative construction buffers have been adopted to allow for clear zones, services and other elements of design that would be refined though detailed design. It is therefore possible the overall construction footprint could be reduced through detailed design.

There is however, a possibility that the construction area may also need to be widened slightly in some areas to accord with recommendations from the Panel Inquiry or to accommodate outcomes of the detailed design. The objective in these instances would be to minimise landowner impacts and native vegetation losses. It is for this reason that the Planning Scheme Amendment exhibited with this EES is a draft only.

6.6.2 Protection of Hazards in Clear Zone

The clear zone either side of the traffic lanes is an area which is ideally kept clear of hazards and is within a recovery area beside a traffic lane required for run off road vehicles to stop safely or be brought under control.

The construction area defined for the existing and new carriageways, as described above, includes clear zones which generally extend a minimum of 10m either side of the edge of the traffic lanes. For operational safety reasons these clear zones are to be free of hazards, such as trees or power poles, so existing trees would be removed or protected, and the power poles relocated.

Where considered feasible, protection of hazards with safety barriers may be possible. This would be considered during the detailed design phase of the Project.

In addition, native vegetation within clear zones that does not constitute a hazard (e.g. grassland) and is not impacted by the construction activity would be retained. These measures would lead to reduced native vegetation loss.

6.6.3 Construction Buffers

In some areas, construction buffers have been included in the construction area to allow enough room for wider batter slopes, provision for drainage and relocation of services.

A preliminary assessment of batter slopes for the main carriageways and service roads, and the location of services has been undertaken for the EES. This would be considered further in the detailed design to confirm the extents and locations.

The construction buffers that are part of the construction area for the proposed alignment include:

- 5m in areas with social and environmental constraints identified through the EES assessment;
- 10m in areas where there are not likely to be constraints or services (this would also be the clear zone); and
- 15m in areas where there are services to be relocated.

Refer to Technical Appendix A to view the locations of these buffers. In some locations the median has been excluded from the construction area to protect significant vegetation, such as between Churchill Crossing Road and Harvey Lane. This is shown in the mapbook in Technical Appendix A.

At the current stage of the design it is not possible to accurately define the construction buffers and so those shown for the purposes of the EES are somewhat conservative (see Technical Appendix A). The extent of the construction buffers would be refined through the detailed design and would likely lead to reduced vegetation loss or impacts on landowners.

