

Great Western Highway Katoomba to Mount Victoria

Urban Design Framework
Roads and Maritime Services | May 2019



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1 INTRODUCTION

1.1 Background

The Roads and Maritime Services (Roads and Maritime) is planning and investigating a duplication of the Great Western Highway (GWH) between Katoomba and Mount Victoria. The duplication in simple terms refers to the providing two travel lanes in each direction in a safer and more efficient alignment.

The GWH is an important freight and tourist route which provides a critical link between the Central West and Sydney.

A section of the road at Mt Victoria has recently been upgraded with safety improvements and a section of the road at Blackheath is currently being upgraded with safety improvements.

It is proposed that these sections would be largely by-passed to further improve travel time and efficiency.

Roads and Maritime has engaged KI Studio to undertake a strategic urban design study to develop a Urban Design Framework to be used to inform the identification of alignment options, taking into consideration urban design challenges and opportunities along the corridor.

1.2 Purpose of the Report

This Urban Design Framework is to guide the corridor investigation at a strategic level for this section of the Highway (Katoomba to Mount Victoria) and to achieve a consistent urban design approach along this stretch of the road. It is also to give Roads and Maritime assurance that a high quality urban design outcome is achieved.

This Framework has been developed to be consistent with the 2006 Great Western Highway Urban Design Framework, Blue Mountains - Lapstone to Katoomba to encourage consistency with the previously upgraded sections of the Great Western Highway in the Blue Mountains to the east of Katoomba.

It is anticipated that this stretch of the highway upgrade between Katoomba and Mount Victoria will be undertaken in phases as separate projects. Hence, it is important that this Framework provides guidance to designers from all disciplines, including urban designers and project managers.

This Framework shall be used in conjunction with other Roads and Maritime reference documents (see section 1.4). These reference documents are updated from time to time and the issue dates reflect the current dates at the issue of this framework document. Hence, the latest issue should be used when referencing to these documents.

1.3 Structure of the Report

The report is structured in sections that describe the various inputs for the framework.

The corridor analysis informs the project vision, and is followed by urban design objectives and principles for the overall corridor.

The landscape character zones are described in more detail and include a more detailed set of applicable design objectives and principles.

Graphic maps support the text and help describe the Journey and the Framework Overview.

The challenges and principles for each zone are concluded at the end of the report.

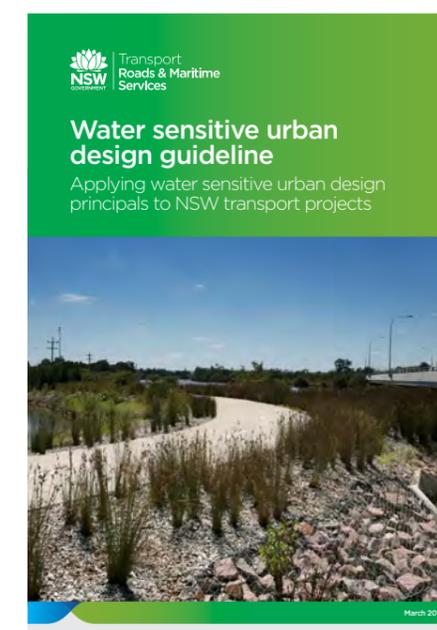
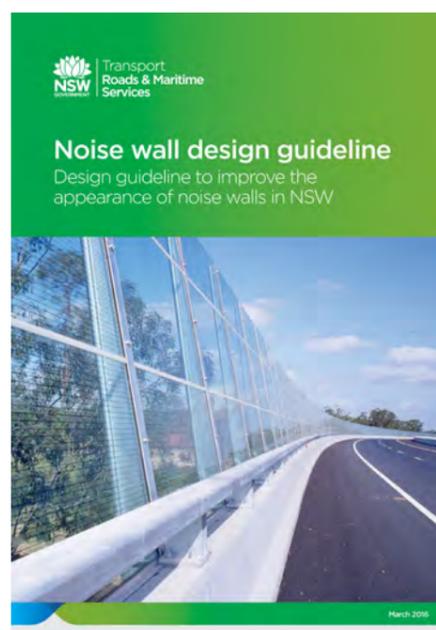
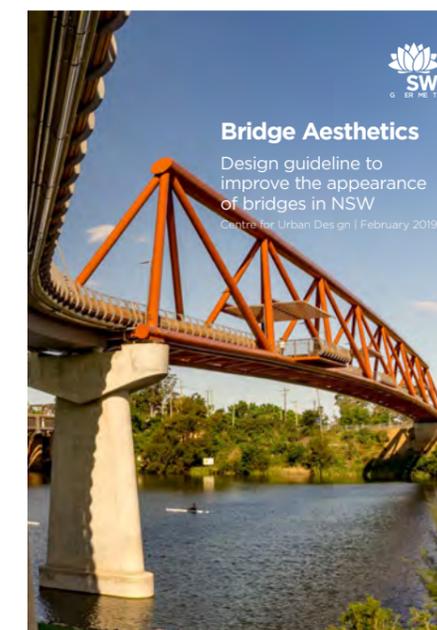
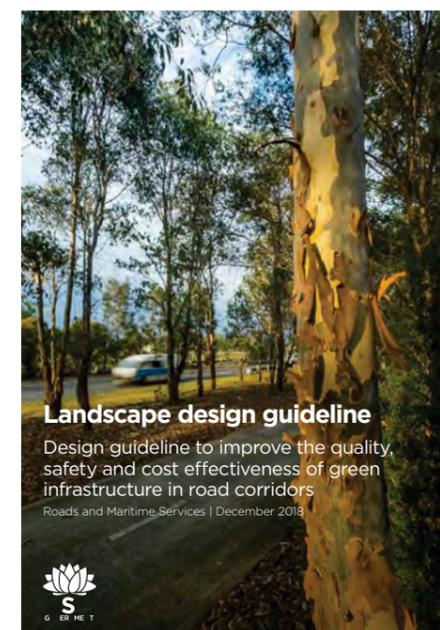
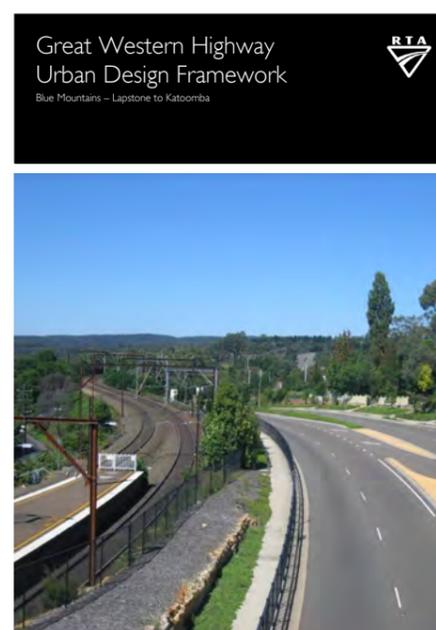
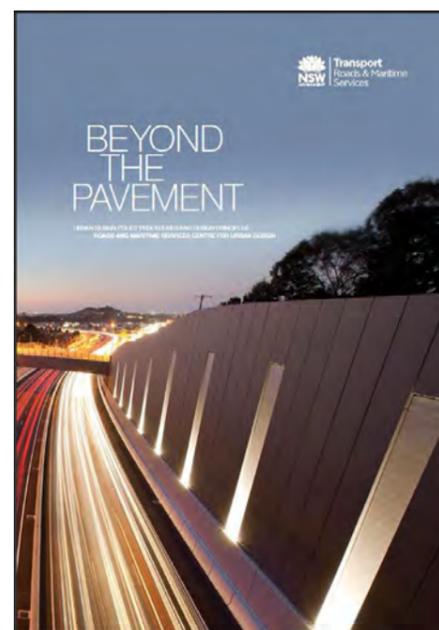
1.4 Reference Documents

Key reference documents for the development of the Urban Design Framework include:

- 'Beyond the Pavement – Urban design policy, procedures and design principles', Roads and Maritime, updated February 2014
- Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, Roads and Traffic Authority, November 2006
- 'Guidelines for landscape character and visual impact assessment No. EIA-N04', December, 2018
- Great Western Highway - Urban Design & Landscape Strategy, Mount Victoria to Lithgow, Roads and Maritime, June 2010.

Other strategic RMS Design Guidelines that have been referred to include:

- 'Landscape design guideline- Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors,' Roads and Maritime, December 2018
- 'Bridge Aesthetics – Design guideline to improve the appearance of bridges in NSW', Centre for Urban Design, February 2019
- 'Tunnel urban design guideline – Design guideline to improve the customer and community experience of road tunnels', Roads and Maritime, May 2017
- 'Noise Wall Design Guideline – Design guidelines to improve the appearance of noise walls in NSW', Roads and Maritime, March 2016
- 'Shotcrete Design Guideline – Design guidelines to improve the appearance of shotcrete in NSW', Roads and Maritime, March 2016
- Water sensitive urban design guideline- Applying water sensitive urban design principles to NSW transport projects, May 2017



2 SITE ANALYSIS

2.1 Site Context

2.1.1 Regional Context

The study area is located within the Great Dividing Range in NSW, west of Sydney, on the western zone of the Blue Mountains, identified as the 'Upper Mountains' in the Great Western Highway Urban Design Framework. Refer Figure 2.1.

This section of the highway is part of a major route between the Central West of NSW and Sydney and is an important haulage route for heavy vehicle traffic. The Great Western Highway and the Main Western Railway Line form the primary transport corridors that link Penrith with Lithgow.

The route interfaces with four historic townships from east to west, these include, Katoomba, Medlow Bath, Blackheath and Mount Victoria.

A secondary route through the Blue Mountains via the Bells Line of Road, connects Windsor to Lithgow.

UNESCO's Blue Mountains World Heritage Area is illustrated by the dark green areas on Figure 2.1. Whilst the villages themselves and the developed area of the ridgeline upon which the highway sits, are not located within the World Heritage areas, the views to these significant areas are obtained from the site, and accesses into the World Heritage Areas meet the highway. As the UNESCO nomination reports: "Most of the natural bushland of the GBMA (Greater Blue Mountains Area) is of high wilderness quality and remains close to pristine."

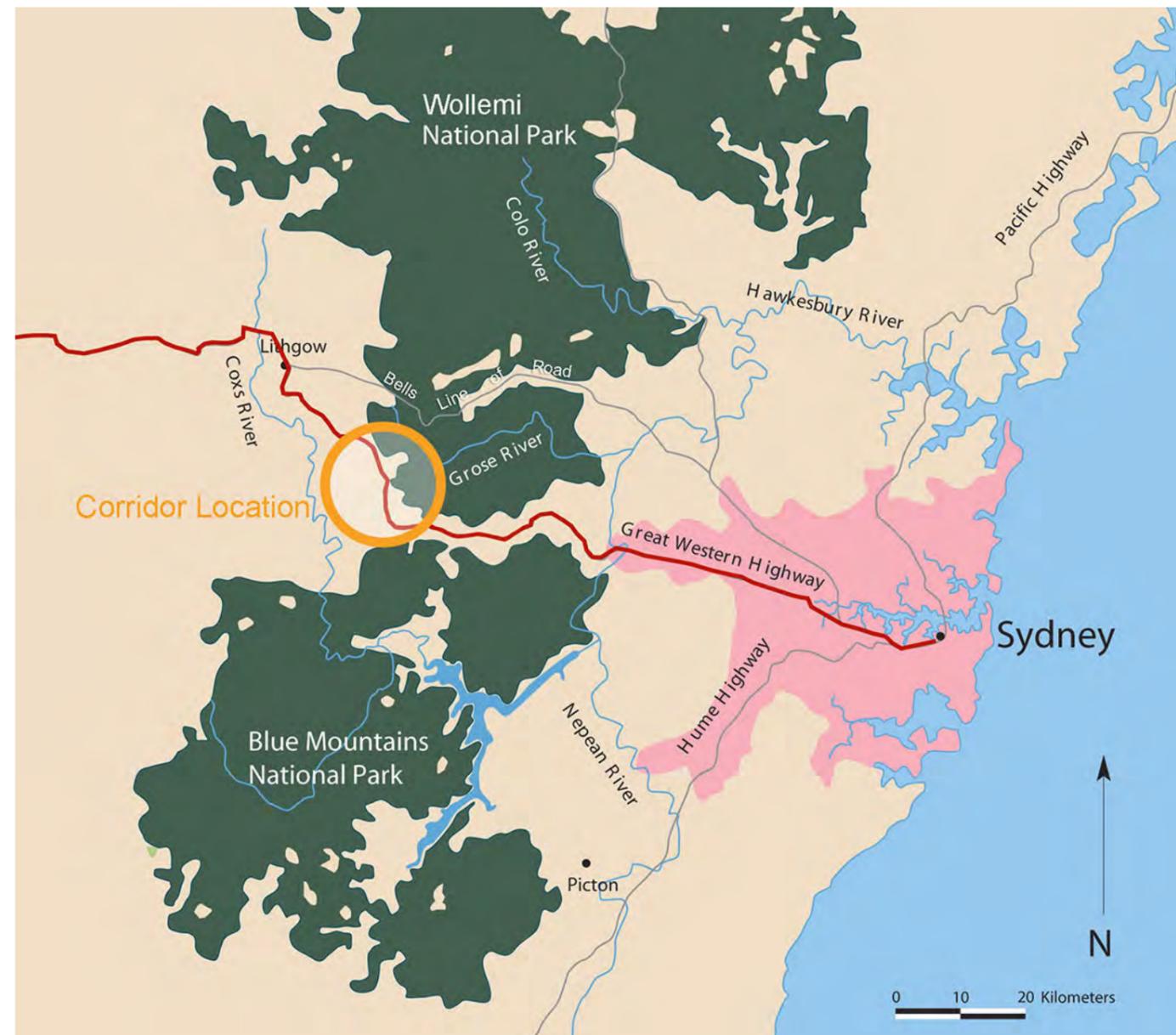


Figure 2.1 Regional Context

2.1.2 Description of the Study Area

The study area is approximately 13.5 km long and 1 km wide except in the area of Blackheath where it is up to 1.5 km wide. The study area generally follows the ridgeline occupied by the existing highway and railway corridor.

The project boundary at the eastern end is in the vicinity of Watson Way, at the western edge of the Katoomba township, whilst the western project boundary is just east of the township of Mount Victoria.

The rugged terrain, combined with its natural beauty, makes it a challenging study area, highly sensitive to change. The study area is situated between two prominent valleys, the Megalong Valley to the west and the Grose Valley to the east- providing a dramatic landscape setting.

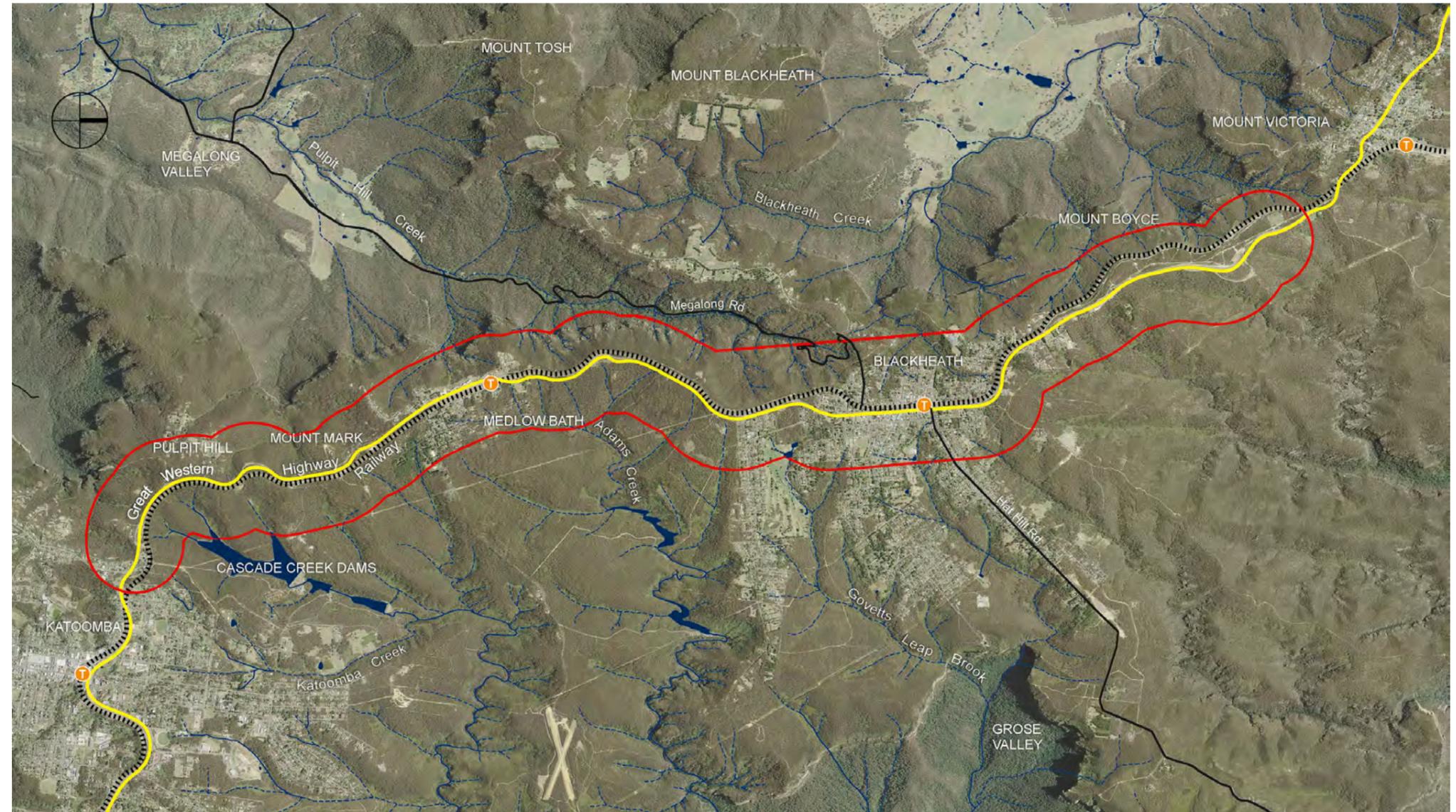


Figure 2.2 Study Area

2.1.3 History of the Area

The Great Western Highway from Parramatta across the Blue Mountains to Bathurst is Australia's most historic road. The original route was identified in 1813 by Gregory Blaxland, William Charles Wentworth and William Lawson who crossed the mountain range.

The route was mapped by surveyor George Evans and shortly afterwards a road was built from Penrith to Bathurst by William Cox, linking the Sydney basin with the Central West of NSW.

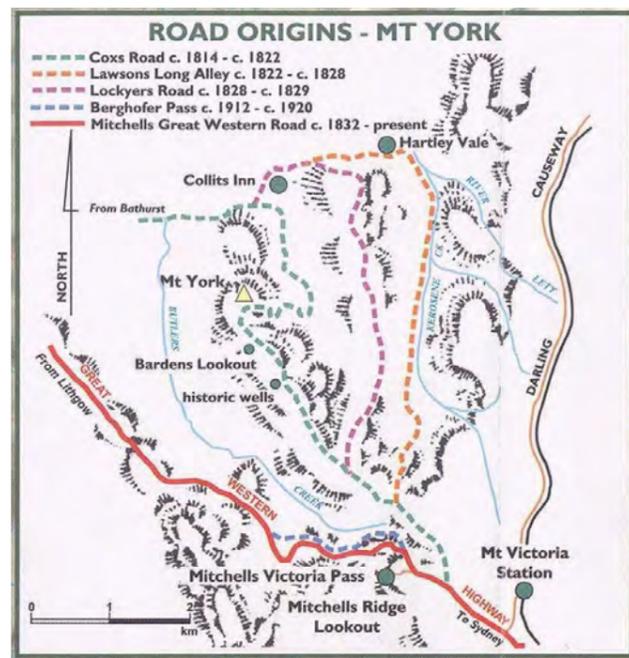


Figure 2.3 History Map illustrating the road origins

The route ensured the survival of the colony, specifically Port Jackson, by providing access to new agricultural land west of the Great Dividing Range. With it, a number of new settlements established along the route and beyond.

The road was improved and realigned in the 1830s by Surveyor General Thomas Livingstone Mitchell who identified a route along a ridge he called Mount

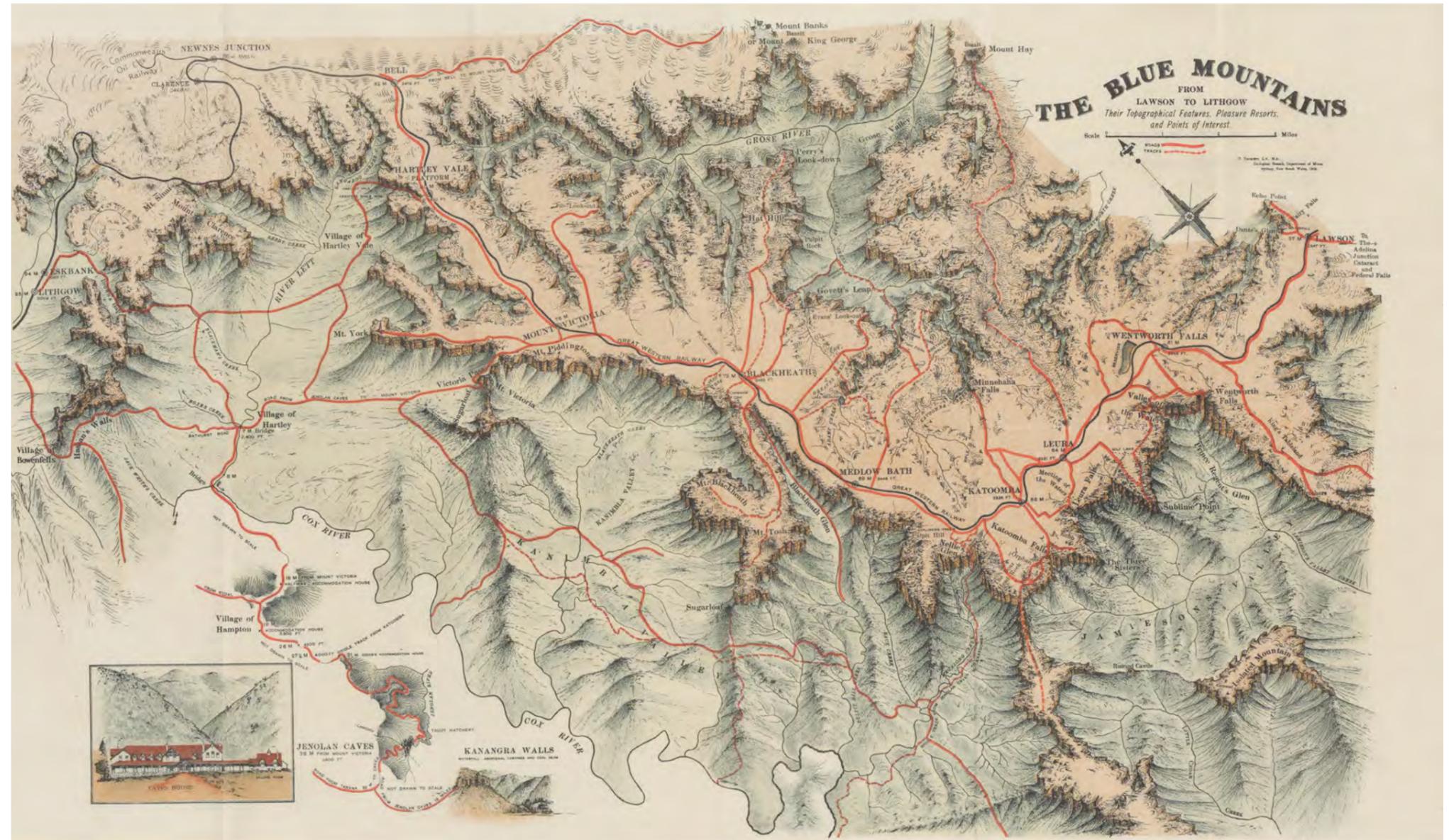


Figure 2.4 --Historic Map 1909 Source: *Modré hory (Nový Jižní Wales)* Creator: Trickett, Oliver; Publisher: Geological Branch, Department of Mines, 1909

Victoria. This road has essentially remained as the present route of the Great Western Highway, with improvements made in 1912 and 1920 to achieve gentler grades around Victoria Pass.