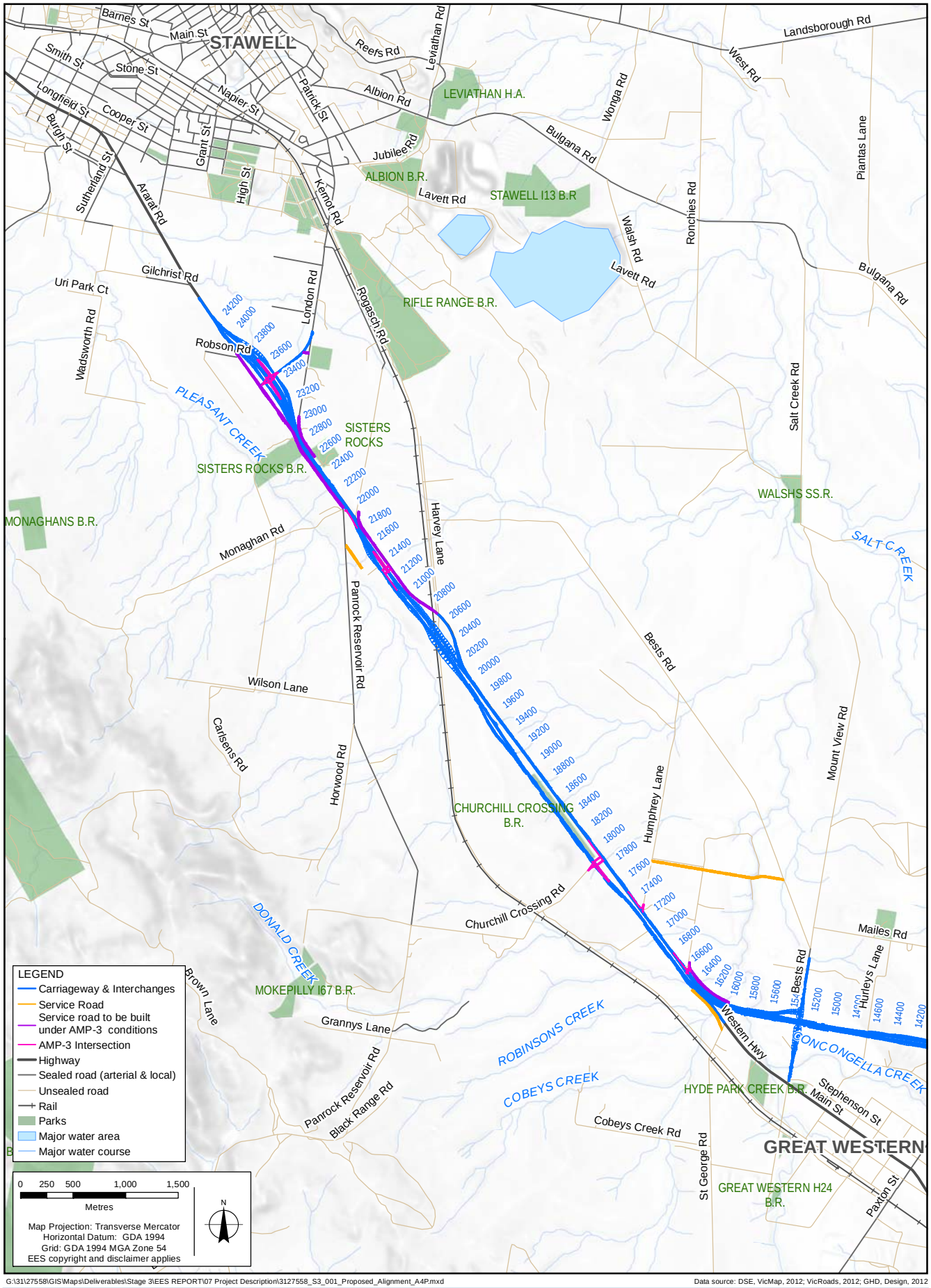


Figure 6-1a Proposed Alignment

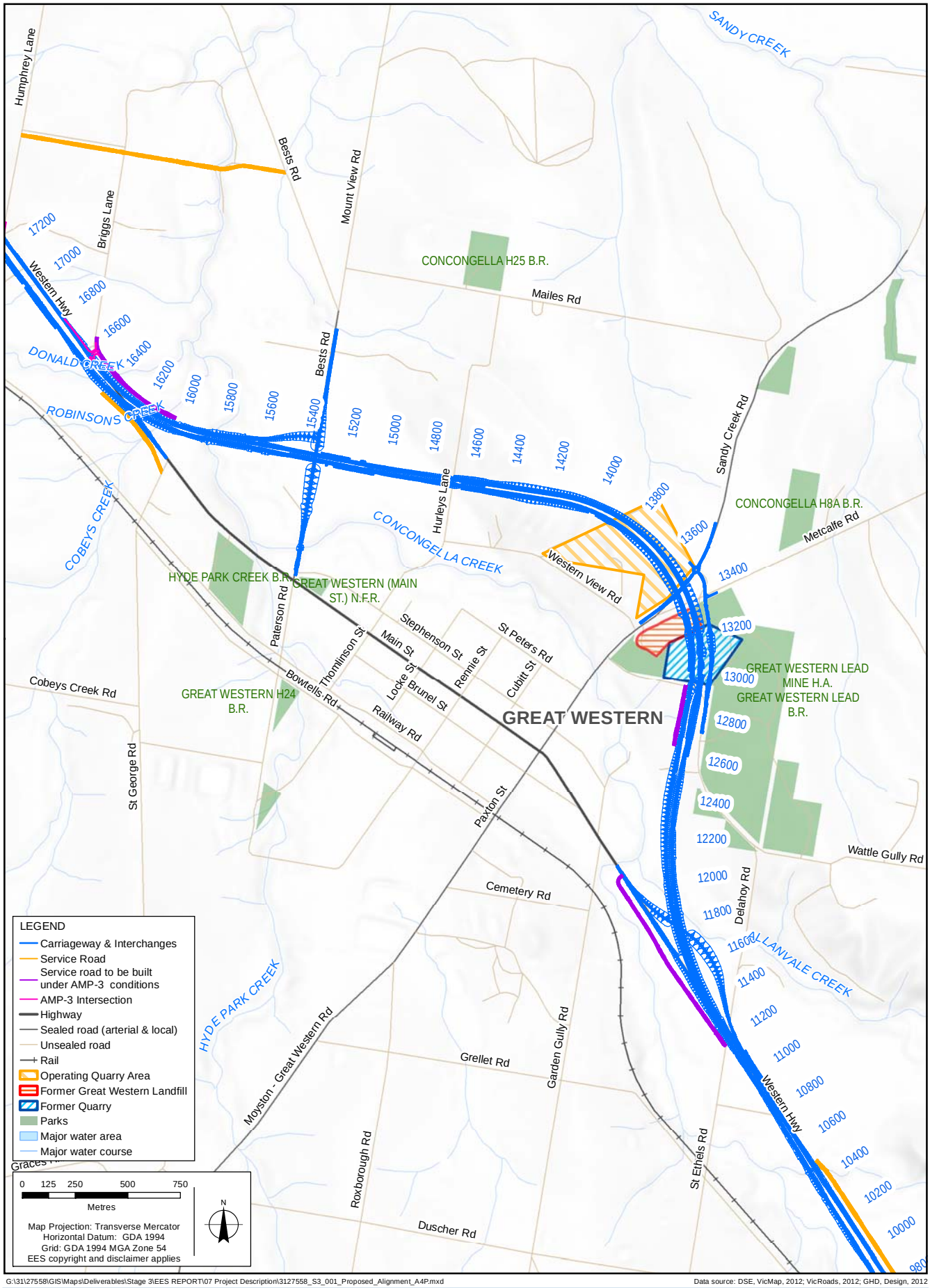
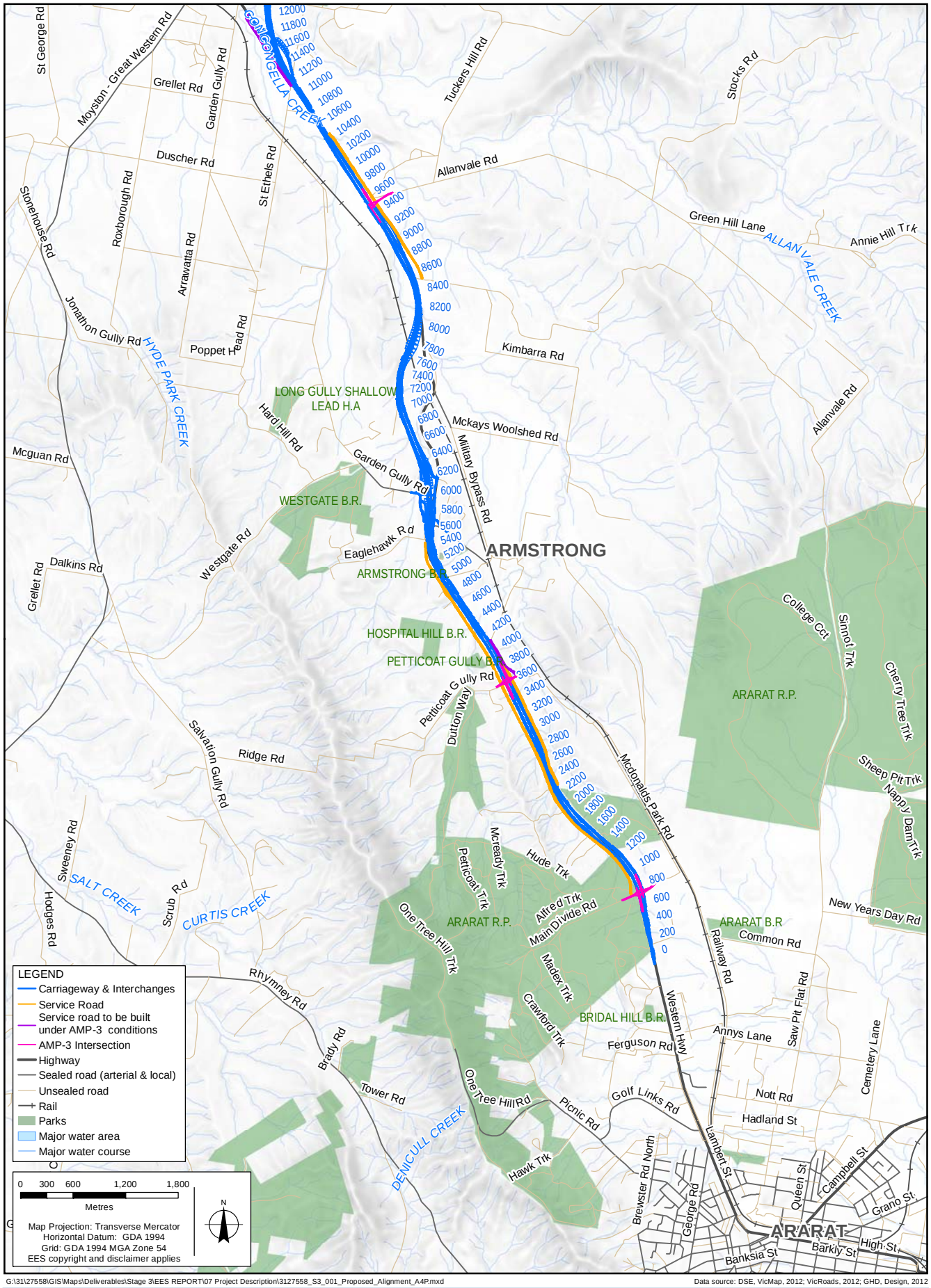