Popular bushwalking tracks now follow a number of the abandoned routes and provide valuable recreational facilities for the locals and tourists.

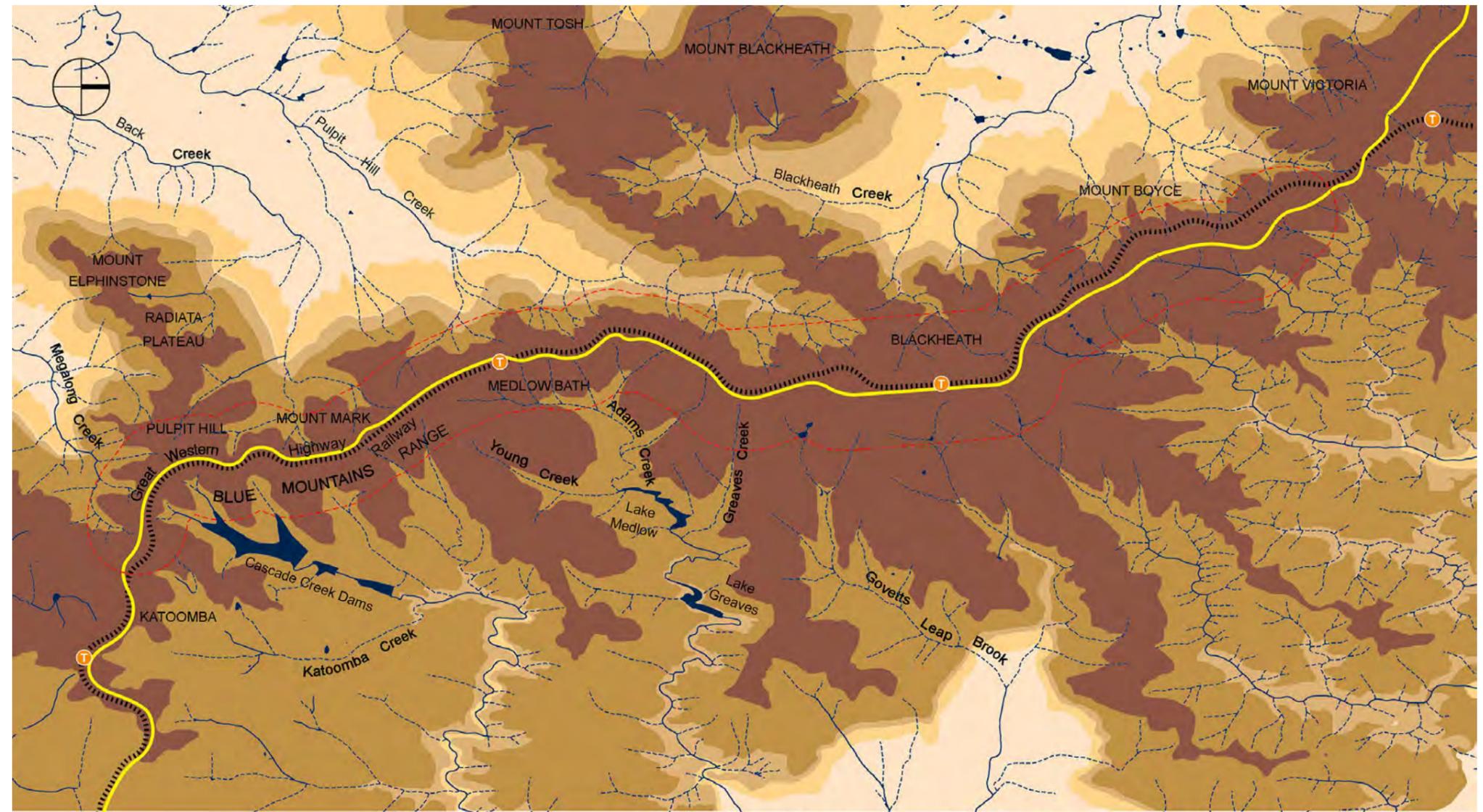
Figure 2.4 illustrates a 1909 map that clearly shows the dramatic landscape contrasts of the area, with the road following the top of the ridgeline, with the steep, gorge like slopes leading into the Megalong Valley.

2.1.4 Landform & Hydrology

The general landform of the Blue Mountains has a rugged topography, characterised by a strongly undulating landscape, interfacing by a steep escarpment. This makes the identification of a route corridor particularly challenging in terms of integrating the road in its setting and conforming to the latest road standards.

The adjacent map illustrates the topography in the vicinity of the study area and shows how the existing road and railway line share the ridgeline—a common characteristic of the Great Western Highway along the Blue Mountains.

To the west of the ridgeline, the steep drop off the escarpment is evident, whilst to the east, more undulating slopes define the topography.



Source: Roads & Maritime Services 2018, 02.1-4 Option1 topography & Watercourses, GWH Upgrade - Katoomba to Forty Bends

LEGEND

	Great Western Highway		Creeks		Ridges/Crests
	Railway		Lakes		Steep Slopes
	Study Area				Undulating Slope
					Lower Areas
					Floodplain

Figure 2.5 Topography and drainage map

2.1.5 Soil Landscapes & Geology

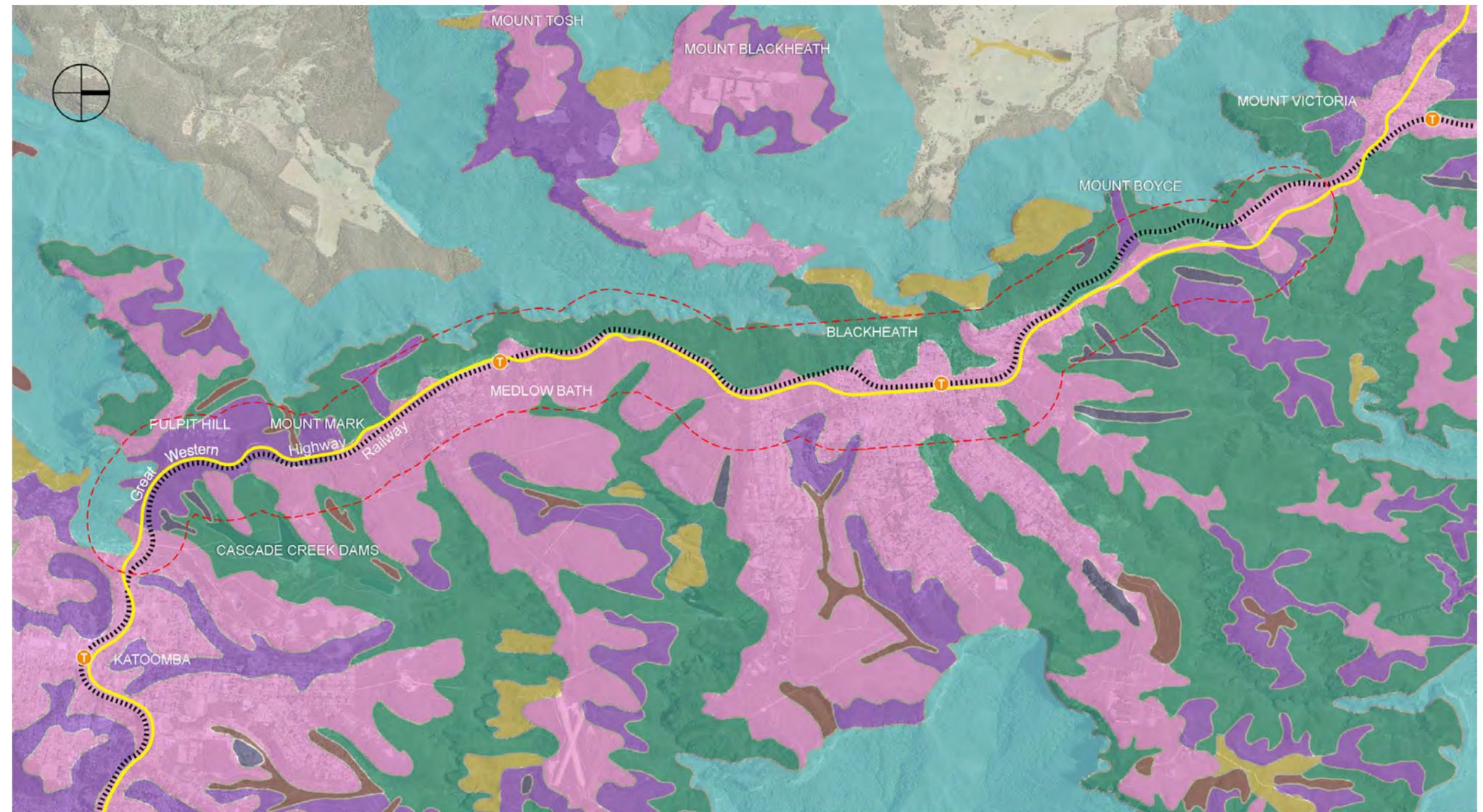
As outlined in the PEI (Preliminary Environmental Investigation), there are three main soil landscapes across the project area. They are Medlow Bath, Warragamba and Wollangambe.

The Soil Landscape mapping provides soil and landscape resource information in a form accessible to a wide range of users. The main geological patterns also identify the original, natural patterns that were once there before the area was disturbed by urbanisation. These patterns also closely correlate with the indigenous vegetation communities in each zone. The framework revegetation/planting themes that are informed by the soil landscapes are covered section 3.4 of this report. A summary of each soil landscape is provided below:

Medlow Bath- gently undulating to rolling rises and low hills on sandstone plateau surfaces. Broad crests, rounded and convex. Elevation generally above 850m. Local relief 20m-50m, slopes mostly 5%-15%. Partially cleared open forest and open-woodland.

Warragamba- moderate to very steep slopes, local relief 50-150m, slope gradients steeper than 35%, Elevation mostly below 700m and gently sloping narrow ridges of 10-20m wide. Narrow sandstone and colluvial benches on the slopes, which contain sandstone boulders. Open forest communities with a variety of trees species.

Wollangambe- rounded crests and moderately to steeply inclined sideslopes. Narrow crests (less than 50m) and convex. Localised rock outcrops in form of small benches, cliffs and low broken scarps. Local relief up to 100m and elevation generally less than 600m. Uncleared open-woodland with low open-forest in more sheltered valleys.