Figure 6-1b Proposed Alignment



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Data source: DSE, VicMap, 2012; VicRoads, 2012; GHD, Design, 2012

Figure 6-1c Proposed Alignment

6.7 Typical Cross Sections

Typical cross sections of the Project are discussed below to illustrate different situations along the alignment. Though these cross sections apply to both the interim and ultimate upgrades, it should be noted that most service roads would only be constructed in the ultimate upgrade.

1. Cross Section 1 – typical (30m median)
2. Cross Section 2 – wide median (greater than 30m)
3. Cross Section 3 – narrow median.

All cross sections include:

- Main carriageway traffic lanes are proposed to be 3.5m wide, with two traffic lanes in each direction. The cross section includes a 3m wide outer shoulder with a 1.5m verge, and a 1m wide median shoulder.
- Service road lanes are proposed to be 3.1m wide lanes and service roads would have one lane in each direction together with a 2m shoulder and 1m verge.
- Separation of the main carriageway and service roads of 15m without a barrier, however if the separation is reduced then a barrier would be required.

The width of the proposed road reserve may vary in some locations in order to protect areas of environmental sensitivity. This would be confirmed during the detailed design phase. Table 6-1 and Table 6-3 outline the proposed median treatments for each intersection within Section 3.

6.7.1 Cross Section 1 – Typical Median

Cross section 1, as shown in Figure 6-2, is typical of new dual carriageways and duplication of sections of the existing Western Highway.

The median width shown for this typical cross section is 30m between the two carriageways or 32m wide separating the traffic lanes if the shoulders are included.

The typical median treatment gives preference for through traffic whilst providing safe turning facilities. The typical median width is designed to allow for vehicles as large as a standard 25m B-Double truck to store safely in the median during a turning manoeuvre.

6.7.2 Cross Section 2 – Wide Median

Cross section 2, as shown in Figure 6-3, applies to some locations where there are environmental constraints that can be avoided by locating them in the median.

This is the same as the typical cross section with the exception of the median, which is greater than 30m width.

6.7.3 Cross Section 3- Narrow Median

Cross section 3, as shown in Figure 6-4, is the same as the typical cross section with the exception of the median, which is narrower (6m wide between the two carriageways or 8m separating the traffic lanes if the shoulders are included).

A wire rope safety barrier would be installed in the median to meet VicRoads safety standards. This type of median is required where values such as significant native vegetation exist on either side of the road corridor.

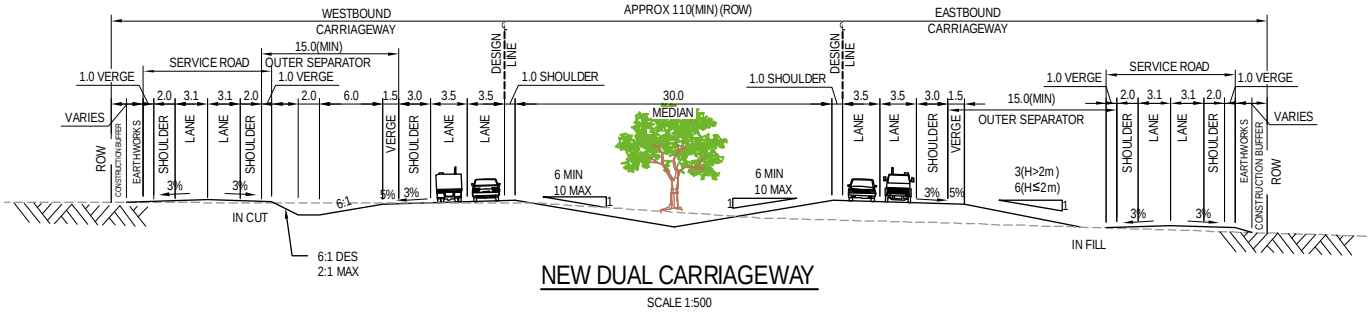

Figure 6-2 Cross Section 1 – Typical median

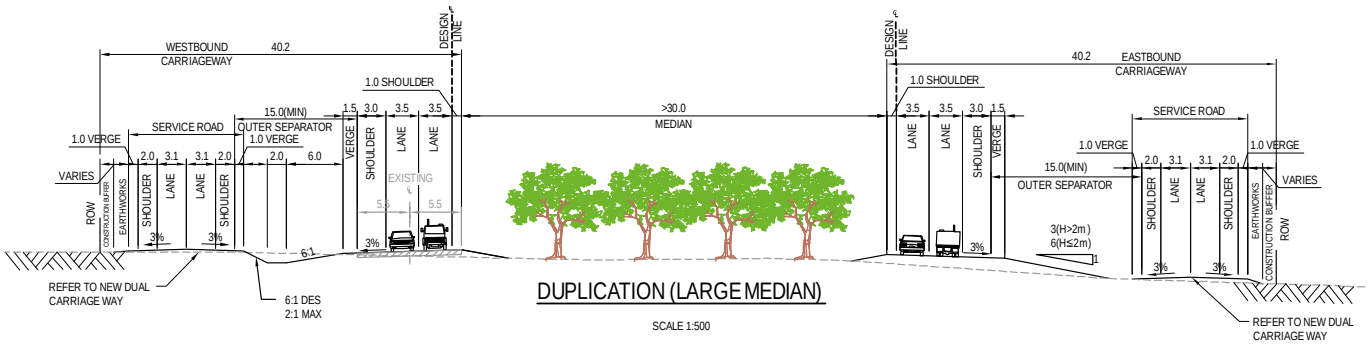

Figure 6-3 Cross Section 2 – Wide median

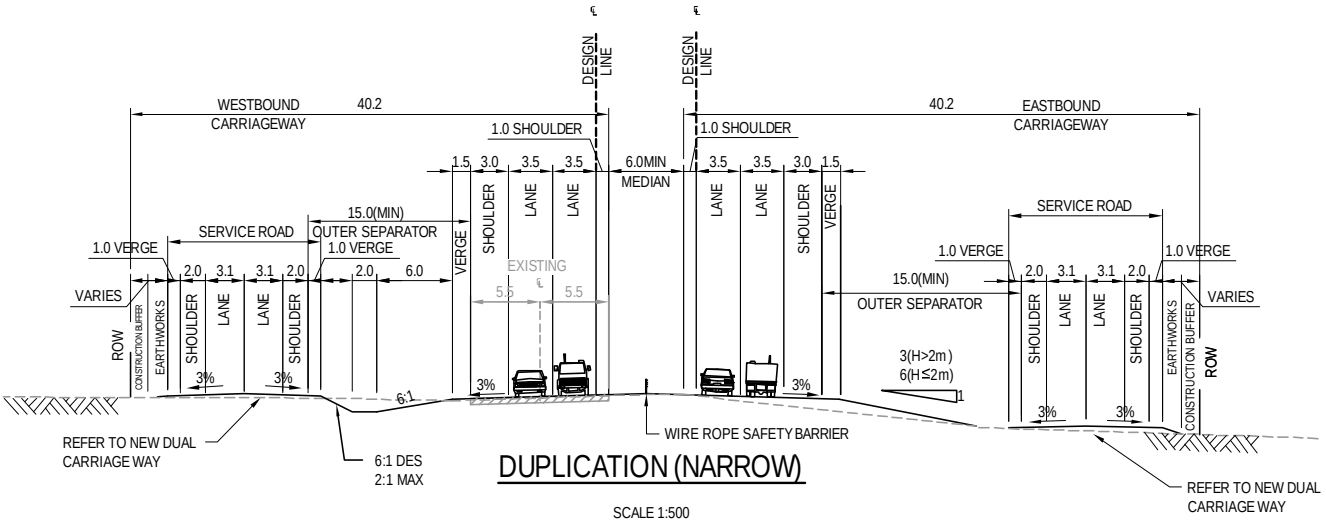

Figure 6-4 Cross Section 3 – Narrow median

6.8 Intersections and Access Control

The Western Highway between Ararat and Stawell has a number of intersecting local roads and direct property access. In developing the Project, VicRoads has sought to balance the road safety and traffic efficiency of the road with the needs of owners and occupiers of adjoining properties. This has been done by seeking to achieve the following key project objectives:

- Provide safer conditions for all road users by:
  - Reducing the incidence of head-on crashes and run-off-road;
  - Improving safety at intersections; and
  - Improving safety of access to adjoining properties.
- Improve efficiency of freight by designing for High Productivity Freight Vehicles.

The VicRoads Access Management Policies have been developed to provide a framework for decision making in relation to access.

Both AMP3 and AMP1 standards are to be utilised (interim and ultimate) for the construction of the Western Highway Project. The transportation function, that is the safe and efficient movement of through traffic, is predominant for both schedules, however the access needs of adjacent land are also important. Based on this policy, VicRoads adopted the following for the Project:

- Grade-separated freeway interchanges and entry and exit ramps are to be provided under the AMP1 freeway standard.
- Wide median intersection treatments are to be provided at key locations along the alignment to facilitate connectivity with major local roads under the AMP3 duplicated highway standard. These are designed to give preference for through traffic whilst accommodating safe turning movements and storage of vehicles accessing the highway. The wide median treatments are designed to allow standard B-Double trucks to store safely within the median during a turning manoeuvre.
- Highway access typically designed to be left in, left out only, under the AMP3 duplicated highway standard.
- Service roads are to be provided wherever alternative access to an existing property is not available, and may be required under both the interim and ultimate proposals.

The intersection arrangements for the alignment are outlined in Table 6-1.

A wide median treatment is shown in Figure 6-5 and a grade separated interchange in Figure 6-6.

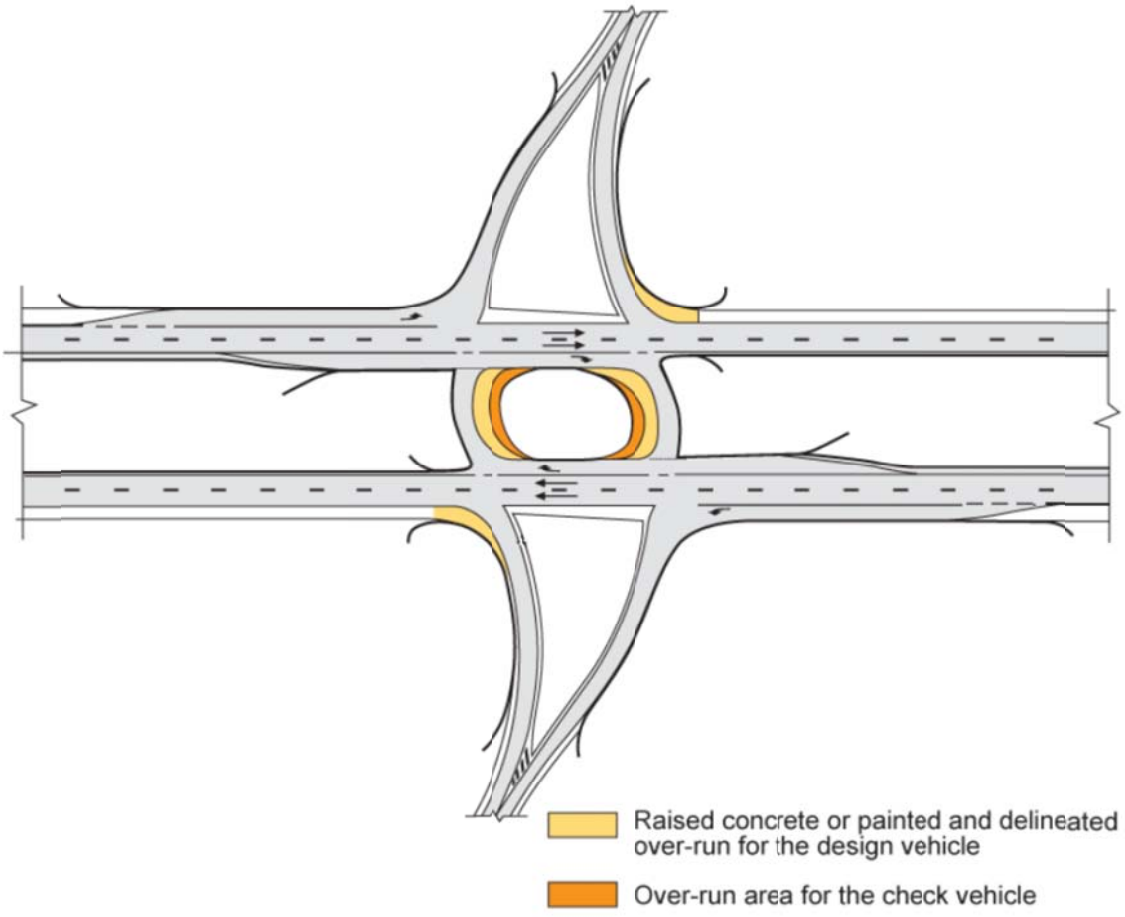

Figure 6-5 Wide Median Treatment (AustRoads 2009, Part 4A, Figure 4.21)