Source: Roads & Maritime Services 2018, 0.080 Option1 Soil Landscapes, GWH Upgrade - Katoomba to Forty Bends

LEGEND

- Great Western Highway
- Railway
- Study Area

Soil Landscapes:

- Hassan Walls
- Warragamba
- Wollangambe
- Medlow Bath
- Deanes Creek

Figure 2.6 Soil landscapes map

2.1.6 Vegetation

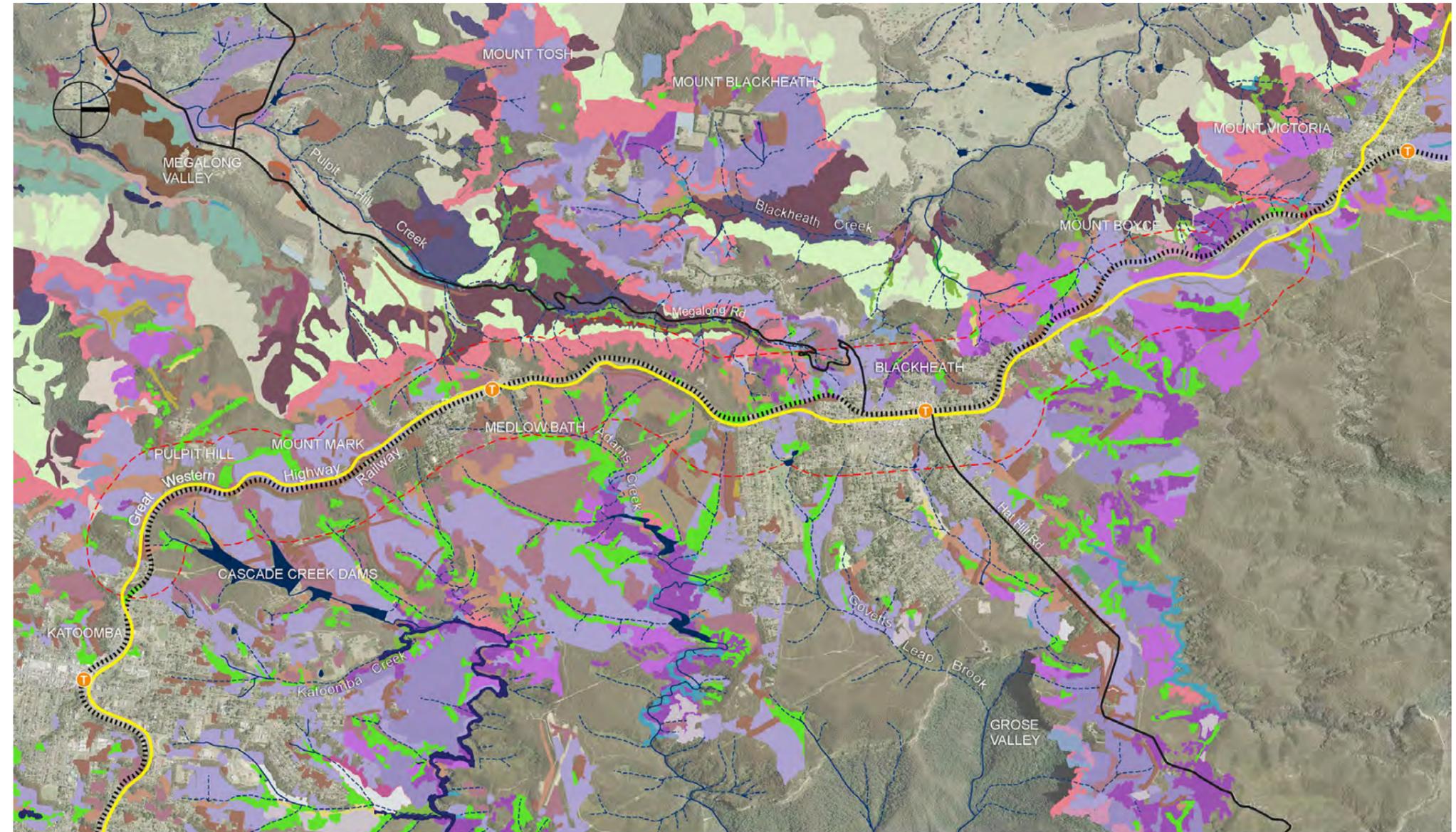
Based on the RMS Great Western Highway PEI (Preliminary Environmental Investigation) January 2019, there are two main vegetation communities (Vegetation community information from Tozer et al 2010) present through the project area. They are:

- *Eucalyptus sieberi*-*Eucalyptus piperita* association; and the
- *Eucalyptus oreades* Open-forest/Tall Open-forest.

Other vegetation communities that may cross the corridor include the Blue Mountains Swamps and *Ceratopetalum-Doryphora* sassafras Rainforest.

As a framework document, this report sets urban design objectives and principles for key strategies. In Sections 3.0 and 4.0 of this report there is a revegetation strategy that reinforces the necessity for developing re-vegetation mixes that closely reflect the majority of indigenous species of each particular vegetation community. Such an approach would achieve a high level of biodiversity, fitting for this site that is surrounded by World Heritage landscapes.

It is noted in the UNESCO nomination for World Heritage, that “most of the natural bushland of the Greater Blue Mountains Area is of high wilderness quality and remains close to pristine.”



Source: Roads & Maritime Services 2018, 09.1 Option1 Vegetation, GWH Upgrade - Katoomba to Forty Bends

LEGEND

Great Western Highway	Blue Mountains Riparian Complex	<i>Eucalyptus oreades</i> Open-forest/Tall Open-forest
Railway	Blue Mountains Swamps	<i>Eucalyptus sclerophylla</i>
Study Area	<i>Ceratopetalum apetalum</i> - <i>Doryphora sassafras</i> Rainforest	<i>Eucalyptus sieberi</i> - <i>Eucalyptus piperita</i>
Blue Mountains Escarpment Complex	<i>Eucalyptus cypellocarpa</i> - <i>E. piperita</i> Tall Open-forest	Megalong Footslopes Forest
Blue Mountains Heath and Scrub	<i>Eucalyptus gullickii</i> Alluvial Woodland	Modified Bushland

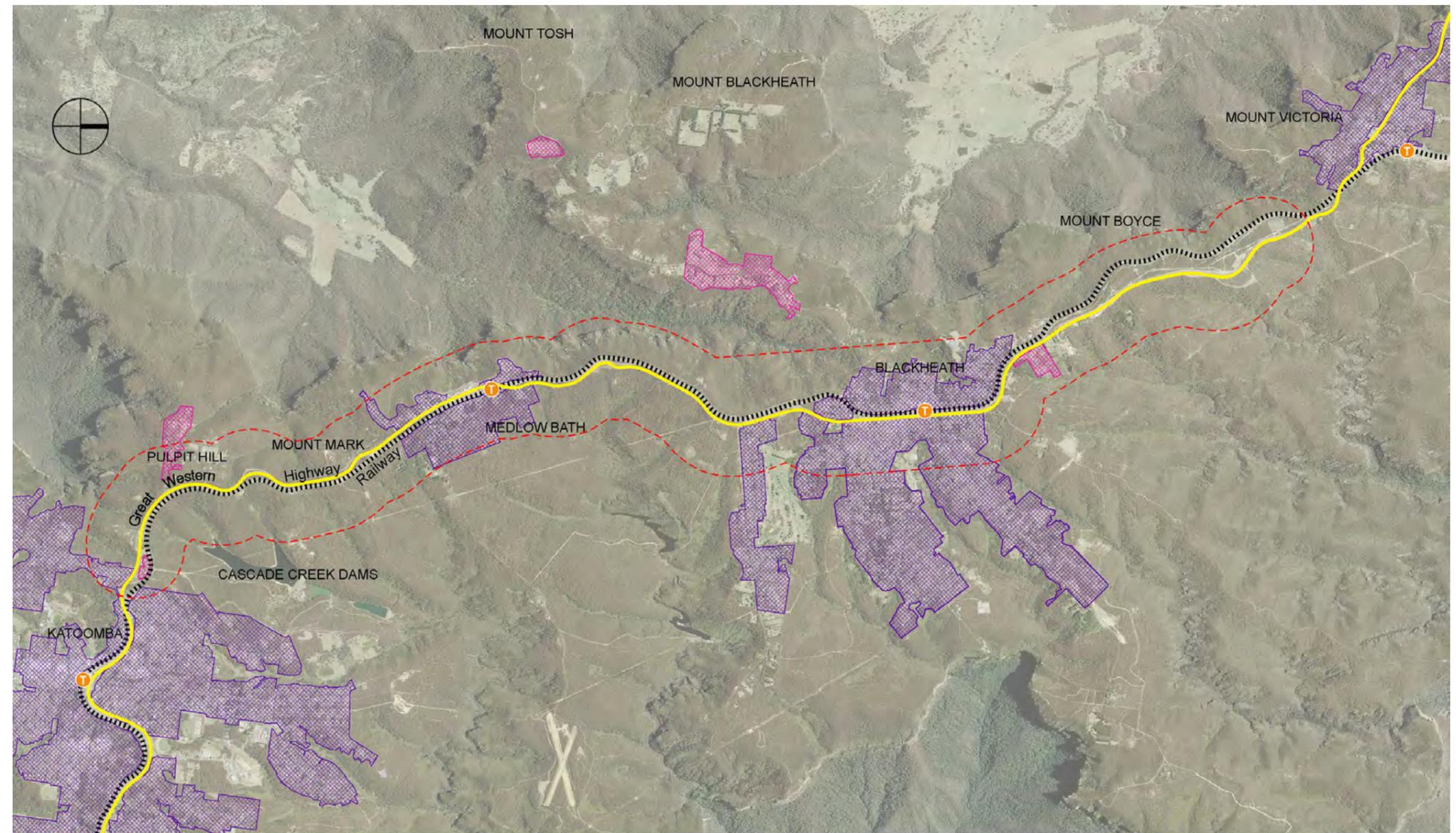
Figure 2.7 Vegetation patterns

2.1.7 Settlement Patterns

It is important to reinforce the ‘string of pearls’ formation of the pattern of settlements along the corridor, identified in the 2006 Great Western Highway Urban Design Framework, Blue Mountains - Lapstone to Katoomba..

Figure 2.8 illustrates the settlement pattern along the study area. The main villages include Katoomba, Medlow Bath, Blackheath and Mount Victoria. It is important to differentiate the character of the village centre, the transition zones (entries into the town) and the bushland.

Expressing the natural and cultural scenic qualities of the area with its heritage values will provide a rich and memorable fabric that reinforces the identity of the area. By the same token, respecting and reinforcing the cultural identity of each village contributes to its uniqueness and provides a richer journey experience.



Source: Roads & Maritime Services 2018, 04.1-4 Option1 Land use zoning, GWH Upgrade - Katoomba to Forty Bends

LEGEND

- Great Western Highway
- Railway
- Study Area
- Main Village Area
- Interspersed Village Area

Figure 2.8 Map illustrating settlement patterns

2.1.8 Land Use & Connectivity

Land Use

The land use in the study area is dominated by world heritage national parklands, nature reserves and environmental designated areas. Public and private recreation is predominantly confined to the urban areas. The same is applicable to residential and industrial areas.

Generally the settlement pattern tends to be confined along the highway, demonstrating its important function as a link between communities. This functions is underpinned by the 'pearls on a string' principle set out in the 2006 Great Western Highway Urban Design Framework.

Key consideration needs to be given to the Environmental land use zoning which includes National Parks, Environmental Conservation, Environmental Management and Environmental Living.