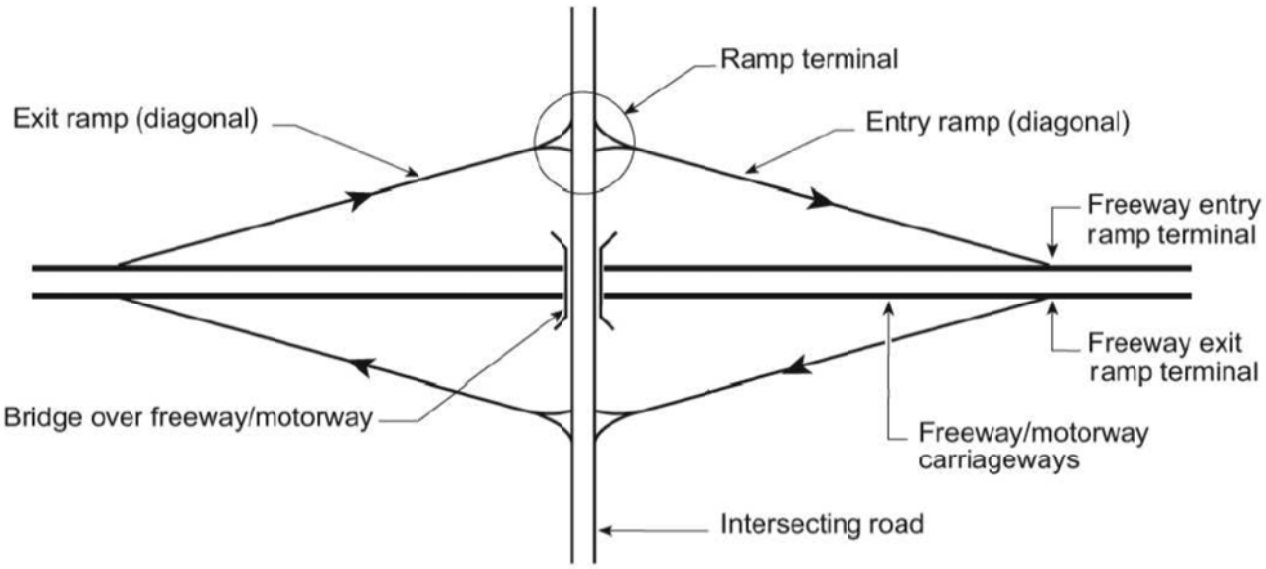

Figure 6-6 Illustration of a Grade Separated Interchange (AustRoads 2009, Part 4C, Figure 3.3)

Table 6-1 Intersection and Access Control

Road	AMP1 – Freeway Standard					AMP3 – Divided Highway Standard	
	Diamond Interchange		Grade Separation / Service Road	Entry Ramp	Exit Ramp	Wide median treatment	Left-in/Left-out only
	½	Full					
The Majors Rd / Main Divide Rd			✓ (service road)			✓	
Petticoat Gully Rd			✓ (service road)			✓	
Old Brewery Rd			✓ (service road)			Truncated - service road to Petticoat Gully Rd	
Thomas Rd, Eaglehawke Rd			✓ (service road)			Truncated - access via Armstrong Interchange	
Armstrong Interchange (Garden Gully Rd/Military Bypass Rd)		✓ (Freeway over)		✓ (Both directions)	✓ (Both directions)	Same as AMP1*	
Kimbarra Rd			✓ (service road)			Truncated – access via Armstrong Interchange and Allanvale Rd	
Allanvale Rd			✓ (service road)			✓	
Delahoy Rd, Metcalf Rd						Truncated – access via Sandy Creek Rd	
St Ethels Rd			✓ (service road)			Truncated – service road to existing highway north of interchange	
Great Western Southern Interchange	✓ (southbound entry ramp over freeway)			✓ (southbound)	✓ (Northbound – using existing highway)	Same as AMP1	
Sandy Creek Rd			✓ (Local road over)			Local road over	
Hurleys Lane						Truncated – access via Bests Rd	
Great Western northern interchange / Bests Road	✓ (Local road over)			✓ (Northbound – using existing highway)	✓ (Southbound)	Same as AMP1	
Briggs Lane, Humphrey Lane			✓ (service road)				✓
Churchill Crossing Rd			Truncated – access via local roads			✓	
Harvey Lane / Oddfellows Bridge			✓ (service road) new bridges for carriageways west of existing bridge		✓ (Southbound)	✓ Between Harvey Lane and Hurst Rd with service road	
Hurst Rd			✓ (service road)				✓
Panrock Reservoir Rd			✓				✓
London Road		✓ (Freeway over)				Same as AMP1*	

* Subject to project funding

6.9 Waterways and Drainage

As shown in Table 6-2, the proposed alignment intersects seven significant waterways at existing crossings of the Western Highway and two significant waterways with new crossings. In three locations, on ramps and off ramps of the proposed alignment also intersect significant waterways at existing crossings. There are 28 minor waterways that would be intersected by the proposed alignment.

Overall there are 10 significant waterways and 28 minor waterways that would be intersected by the proposed alignment. A significant waterway is a well-defined channel and/or with significant ecological value. A minor waterway is an unnamed tributary stream or drainage line.

It is proposed that the type of waterway crossing treatments for the Project would typically match those of the existing highway. This means that where there is an existing culvert, a culvert is proposed for the duplicated highway, and where there is an existing bridge, a bridge is proposed for the duplicated highway.

The piers of the bridges would be constructed outside of the low flow channel extents. In order to prevent exacerbation of flooding it is likely that some existing bridges would require upgrades to accommodate the duplicated crossing. Preliminary flood modelling has been completed for key crossings and has informed the EES (refer to Chapter 12 (Surface Water)).