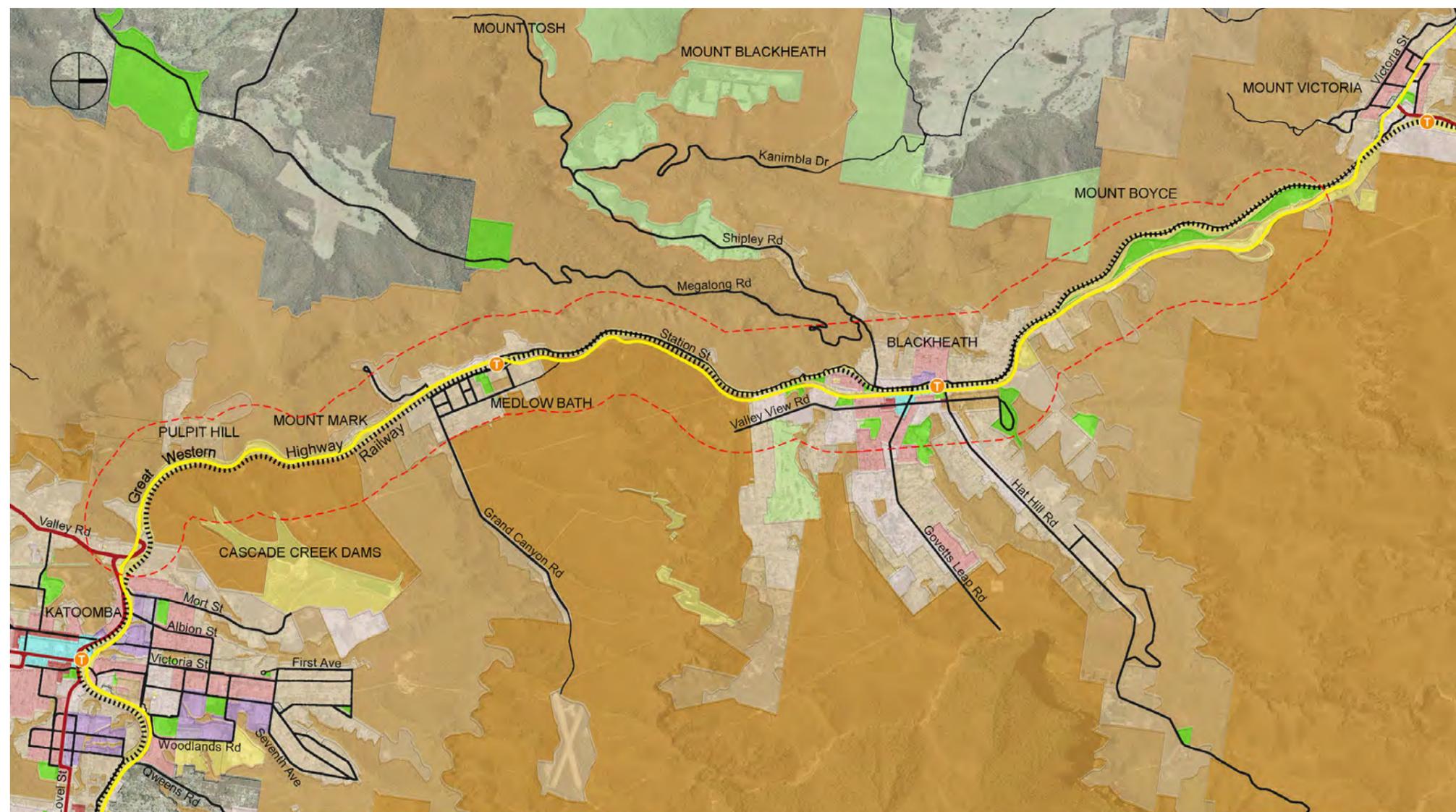
As BMCC describe in their LEP, there are two key objectives for these zones (as illustrated on the following page) :

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

To ensure that the form and siting of buildings are appropriate for, and harmonise with, the bushland character of the locality.”

These objectives are applicable to transport infrastructure, planning and design of the unique bushland environment within and surrounding the corridor.

The Objectives are reproduced overleaf to provide further guidance in the future identification and selection of options..



Source: Blue Mountains LEP- Land zoning maps LZN001-006

LEGEND

Great Western Highway	E1 National Parks and Nature Reserves	RE2 Private Recreation	R3 Medium Density Residential
Railway	E2 Environmental Conservation	RU2 Rural Landscape	R2 Low Density Residential
Study Area	E3 Environmental Management	IN1 General Industrial	SP2 Infrastructure
Arterial Road	E2 Environmental Living	IN1 Light Industrial	DM Deferred Matter
Local Road	RE1 Public Recreation	Local Road	

Figure 2.9 Land use map with road & rail connectivity

Zone E2 Environmental Conservation

Objectives of this zone are to:

- *Protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values*
- *Prevent development that could destroy, damage or otherwise have an adverse effect on those values.*
- *Encourage land restoration works on disturbed bushland areas.*
- *Restrict the development of private land that would be inappropriate because of physical characteristics or high bush fire hazards, but only where less restricted development is permitted elsewhere on the land due to split zoning.*
- *Maintain biodiversity in the Blue Mountains*

Zone E3 Environmental Management

Objectives of this zone are to:

- *Protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.*
- *Provide for a limited range of development that does not have an adverse effect on those values.*
- *Protect the natural bushland buffer between towns, to avoid ribbon development and to conserve vistas of bushland obtained from public places and the Blue Mountains National Park.*
- *Ensure that the form and siting of buildings, colours, landscaping and building materials are appropriate for, and harmonise with, the bushland character of the area.*
- *Encourage landscaping and regeneration of natural bushland in areas with sparse tree or canopy cover.*

Zone E4 Environmental Living

Objectives of this zone are to:

- *Provide for low-impact residential development in areas with special ecological, scientific or aesthetic values.*
- *Ensure that residential development does not have an adverse effect on those values.*
- *Preserve and re-establish native bushland in those areas that exhibit a predominantly bushland character, where consistent with the protection of assets from bush fire.*
- *Ensure that the form and siting of buildings are appropriate for, and harmonise with, the bushland character of the locality.*

Road & Rail Connectivity

The key transport infrastructure along the study area is dominated by the Great Western Highway and the Main Western Railway Line. Both road and rail are closely intertwined, driven by the rugged topography, and following the ridgeline. They provide a critical transport artery for the regional economy, including agricultural operators, forestry, mining industry and tourism.

The road and rail corridors also provide a vital link for the local communities to other town centres within the Blue Mountains and beyond. Hence, these two transport corridors perform a vital function for local and regional traffic and support the livelihood of a number of communities. This is underpinned by the variety of traffic types, ranging from heavy vehicles, commuting traffic, local traffic, tourism etc.

Secondary or local roads predominantly occur within the villages that the corridor crosses. Three secondary roads that link to areas further afield include Darling Causeway which connects to the Bells Line of Road to the east, and Shipley Road and Megalong Road which link into the Megalong Valley to the west.

Pedestrian, Cycle & Bus Connectivity

Situated amongst World Heritage National Parks, and along a ridgeline of small villages, the connectivity for pedestrians, trail users and bicycles is critical to maintain.

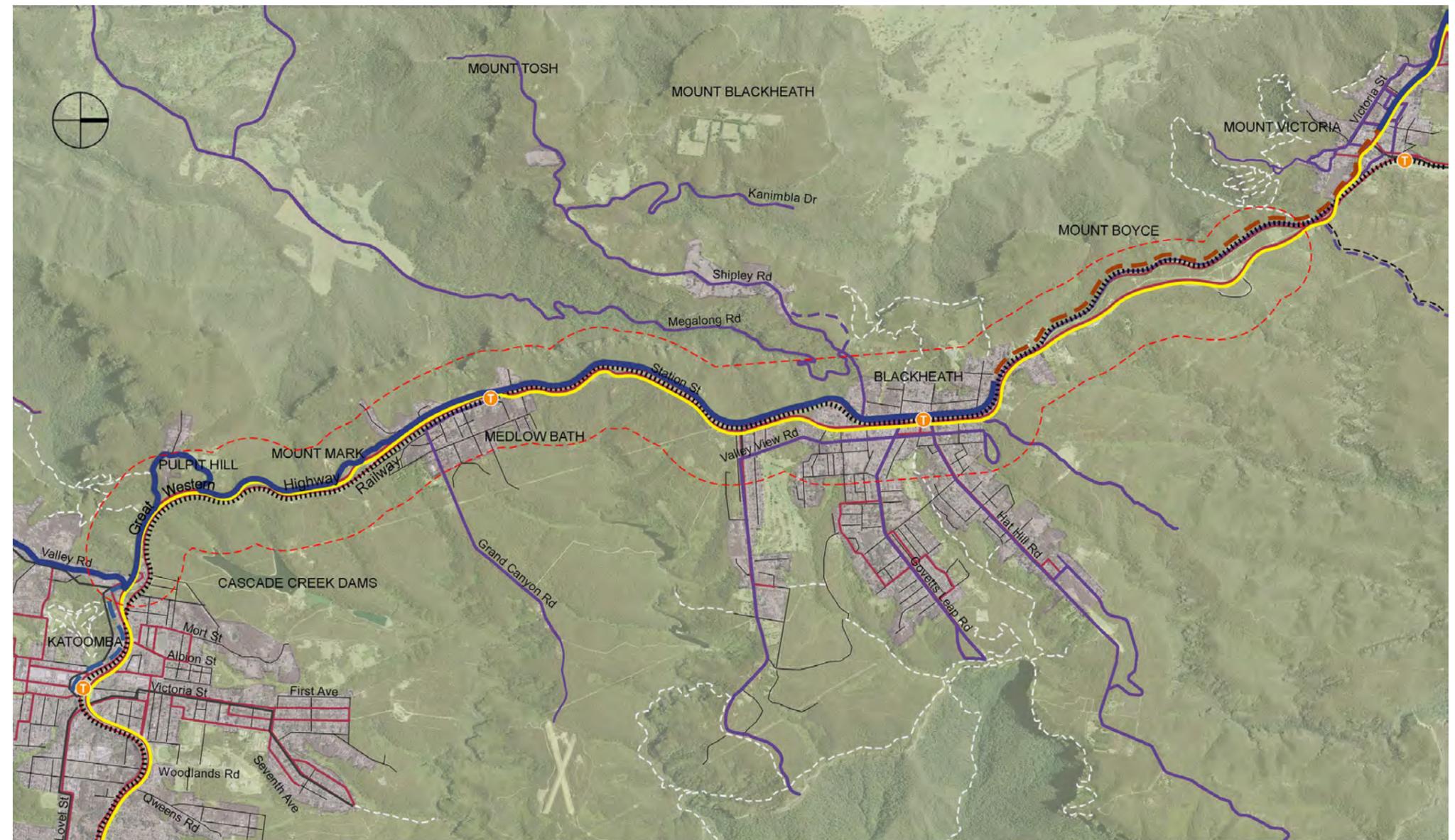
From the regional trail (Great Blue Mountains Trail) that basically follows the ridgeline north south, there are links that provide east-west connectivity across the highway, particularly at the villages and to key National Park destinations and trails.

Figure 2.10 illustrates the existing and proposed connections for walking trails and bike paths, both on and off road. BMCC's proposed trail will eventually link up with the Lithgow and Oberon trail network further west. The main trail is from Katoomba to Blackheath, with side trips that incorporate the Six Foot Track, Narrow Neck, Porters Pass, and major tourist attractions such as Echo Point and Scenic World in Katoomba, and Govetts Leap and Evans Lookout in Blackheath.

The information has been adopted from the "Great Blue Mountains Trail map, BMCC Integrated Transport Study (May 2017) and the Blue Mountains Bike Plan 2020.

Figure 2.10 also indicates the main bus routes and train stations.

Any future projects within this study corridor will need to carefully assess these routes to minimise disruption to connectivity and hopefully improve the connectivity for residents, recreational users and tourists for the local and regional areas.



Source: GreatBlueMtnsTrail-12ppDL-0915 & Blue Mountains Bike Plan 2020

LEGEND

- | | | |
|-----------------------|---------------------------------|----------------------------------|
| Great Western Highway | Major access: sealed / unsealed | Walking track |
| Railway | Minor access | Other cycling route |
| Study Area | Great Blue Mountains Trail | Proposed cycling route extension |
| Natural Area | Trail connection on road | Bus route |
| Urban Area | Proposed trail connection | |

Figure 2.10 Pedestrian, cycle and bus connectivity map

2.1.9 Cultural & Scenic Values

2.1.9.1 Protected Areas

Under Part 6 of the BMCC LEP 2015, there are additional local provisions, in particular for the two protected areas, as illustrated in the adjacent map and described below.

These areas are environmentally sensitive, with high scenic values. They provide buffers to areas of ecological significance and Council's objectives will ensure that any development should be restricted in these areas.

As outlined by the BMCC LEP, the key objectives of these zones applied to these protected areas as identified in Figure 2.11, are outlined below.