In order to sustainably manage surface water runoff and protect water quality, the duplicated highway would be constructed and operated in accordance with the VicRoads Integrated Water Management Guidelines (VicRoads, 2011) and Water Sensitive Road Design Guidelines (VicRoads, 2007).

The Project would also be designed to meet the objectives for water quality that are described in the Best Practice Environmental Management Guidelines (CSIRO, 1999).

Specifically VicRoads proposes to:

- Use sedimentation basins and other best-practice environmental management techniques to prevent sediment laden run-off from leaving construction sites; and
- Utilise non-potable (non-drinking water quality) water for construction activities wherever practicable.

Table 6-2 Waterway Crossing Treatments

Type of Waterway	Waterway	Waterway Crossing Treatment
Significant waterways	Concongella Creek	3 existing culvert crossings –replace and duplicate 1 Existing bridge crossing (off ramp, southern Great Western Interchange) - No change to bridge structure 1 Existing bridge crossing (Bests Road) - Minor change to existing structure 1 New Crossing - Twin Bridges
	Allanvale Creek	New crossing – twin bridges
	Donald Creek	1 existing culvert crossing – replace and duplicate
	Robinsons Creek	1 existing culvert crossing (on ramp, northern Great Western Interchange) – minor change to existing structure 1 new crossing – culvert
Minor waterways	Tributary of Hopkins River	2 existing culverts crossings - replicate and duplicate
	Tributaries of Concongella Creek	25 existing culvert crossings - replicate and duplicate
	Tributary of Pleasant Creek	1 Existing culvert Crossing - Replace & Duplicate

6.10 Bicycle and Pedestrian Use

Based on VicRoads Access Management Policies and road rules, it is anticipated that cyclists would be able to continue using the Western Highway between Ararat and Stawell for both the interim and ultimate upgrades, provided road access signs do not prohibit cyclists. The 3m sealed shoulder is sufficient width to allow for cyclists.

No specific provisions have been included within the design for pedestrians.

6.11 Railway Crossings

Two new crossings of the Melbourne – Adelaide railway line are proposed between Ararat and Stawell, each adjacent to existing railway bridges at Armstrong and Oddfellows Bridge, approximately 5km east of Stawell.

Access arrangements regarding construction work over and in the vicinity of the railway line would be agreed between VicRoads and the Australian Rail Track Corporation. This agreement would identify when construction activities can occur, which would predominantly be between train movements (which are not frequent) or after hours. Although unlikely, it is possible that operation of passenger trains could be suspended for a short period to allow construction work to occur.

6.12 Noise Attenuation

As described in Chapter 16 (Noise and Vibration), in accordance with the provisions of the Traffic Noise Reduction Policy (VicRoads, 2005) noise attenuation measures may be required in certain circumstances.

6.13 Lighting and Traffic Signals

Street lighting would be provided in accordance with Chapter 6 of VicRoads Traffic Engineering Manual Volume 1 – Traffic Management which states a specified level of lighting at intersections. Street lighting would be provided at all interchange and wide median treatment intersections.

No traffic signals are proposed for the Project.

6.14 Landscaping

Some vegetation in the road reserve which currently screens views to and from the highway would be removed for the Project. Landscaping for the Project would be undertaken in accordance with VicRoads Roadside Planting Guidelines (VicRoads, 2010). The design and species selection for landscaping would be in keeping with the existing landscape.

6.15 Rest Areas and Truck Stops

New northbound and southbound truck stops are proposed between Ararat and Stawell.

For the southbound carriageway, a truck parking bay has proposed at approximately Ch. 9000 - 9500.

For the northbound carriageway, a new truck parking bay has been proposed at approximately Ch. 19000 - 19800.

6.16 Refinement of the Alignment

Following selection, the alignment has been refined through the EES assessment process. The refinement of the alignment has been iterative following the risk assessment and impact assessment stages as these have progressively provided further information on environmental values and risks.

The key changes and basis for the final proposed alignment presented in this EES are outlined in Table 6-3. Further description of the alignment changes to avoid impacts on native vegetation is provided in Chapter 13 (Biodiversity and Habitat).

The location of each item described in Table 6-3 is shown in the mapbooks in Technical Appendix A with the corresponding item number.

Table 6-3 Key Changes and Basis for Alignment

Item No. and Chainage	Basis for Final Alignment
1 Ch. 0 to 2400	▪ Access to be maintained to The Majors Road and Main Divide Road – by wide median treatment for Interim Upgrade and service roads for ultimate upgrade ▪ Minimise impact on and maintain access to the Ararat Regional Park ▪ Minimise impact on landowners by extending alignment adjacent to the existing highway ▪ Minimise impact on olive plantation at Ch. 1600 ▪ Use of existing highway to minimise impacts on landowners
2 Ch. 2400 to 5400	▪ Proposed alignment construction footprint constrained to reduce impact on vineyard at Ch. 3600 ▪ Access to be maintained to Petticoat Gully Road and Old Brewery Road (to maintain access to Armstrong) – by wide median treatment for Interim Upgrade and service roads for ultimate upgrade ▪ Wide median and service road located to reduce impacts on road side vegetation ▪ Use of existing highway to minimise impacts on landowners
3 Ch. 5400– 8600	▪ Use of existing Armstrong deviation to minimise impacts on landowners ▪ Interchange proposed at Garden Gully Road / Military Bypass Road to provide access to Armstrong and Garden Gully Road which provides access to Great Western