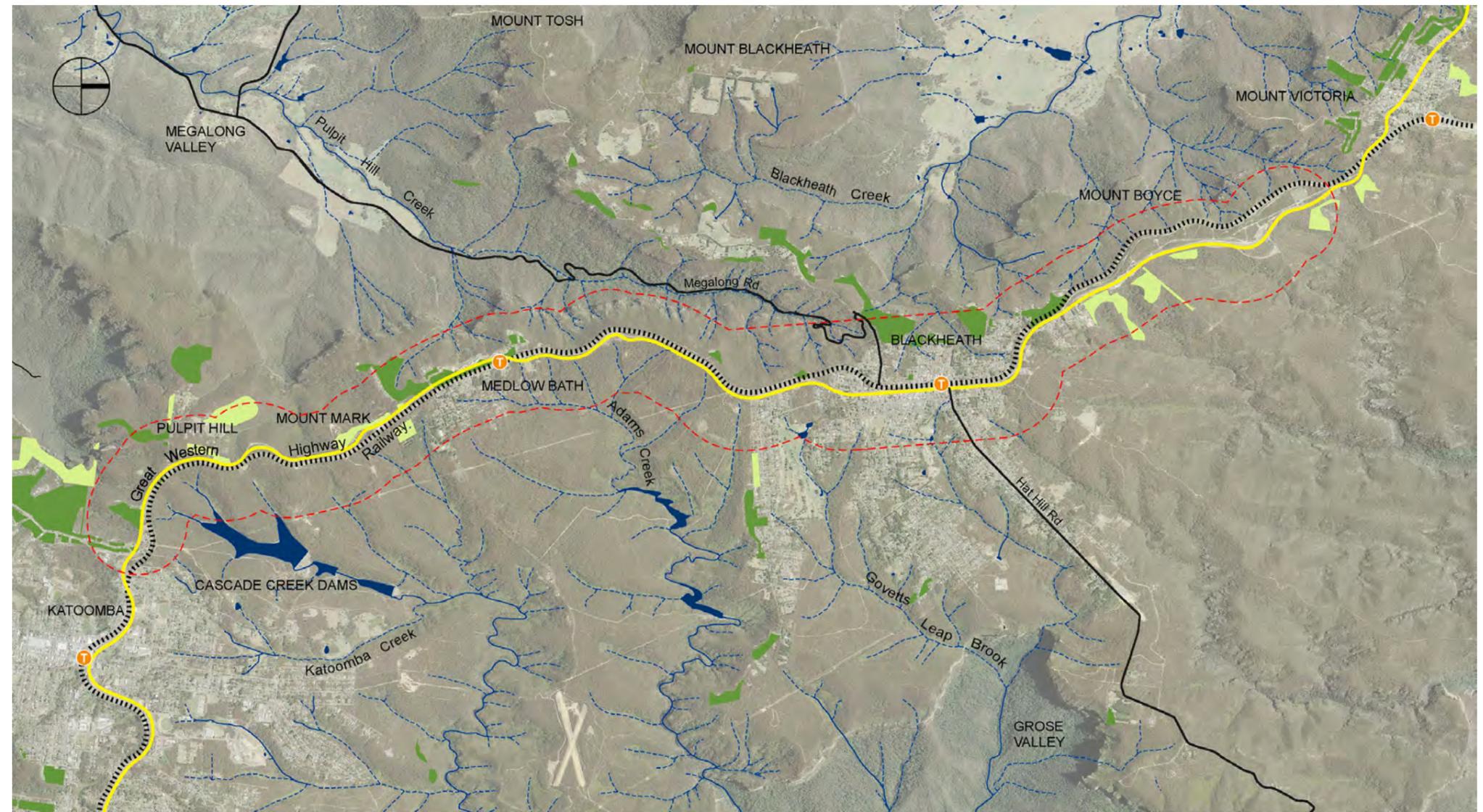
Protected Area-Land between towns

These areas include the land uses identified in Figure 9, i.e.

- E2- Environmental Conservation
- E3- Environmental Management
- E4- Environmental Living

Key objectives are to protect environmentally sensitive land and areas of high scenic value in the City, to provide buffers around areas of ecological significance and to restrict development on land that is inappropriate by reason of its physical characteristics or bushfire risk.

These areas have been identified as areas of land between the towns that are to be maintained as they have particular scenic value viewed from the Great Western Highway or other public places. As mentioned in the 2006 Great Western Highway Urban Design Framework, Blue Mountains - Lapstone to Katoomba, these areas have significant natural bushland character of land that separates the villages of the Blue Mountains.



Source: Roads & Maritime Services 2018, Protected Areas Map

LEGEND

Great Western Highway	Main road	Protected Area - Escarpment
Railway	Main creek	Protected Area - Land Between Towns
Study Area		

Figure 2.11 Map illustrating protected areas



Council's objective for this zone of ensuring any built development is sited sensitively and designed to minimise any adverse visual impact should also be applied to infrastructure projects.

Protected Area-Escarpment

The objectives for these areas aim to preserve and enhance the visual, scenic, cultural and ecological values of the escarpment systems in the Blue Mountains, restrict development and vegetation clearing, so as to minimise any adverse impact on the perception of escarpments as significant natural features.

Similar to the other zone, Council has objectives to limit the proportion of hard surfaces in close proximity to escarpment systems and to ensure that the design and siting of development minimises any adverse environmental impact.

Council requires an assessment of the landscape and environmental impact (especially visual and ecological effects) of any proposed developments within this zone to ensure that the objectives of the zone are not compromised. They also have restrictions on building heights not being higher than vegetation canopies nor ridgelines.

Summary

In summary, the objectives and key principles of both protected zones, whilst they are applied to traditional land use development in the LEP, of minimising impacts to visual, scenic, cultural and ecological values of the areas should also be applied to major transport infrastructure in the identification and prioritisation of route and design options.

Key principles should be to:

- reinforce similar urban design objectives for the corridor that aim to conserve the natural bushland that separates the villages
- ensure any developments are sympathetic to the bushland setting; and
- incorporate visual mitigation measures to screen views from the highway corridor and to plant indigenous species.

2.1.10 Non Aboriginal Heritage

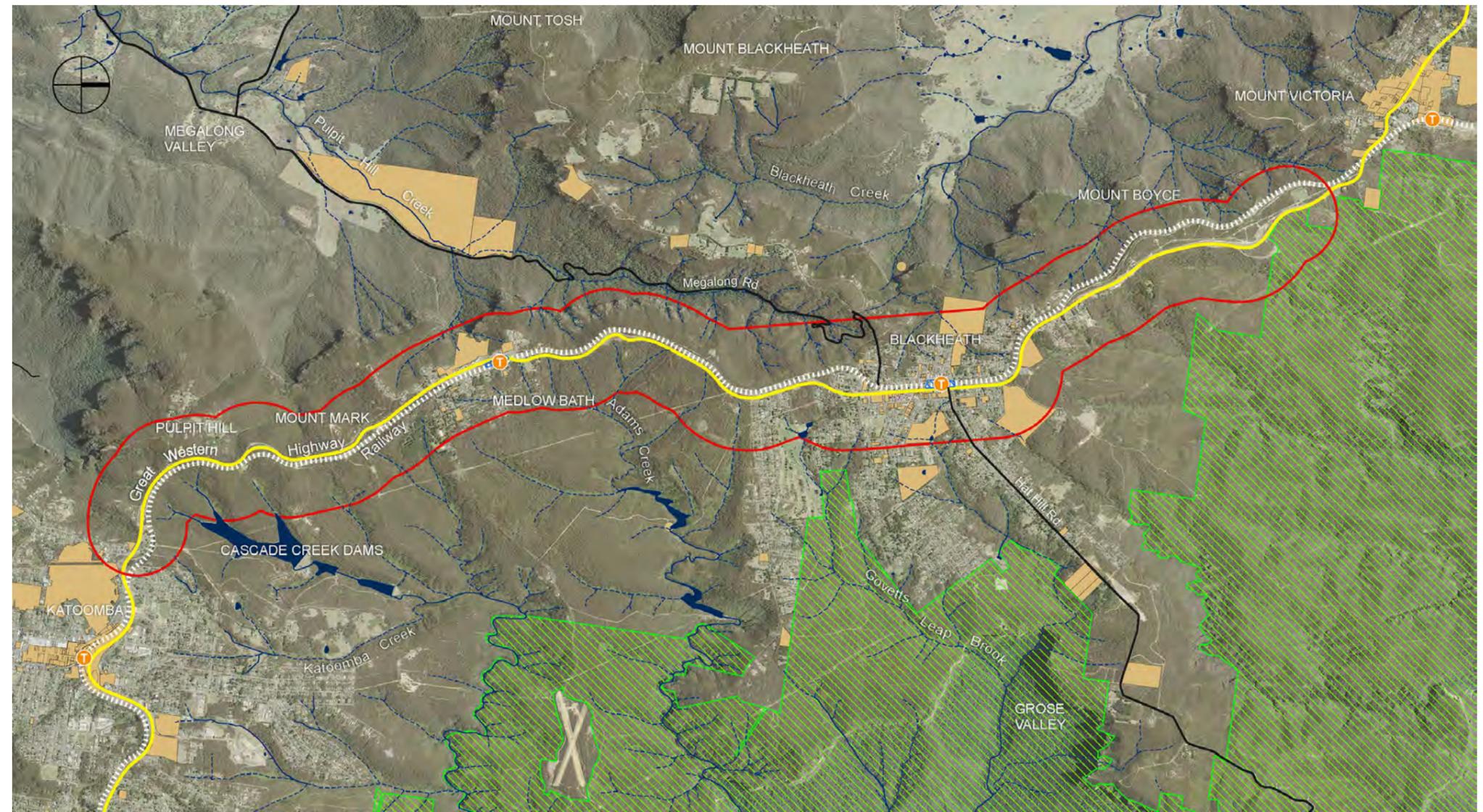
Figure 2.12 illustrates key heritage- natural and cultural in proximity to the project area. Of key significance is the World Heritage of the Greater Blue Mountains that was inscribed on the World Heritage List in 2000. It is one of 15 World Heritage places listed in the National Heritage List on May 2007.

“The unique plants and animals that live here relate an extraordinary story of the evolution of Australia’s unique eucalypt vegetation and its associated communities of plants and animals. It is an area of breathtaking views, rugged tablelands, sheer cliffs, deep inaccessible valleys and swamps.”

These World Heritage National Park areas, also contain major tourist attractions close to the project area and need special consideration. Such wilderness in the world is unique, and this highway provides access to this unique world wilderness area.

There is a rich and highly valued Aboriginal and non-Aboriginal history throughout the study area. There are three known Aboriginal sites in close proximity to the highway corridor. (refer to the corridor PEI for more detail)

As the Figure 2.12 indicates, there are many “General” heritage items. These items are recognised through Council’s LEP and or listing through the NSW Heritage Division. A comprehensive range of non-Aboriginal heritage sites are located across the study area, including historic travel routes, buildings, cemeteries, as well as natural heritage and landscapes. Awareness of the need for appropriate mitigation strategies or buffer zones and connectivity to these areas in the vicinity of these sites will need careful consideration in future planning stages.



Source: Roads & Maritime Services 2018, 06.1-4 Option1 Non Aboriginal Heritage, GWH Upgrade - Katoomba to Forty Bends

LEGEND

- | | | |
|-----------------------|------------|--------------------|
| Great Western Highway | Main road | Item - General |
| Railway | Main creek | World Heritage |
| Study Area | | State Heritage Act |

Figure 2.12 Heritage Map

In Medlow Bath, the Hydro Majestic Hotel is a state heritage listed complex of local significance. It is one of the grand hotels in the Blue Mountains and includes exotic trees and manicured gardens that contribute to this unique ensemble.

A key site not yet on the LEP mapping in Figure 2.12 is Pulpit Hill, originally an arduous and steep incline, that has significance as forming part of the history and evolution of transport routes across the Blue Mountains.

This area, noted by Council as “*Pulpit Hill and Environs*” is part of BMCC’s draft heritage conservation area and is subject to some legislative protections under the LEP and state governments SEPPs.

In the current Heritage Review (Amendment 5 to LEP 2015), Pulpit Hill is mapped as a draft “*archaeological conservation area*” as it has mostly archaeological potential across a broader area.

The adjacent photo illustrates the unique quality of the surrounding World Heritage National Park- with “*breathtaking views, deep inaccessible valleys*” as quoted in the World Heritage Listing.