Item No. and Chainage	Basis for Final Alignment
4 Ch. 8600 to 11400	▪ To address landowner comments, the carriageways are proposed to extend along the southern side of the existing highway – this would result in the loss of a dwelling at Ch. 9400, as discussed with landowners. ▪ Construction footprint minimised with narrow median to avoid impacts on heritage cellar at Ch. 10800 and associated dwelling. ▪ Wide median and service road located (Ch. 8600 to 10400) to reduce impacts on road side vegetation. ▪ Narrow median to avoid vineyard between Ch. 10400 and 11200 ▪ Access maintained to St Ethels Road.
5 Ch. 11400 to 14800	Proposed bypass of Great Western to: ▪ Remove large trucks from travelling through the town thereby improving safety ▪ Avoid impacts on heritage listed sites and vineyards ▪ Avoid severance of the township areas on the south of the existing highway The proposed alignment: ▪ Extends along the edge of property boundaries where possible to minimise impacts on landowners ▪ Avoids historical heritage sites ▪ Minimises impact on vegetation ▪ Extends across a corner of the former landfill site and quarry in order to minimise construction impacts New service road proposed between Ch. 12600 and 13000 to provide access to property New access proposed from Sandy Creek Road / Metcalfe Road to Delahoy Road
6 Ch. 14800 to 20200	▪ Overpass provided at Bests Road to maintain access ▪ Proposed alignment located to minimise impacts on vineyard at Ch. 15400 to 15800 ▪ New access road to be provided between Bests Road to Briggs Lane to maintain access ▪ Alignment proposed on the southern side of the existing highway from Ch. 16400 to 20200 in accordance with landowner discussions ▪ Widen median to avoid impacts of sensitive vegetation Ch. 18000 and 19000 ▪ Truck parking bay provided for west bound traffic at Ch. 19200 to 19800
7 Ch. 20200 to 24200	▪ Alignment extends straight across the railway line to avoid dangerous gradeline and sight distances with existing alignment. ▪ Existing highway proposed to be a service road between Ch. 20300 and Hurst Road, which would also provide southbound access to the proposed duplication ▪ New access proposed for property off Panrock Reservoir Road ▪ Existing highway proposed to be utilised for providing access from London Road interchange to the golf course and caravan park ▪ Proposed duplication follows existing highway with a reduced median with and constrained construction footprint to minimise impacts on landowners and vegetation. ▪ Proposed alignment located west of existing highway to avoid impacts to the heritage site, Sisters Rocks ▪ New interchange proposed at London Road to address existing safety issues with London Road / Panrock Reservoir Road intersection ▪ Proposed alignment extends on the eastern side of the existing highway to avoid impacts on sensitive vegetation area between Ch. 23200 and 24200.

6.17 Construction Method

This sub-section outlines an indicative construction method which is based on VicRoads experience in constructing projects of a similar scale.

Staging of works has not yet been determined and would be dependent on project funding.

6.17.1 Workforce and Working Hours

It is likely that a considerable number of construction and site management personnel would be required; however this would be dependent on the structure and size of the contract packages. Construction is expected to be undertaken over a period of up to three years subject to the availability of future funding.

Construction work for the Project would be undertaken during the standard hours for construction work as set out in VicRoads specifications, which are:

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

Construction outside of the standard hours is likely to be minimal and would be subject to approval by VicRoads and notification of affected members of the community.

6.17.2 Construction Activities

Construction activities would be guided by the Contractor(s) Environmental Management System (EMS) and associated Construction Environmental Management Plans (CEMPs) which would incorporate all measures as described in Chapter 21 (Environmental Management Framework) of this EES, and any other measures identified in the conditions of subsequent statutory approvals for the Project.

6.17.2.1 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 for all 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 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 around each stockpile and seeded to minimise erosion.
- Utilities would be relocated or protected, as and when required. Refer to Section 6.17.9 for more information.
- Stormwater drainage works would be completed, including the construction of water sensitive road design measures. These may be consolidated with temporary sediment basins.
- Earthworks and pavement preparation would be carried out by graders, dozers, scrapers and other equipment, including compaction of the resultant surface using compaction equipment such as various types of rollers (vibrating, pad-foot, smooth-drum) 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 each 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.
- Flexible 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.
- The construction site would be landscaped and re-vegetated, including reinstating and topping up of topsoil, seeding, planting trees and shrubs, installing weed mats and mulch. Any design elements such as artwork would be installed as required.

6.17.2.2 Structural Works

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

- Bored or driven piles are proposed 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 etc.
- 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. 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.
- The site would be cleaned up and all surplus waste materials disposed of.

6.17.3 Plant and Equipment

Plant and equipment for the construction of the Project would be determined by the Contractor(s) during the construction planning phase. An indicative list of plant and equipment likely to be used on site for the Project would include:

- Scrapers, dozers, excavators, backhoes, graders, paving and other earth moving equipment.
- Kerbing machine, profiler, trenching machine, line marking machine and concrete trucks and pumps.
- Compaction equipment such as rollers, vibrating rollers and compactors.
- Piling rig, cranes, crane trucks (truck with a mounted crane on the rear), and associated equipment.
- Trucks and trailers, water carts, dump trucks and associated equipment.
- Light vehicles, pneumatic hand or power tools, and general tradesmen equipment.
- Pavement profiler and pavers for asphalt and/or crushed rock pavements.
- Traffic management gear such as safety barriers and variable message boards.
- Bitumen sprayers, rollers and aggregate loaders for spray seal surfacing works.

6.17.4 Earthworks

Earthworks construction for the Project is expected to be dominated by the need for cutting into some hillsides to achieve adequate grades and for fill above the natural surface in other areas. Much of the new carriageway(s) would be built on low level fills to achieve drainage and protect the road pavement.

For the proposed alignment, preliminary estimates forecast that approximately 1 million cubic metres of spoil from excavations would be reused or disposed with potentially up to around 3 million cubic metres of fill material required to build up the road in other areas.

Spoil would be used during construction for batter flattening or land forming where this is possible. Spoil considered unsuitable for this purpose would be disposed of onsite where possible. Disposal of spoil onsite would be within the identified construction area or outside of environmentally sensitive ‘no go’ areas. Spoil may be disposed of offsite on adjacent properties (in non-environmentally sensitive areas) as agreed with landowners and subject to necessary statutory approvals.

6.17.5 Source and Quantity of Materials

Fill material would be sourced from cut areas from the site wherever possible, however considering the likely significant short-fall, additional sources would need to be identified. These would potentially be from a combination of sources, including local quarries and borrow pits in the vicinity of the works.

It is possible that the Contractors could come to an arrangement with local farmers for the construction of dams and reshaping of adjacent land to source the necessary material. It has not been feasible to identify sites for gaining fill material during this EES because:

- the precise quantities of fill required cannot be determined until the detailed design phase;
- the precise nature and quantity of materials on nearby sites is currently not available; and
- the sourcing of fill is to be the responsibility of the construction contractor(s).

The road pavement material would be sourced from appropriately licensed facilities which meet the quality requirements of the required material. Exact material quantities are unknown at this stage but materials may include concrete, steel, crushed rock, aggregate, sand and other quarry materials. These materials would be sourced from local quarries and commercial suppliers wherever possible.

Surplus material that cannot be used on site would be re-used or disposed of at accredited materials recycling or waste disposal facilities.

Quantities of water required during construction are unknown at this stage and would depend on material sources and methodologies applied by the contractor(s). Water would be required for earthworks and pavement construction as well as part of dust suppression measures.