Figure 2.13 Pulpit Rock Lookout, NSW National Park. Source: Google, NSW National Park

2.2 Landscape Character Zones & Sensitivities

2.2.1 Landscape Character Zones

The purpose is to identify similar areas to facilitate assessment and provide a description of each zone, giving the project its context and interface. This will inform the route selection process, particularly in the identification of impacts and mitigations measures applied as a design tool.

The study area has been divided into 8 distinct precincts, each with its own unique character. Some of the precincts have been subdivided based on its particular characteristics including topography, land use, cultural and scenic values.

The purpose of identifying these zones is to facilitate assessment and provide a description of each zone, giving the project its context and interface. This will inform the corridor and route selection process. The landscape character precincts are illustrated overleaf and are as follows:

- Zone 1: Pulpit Hill
- Zone 2: Enclosed Bushland
- Zone 3A: Medlow Bath (west)
- Zone 3B: Medlow Bath (east)
- Zone 4A: Ridgeline Pass (west)
- Zone 4B: Ridgeline Pass (east)
- Zone 5A: Blackheath Approach (west)
- Zone 5B: Blackheath Approach (east)
- Zone 6A: Blackheath (west)
- Zone 6B: Blackheath (central)
- Zone 7: Blackheath Approach (North)
- Zone 8: Highway Pinnacle



Figure 2.14 View looking west from Character Zone 4A, Ridgeline Pass (West). Source: KI Studio

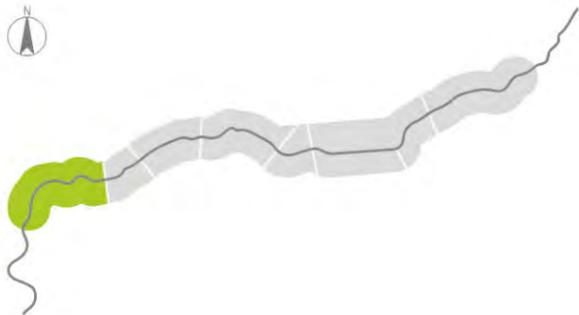


Figure 2.15 Landscape character zones

Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria



Figure 2.16 Landscape character zones



Zone 1: Pulpit Hill

Driving west from Katoomba, one approaches Pulpit Hill, a high hill, on the west, hugging the Great Western Highway, with heavily clad indigenous vegetation reflecting a natural bushland character.

Pulpit Hill is a prominent high landform, with steeply undulating landform, with incised valleys/drainage lines surrounding it. To the east, the landform is deeply incised as it slopes towards the Cascade Creek Dams.

Within the zone, key historic sites include the Explorer's Tree and junction to the Grand Hilltop Track, and the cemetery. The historic marker- the Explorer's tree is prominent, close to the road edge and used to be surrounded by sandstone retaining walls and a balustrade as shown in Figure 2.18.

The slopes are mostly heavily clad in two rare vegetation communities refer to the heritage listing SHR (State Heritage Register) Criteria (f): *"indigenous vegetation- including Blue Mountains Swamp and the Eucalyptus oreades (Blue Mountains Ash) open forest community."*

A road loops around the hill providing access to properties and the small carpark provides a convenient meeting point for the adjacent popular walking trails in the area.

In 2018 it was proposed to include Pulpit Hill as part of BMCC Heritage (Draft Item "Pulpit Hill and Environs Local ID :K166.") and Figure 2.15 illustrates as excerpt from it.



Figure 2.17 -Plan excerpt from the BMCC Draft Heritage Data Form for Blue Mountains Heritage 2016, indicating the potential heritage items within and outside (the asterisk representing the police lockup). The ochre coloured areas have "moderate cultural sensitivity"- e.g the area 2B to the south which is the Eucalyptus oreades/Open forest/Tall open forest area, and precinct 2 to the north; the orange ares represent "High Cultural Significance" and include precinct 1 that contains the stone arrangements, smaller blocks and Explorer's Tree and environs. (K031)

The proposal quoted Pulpit Hill as:

"one of the earliest identified landmarks on the Bathurst Road, Pulpit Hill, has historical significance as a natural eminence which afforded an 'immense diorama' across the Blue Mountains. Pulpit Hill has historical significance as a well-known resting place for weary travellers and their stock from 1815. Pulpit Hill has been a popular destination for visitors since the 1860s and is of historical significance in the course and pattern of tourism to the Blue Mountains which is one of Australia's most popular visitor destinations. "

As the area has both visual and heritage sensitivity, careful consideration should be given to this zone.



Figure 2.18 Pulpit Hill is situated on a prominent bend as one leaves Katoomba. The bushland (Eucalyptus oreades/Open forest/ Tall open forest) is of a high visual quality.



Figure 2.19 -The Great Blue Mountains Trail leads from Leura to Mount York, linking Katoomba with Medlow Bath, Blackheath and Mount Victoria



Figure 2.20 To left-early photo of the Explorer's Tree. Source: the Tyrrell Collection - https://www.flickr.com/photos/powerhouse_museum/sets/72157604336078298/; to right- recent photo



Figure 2.21 The trail intermittently interfaces with the road corridor. Careful planning will be required if re-locating the trail to limit environmental impacts



Zone 2: Enclosed Bushland

From Pulpit Hill, the highway cuts through heavily forested and enclosed bushland, with prominent rock cuttings.

This zone provides the bushland interface before Medlow Bath and is important as a “natural bushland “ buffer experience.

Whilst the railway sits on the high ridgeline close beside the highway corridor, it is visually screened from it.

From both road and rail alignments, views into the bushland predominate.

There are a few bushland tracks in the area, mainly on the west, at Mount Mark, prior to reaching the village sign for Medlow Bath.



Figure 2.22 This section is characterised by a strong tree canopy interfacing the road and creating a rather lush and intimate character



Figure 2.23 Approaching Medlow Bath, is a small pocket of residences set within a bushland setting. Native vegetation is dominant and the enclave has a rather informal and unstructured character



Figure 2.24 Access driveways to private properties with an informal character surrounded by bushland



Figure 2.25 Rock cuttings directly adjacent to the road are a prominent feature along this section



Figure 2.26 Signage announcing Medlow Bath with the railway line in the background. As the traveller approaches Medlow Bath, the railway corridor becomes more apparent. There is a typical interplay of road and rail along the Blue Mountains, with often the rail corridor being most prominent in village centres



Figure 2.27 Approaching Medlow Bath, the verge vegetation transitions to cultural trees that mark the villages along the route to create a 'pearls on a string' effect



Zone 3A: Medlow Bath - West

At Medlow Bath, the highway is situated on a plateau close to the cliff line of the Megalong Valley escarpment and defined by the Hydro Majestic Hotel and a number of residences.

The hotel buildings are visually prominent from the highway, creating a distinct landmark along the journey. The Hydro Majestic Hotel was developed by Sydney businessman, Mark Foy in the early years of the twentieth century and was the main economic activity in the area. It has been recently renovated and has become a key attractor in the area again.

Spectacular views from on top of the escarpment to the Megalong Valley are a major tourist attraction.

North of the hotel is a pocket of residences that are less apparent from the highway as one approaches the bridge carrying the highway over the railway line.



Figure 2.28 A mix of native and cultural vegetation is present within the southern transition zone of the village. This is a typical character for most village entries and centres along the Blue Mountains



Figure 2.29 The Hydro Majestic is a popular place for visitors and offers a number of venues including shops, restaurants, tea room and a hotel



Figure 2.30 There are a number of heritage properties towards the northern end of Medlow Bath, west of the highway



Figure 2.31 The distant panoramic views into the Megalong Valley are a key feature of the Hydro Majestic site



Figure 2.32 A pocket of residences occupy the northwestern end of the village. This group forms a distinct ensemble of single storey homes with manicured gardens



Figure 2.33 A heritage property wedged between the railway and Station Street



nla.pic-an23078328-v

Figure 2.34 The Hydro Majestic in early days with the heritage fence still remaining today.



National Library of Australia nla.pic-an23097504-v

Figure 2.35 Historic photo, with the casino dome in the background, bought in Chicago and shipped to Australia. Source: <http://nla.gov.au/nla.obj-146213201>



National Library of Australia nla.pic-an23078513-v

Figure 2.36 Early photo showing the generous grassed streetscape with formal planting of pine trees



Figure 2.37 Poster advertising the hotel from the 1920s
Source: Public Domain, <https://commons.wikimedia.org/w/index.php?curid=92790>



Figure 2.38 Image of the Hydro Majestic today, with its dominant architectural dome and arching fenestration.
Source: Google maps.



Zone 3B: Medlow Bath - East

The eastern side of Medlow Bath is dominated by detached residences on large blocks in green settings that include remnant native trees as well as mature planted exotic trees.

East of the railway corridor, the residential areas create a strong precinct adjacent the railway line. The zone forms a separate enclave beyond the highway corridor and is not visually linked to the areas west of the Great Western Highway.

The bridge over the railway is a prominent built element along the highway that marks the entry into this residential area.

The vegetation cover includes both native and planted exotic trees - a mix of deciduous and evergreen pines that are dominant in the village areas. This provides a rather enclosed character with introverted views, except for the visual exposure of the street running parallel to the railway line.

Residential buildings throughout the village are predominantly free standing, single storey and varying in age and appearance.



Figure 2.39 An example of one of the village's landmark buildings



Figure 2.40 The residential area of Medlow Bath to the east provides a quiet character with a combination of pine trees, deciduous trees and natives



Figure 2.41 The rural fire building has a rather utilitarian character compared to the manicured gardens of the nearby residences



Figure 2.42 The streetscape character has a strong European identity



Figure 2.43 Along Railway Parade, the rail corridor is highly exposed to local residences



Figure 2.44 The outskirts of the village have a more rural and informal character



Zone 4A: Ridgeline Pass - West

A beautiful natural bushland zone, high on the ridgeline, with a dramatic topographical drop to the west to the Megalong Valley. Native forest dominates with patches of more heathlike vegetation associated with the escarpment.

Spectacular panoramic views over the Megalong Valley are available from the top of the escarpment. Access to the top of the escarpment is limited to walking tracks.

This zone is highly sensitive to change.



Figure 2.45 The lush bushland has a pristine character with a very high visual quality



Figure 2.46 Views into Blackheath Glen with dense bushland in the background of Mount Tosh



Figure 2.47 There are intermittent views from the track along the edge of the escarpment. This environs is considered highly sensitive



Figure 2.48 The windy track (Station Street) is ideal for walking or cycling, away from the road, allowing the user to enjoy the natural qualities of the Blue Mountains region



Figure 2.49 Station Street is a track that follows the railway line, creating a strong visual interplay between the two elements



Figure 2.50 As one approaches the outskirts of Blackheath the treed bushland character diminishes, with understory shrub plantings being more dominant



Zone 4B: Ridgeline Pass - East

This zone is dominated by native forest to the east and the railway line to the west, situated on the ridgeline plateau. A number of minor tracks occur to the east of the highway and the eastern verge of the road corridor has been impacted by overhead power lines.

There are numerous areas where the road verges widen, providing informal lay by areas and increasing the apparent footprint of the corridor.

Overall, this zone has a strong natural landscape character, which reflects the dominance of the native forest vegetation. However, the extensive impacts alongside the verges detract from the setting and offer the potential opportunity to consolidate impacted areas as part of any future upgrade.



Figure 2.51 There are power lines on both sides of the road. Consolidating utilities and locating them underground should be considered.



Figure 2.54 There are extensive sections of the road with wide gravel verges. These detract from the bushland setting to the east



Figure 2.52 The bushland on the eastern verge includes well established trees. Mitigating any impacts to this vegetation is important



Figure 2.55 The railway corridor is a dominant feature along this stretch of the road, with it often being elevated above the road



Figure 2.53 Section of sealed road that should be used for the road widening. Also notice the power lines impact the vegetation on the verges



Figure 2.56 Disturbed areas along the eastern verge are of limited quality. This section of verge could be used as part of the road widening, limiting the overall impact to the environment



Zone 5A: Blackheath Approach - West

An area of the central high ridgeline of the Blue Mountains Range with dramatic, steep slopes dropping quickly towards the west, with views over the Megalong Valley and towards Mt.Tosh and Mt Blackheath. Panoramic views over the Megalong Valley and the undulating topography greatly contribute to the identity of this zone.