As the majority of water is likely to be required for earthworks construction and dust suppression, this could be sourced locally through re-use of water captured on site or other non-potable supplies. In accordance with VicRoads Water Use Policy, in this area, recycling of waste water would also be considered where possible.

6.17.6 Construction Site Drainage

During construction, provision of sedimentation basins and other similar treatments and measures may be required to capture and treat any runoff from the site to prevent the discharge of sediment laden water into nearby waterways. In accordance with VicRoads requirements the sedimentation basins would be required to have a capacity to capture/store water generated up to a two year Average Recurrence Interval (ARI) storm event. The sizing of sedimentation basins would also need to be determined in accordance with the VicRoads Temporary Sedimentation Basin Design Tool.

The quality of water in receiving waterways would be monitored to ensure there was no detrimental impact from site runoff.

6.17.7 Traffic Management and Access

There would be movements of heavy vehicles resulting from the construction works, primarily associated with transport of construction machinery and equipment to and from the site, and import and disposal of materials (fill, pavements, etc.) using trucks.

In accordance with VicRoads policy, construction vehicles and machinery would be restricted to the highway and arterial roads wherever possible. Construction vehicles would not typically use local roads and would likely access the site via the highway and possibly purpose built access tracks along the alignment. These access tracks would be restricted to avoid environmentally sensitive areas (which would in turn be fenced off to prevent construction access) and are identified within the construction footprint.

The volume of construction traffic would ultimately depend on the program and staging of construction sections, where an increased rate of construction would result in higher traffic volumes on the network each day but over a shorter overall period. The sequencing of construction phases would depend on contractor's works program, construction methodology adopted, the time of year and the part of the Project.

The construction of the Project is estimated to generate traffic related to the following broad construction activities:

- Set out and preparation of the construction corridor.
- Relocation or protection of utilities and other services, where required.
- Completion of drainage works.
- Undertaking surface preparation, compaction and associated earthworks.
- Construction of pavement, including verges, batters, kerb and channel, where required.
- Construction of bridge and culvert structures.
- Application of flexible asphalt pavement and/or spray seal treatment.
- Application of line markings, re-vegetation and installation of other road furniture.

An accurate estimate of construction traffic generation cannot be made until a program and staging of construction has been developed. However, the construction of similar projects typically generates the greatest traffic volumes during the earthworks and pavement construction phases, and generally less traffic volumes at other times. These two phases could be expected to generate in the order of 100 – 150 truck trips per day across the workday. Less than 100 light vehicle trips would be expected to be generated by worksite contractors accessing the site, typically expected to occur during early morning and late-afternoon periods.

Based on the above, at its peak, the construction of the Project would be typically expected to generate in the order of 250 vehicle trip ends per day, including 150 heavy vehicles.

It is not anticipated that night work would be required, although this would be considered where it may reduce the impact on the public and local community.

It is conservatively assumed that 30% of light vehicle construction traffic occurs during the peak hours, associated with worksite employees arriving and departing the site. Similarly, it is conservatively assumed that 15% of heavy vehicle traffic occurs in the peak hours, associated with an even distribution of truck movements across the workday. It is also conservatively assumed that the construction peak hours would coincide with the peak hours of Western Highway. It is therefore estimated that the construction activities may generate up to 43 vehicle trip ends in peak hours, including 13 heavy vehicles.

Given the existing observed peak period traffic volumes and relatively high percentage of heavy vehicles on Western Highway in the project area, the additional construction traffic is not anticipated to have an unmanageable impact on the operation of the highway. More significant impacts are likely to result from temporary changes to road environments and localised speed reductions, and these would be addressed in the Traffic Management Plan.

6.17.7.1 Traffic Management Plan

Traffic management would be undertaken in accordance with established VicRoads practices, the Worksite Safety Traffic Management Code of Practice and the *Road Management Act 2004*. Typically, this would include installation of traffic barriers along the alignment to separate the construction work area from passing traffic as appropriate, a reduction in speed (nominally to 60km/h or 80km/h, or lower if justified at a locality) and other routine traffic management measures.

Traffic Management Plans would be prepared to provide details of the traffic management to be implemented during construction to minimise highway impacts and maintain traffic flow on the surrounding road network. This would include details of all traffic management measures and any specific routes that construction traffic and local traffic would follow, if required, to minimise the overall impact on the public and local community. Details of the staging of the works have not yet been finalised, and would be dependent on a number of factors including the final design adopted, the staging and breakdown of construction contracts/packages, and the actual works ultimately required.

6.17.8 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. Chemicals and fuels for construction would be stored in appropriate storage areas within the compound site.

Site compounds and construction laydown areas are likely to be located in close proximity to the section of highway under construction, but the exact number, area and locations cannot be identified at this time.

The construction area identified for the EES does not include location of site compounds, however there may be some areas that could accommodate them.

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

The contractor(s) CEMP would be required to contain provisions excluding the locations of site compounds and laydown areas from sites that:

- Contains remnant native vegetation;
- Contain significant Ecological Vegetation Classes or known habitats for endangered species;
- Contain Aboriginal or non-Aboriginal cultural heritage sites;
- Within 30m of waterways; and
- Within 100m of dwellings.

6.17.9 Utility Services

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

Actions would be put in place to ensure no damage occurs to existing services, and the road design incorporates the requirements of the utility asset owners. These actions would potentially include:

- Additional potholing and proving of services (locations, depths, etc.).
- Obtaining specific approvals from utility asset owners and agreeing on proposed measures to protect, relocate or maintain those services.
- Protection of impacted assets (e.g. using measures such as concrete covers of the affected services) and/or relocation of the affected service, as appropriate.
- Adjustment of the road design where required.

Dial-Before-You-Dig searches were undertaken during the concept development stage. The services understood to be located in close proximity to the works and which would require re-location include:

- Telecommunications (Telstra and Optus); and
- Electricity (Powercor).

6.18 Rehabilitation

Upon completion of the 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.

6.19 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.

6.19.1 Roadside Management

VicRoads has a number of tools with which it manages its assets, including roadsides.

VicRoads' 'Roadside Management Strategy 2011, Roadside Management – A Balanced Approach' is a strategy which aims to provide clear and consistent objectives to manage roadside areas. It provides a balanced approach to management, including 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.
- 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.

Fire management is a cooperative approach between government agencies to ensure that fire management is strategic, effective and targeted.

Particular actions associated with the strategy are to assess all arterial roads for fire risk and identify a treatment program based on risk assessment. Road reserve fire hazards that have been identified by landowners through consultation for the Project, would be assessed as part of the above Roadside Management Strategy for all roads VicRoads has the responsibility to maintain.

Western Highway, Armstrong