Apart from a gravel access track, the area is heavily clad in indigenous forest.

This area has high sensitivity.



Figure 2.57 The track (Station Street) includes steep sections which include mid-range and panoramic views beyond, all enriching the journey



Figure 2.58 The track (Station Street) is fairly isolated with minimal pedestrian or motorised traffic. Hence, it has a very serene character



Figure 2.59 Views across to Mount Tosh and Mount Blackheath provide a sense of remoteness and wilderness



Figure 2.60 The lush, well established vegetation, with its high diversity of vegetation species provides a richly textured vegetation



Figure 2.61 The strong natural vegetation character conveys a sense of an untouched landscape



Zone 5B: Blackheath Approach - East

This zone defines the southern entry into Blackheath. It comprises of a well established residential area with predominantly single storey, free standing homes, varying in age and design style.

Planted exotic and native trees are present throughout the residential areas, together with patches of remnant native forest.

This zone has an enclosed character due to the dominance of mature trees and other vegetation. It has a quiet and serene character which contributes to its sensitivity and sense of place.

The southern transition zone of the village is separated from the rest of the town by a wedge of bushland.



Figure 2.62 There is a service road along the eastern verge servicing private residences. Mature stands of trees and shrubs provide an important buffer between the highway and service road



Figure 2.63 This pocket of residences has a somewhat quiet and isolated character.



Figure 2.64 There is currently road construction being undertaken as part of a safety upgrade. Some removal of trees has impacted the streetscape



Figure 2.65 The intersection with Evans Lookout Road is marked by this colourful building, which also marks the entry into the Blackheath village.



Figure 2.66 As with many other village transition zones, this area presents a variety of native and European vegetation



Figure 2.67 Indigenous trees are wedged between the highway corridor and the service road in this very confined location



Zone 6A: Blackheath West

This zone occupies the area to the west of the railway line and is situated on undulating land that drops towards the steep Megalong Valley escarpment.

The area is dominated predominantly by single and double storey detached homes on large blocks. There is a pocket of commercial properties near the railway line, opposite to the town centre.

Vegetation is a mix of exotic pine dominant species, with remnants of native forest. Panoramic views are achievable from a number of vantage points, particularly to the west, overlooking the Megalong Valley.

This zone has a somewhat quiet and detached character from the rest of the township, reinforcing its identity as a separate zone. The tranquil sense of place, combined with serene panoramic vistas makes this zone sensitive to change.



Figure 2.68 Landscape of pine trees and mature Eucalypts with picket fences, small scaled cottages in generous landscape settings



Figure 2.69 Narrow roads in highly undulating terrain with residences nestled against road amongst garden settings



Figure 2.70 Station Street- with embankment to railway corridor, power lines and picket fences with small scaled heritage housing- a sensitive landscape



Figure 2.71 Housing nestled in generous landscape settings, with mature pine trees often marking the roadways



Figure 2.72 Typical residential character of houses in this zone



Figure 2.73 Example of dramatic views from this zone to the west - Mt Boyce, and valley and ranges beyond



Zone 6B: Blackheath Central

This zone is situated on a broad plateau that extends towards the Grose Valley. Blackheath developed into a town after the Main Western railway line was built in 1869. The township is the highest in the Blue Mountains dominated by single and double storey buildings, with a number of them listed as local heritage items.

The vegetation is dominated by exotic trees, especially deciduous ones, planted throughout the township. This provides a rather enclosed and intimate character. Along the highway, rows of mature trees flanking the railway line form an important visual element to the town centre.

At the town centre, the built form is denser with continuous facade elements, whilst further afield residential buildings throughout the village are predominantly single storey and free standing, varying in age and appearance.



Figure 2.74 Existing Plane trees mark this key intersection that leads to the Megalong Valley & Shipley Plateau



Figure 2.75 Tree lined street - Wentworth Street, to the east of the main street



Figure 2.76 Existing parking alongside the highway, near the community hall, on the northern end of Blackheath village



Figure 2.77 The Plane trees to the right of the photograph, flanking the Great Western Highway, provide an important visual buffer to the railway corridor



Figure 2.78 Exotic deciduous trees with pine trees on the entrance into Blackheath, with railway corridor to the right



Figure 2.79 Quaint cottages and residences amongst exotic gardens on the northern approach into Blackheath



Zone 7: Blackheath Approach (North)

This transition zone between the Blackheath town centre and the natural landscape area further north is quite disturbed along the road corridor, and there is a high awareness of the railway corridor.

The landscape is of mixed character along the highway, with a mix of native and exotic trees, with above ground power lines restricting planting on the railway side.

Predominantly single storey residential dwellings, together with schools and other community facilities occupy the eastern area. There is an isolated pocket of residences to the north of the township. Planted exotic and native trees occur throughout the residential areas, together with patches of remnant native forest, particularly along drainage lines.

Blackheath Cemetery (also heritage listed) forms an important open space, and a substation defines the southern end of this zone.

The railway corridor area which divides Zones 7 and 6A, is of disturbed character with a lack of trees and vegetation.



Figure 2.80 The pocket of residential properties at the northern end of Blackheath consist of single storey homes on large plots



Figure 2.81 This area has a strong interface with the adjacent bushland



Figure 2.82 Railway perched above the road corridor with pine trees beyond providing some landscape definition for Blackheath entry



Figure 2.83 Local access road, with remnant indigenous trees between the local road and the highway corridor



Figure 2.84 Looking towards Blackheath, with a mixture of exotic and native trees along the highway corridor



Figure 2.85 View to the cemetery with extensive areas of gravel used for parking



Zone 8: Highway Pinnacle

The general setting comprises of dense bushland vegetation set in a strongly undulating landscape. This section of the road includes the highest point of the Great Western Highway, reaching an altitude of 1,093 metres at Mount Boyce. There is a memorial beacon and rest area that mark this location along the highway. From the various rest areas there would be views across to the Megalong Valley.

In Fairy Bower to the north west of the corridor is a popular loop walking track-Fairy Bower to Cox's Cave Loop, that encompasses the beautiful sandstone caves and temperate forest of the upper Blue Mountains.

Sandstone is exposed in a number of cuttings, expressing the sandstone character and shale derived soils.

A visually prominent built form element is the heavy vehicle inspection station, located near the pinnacle which includes a building, signage, lighting and access lanes.

There are inward focussed panoramic views along this section of the road into adjacent natural bushland and the landscape setting is of a high visual and scenic quality and greatly contributes to the journey experience.



Figure 2.86 This sandstone cutting adjacent to the road is visually prominent. Note the strong tree canopies on top of the cutting



Figure 2.87 Dense and varied bushland is strongly prevalent within this zone



Figure 2.88 Large sandstone cuttings create a dramatic effect along the journey



Figure 2.89 Abandoned sections of road could be opportunities for cycling/walking facilities



Figure 2.90 One of the rest areas to the left, with mixed exotic and native trees within the road corridor



Figure 2.91 Travelling from Mount Victoria with its heathlike vegetation in the foreground, the curvilinear road ahead marks the location of the high rock cutting

2.2.2 Sensitivities & Likely Impacts

The sensitivity assessment has been based on RMS's Environmental Impact Assessment Practice Note - Guidelines for Landscape Character and Visual Impact Assessment No. EIA-N04.

The sensitivity value refers to the qualities of a particular character zone, which may include the number and type of receivers and how sensitive the existing character of the setting is to the proposed change. For example a pristine natural environment will be more sensitive to change than a built up industrial area.

It should be noted that the sensitivity ratings are measured relative to each other rather than being assigned through an absolute scale. Hence the resulting sensitivity rating is project specific and identifies those areas within the project with the highest and lowest sensitivities relative to each other.

It is acknowledged that the overall study area is generally of high sensitivity, environmental beauty and cultural importance.

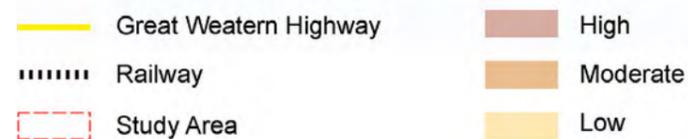
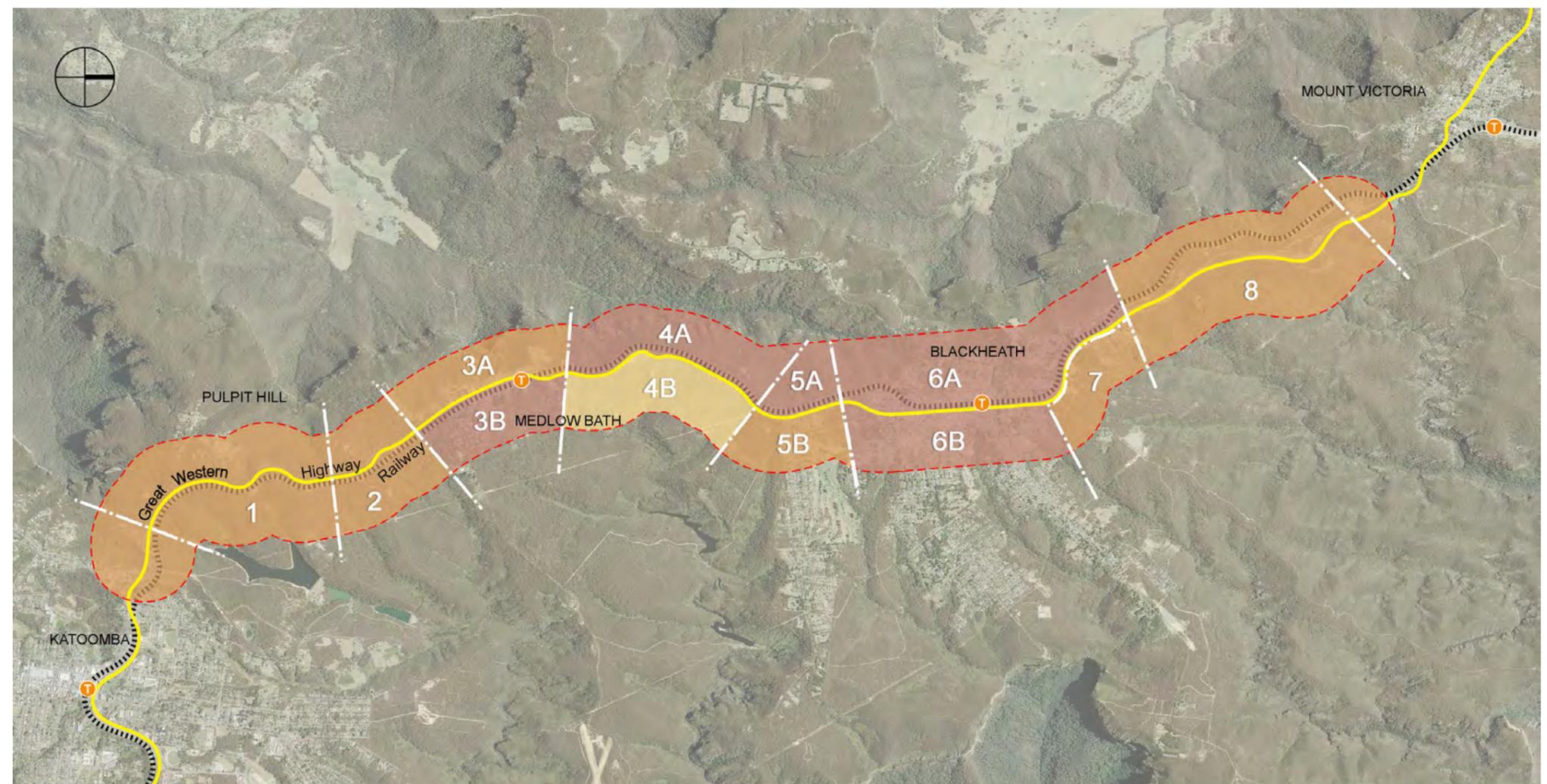
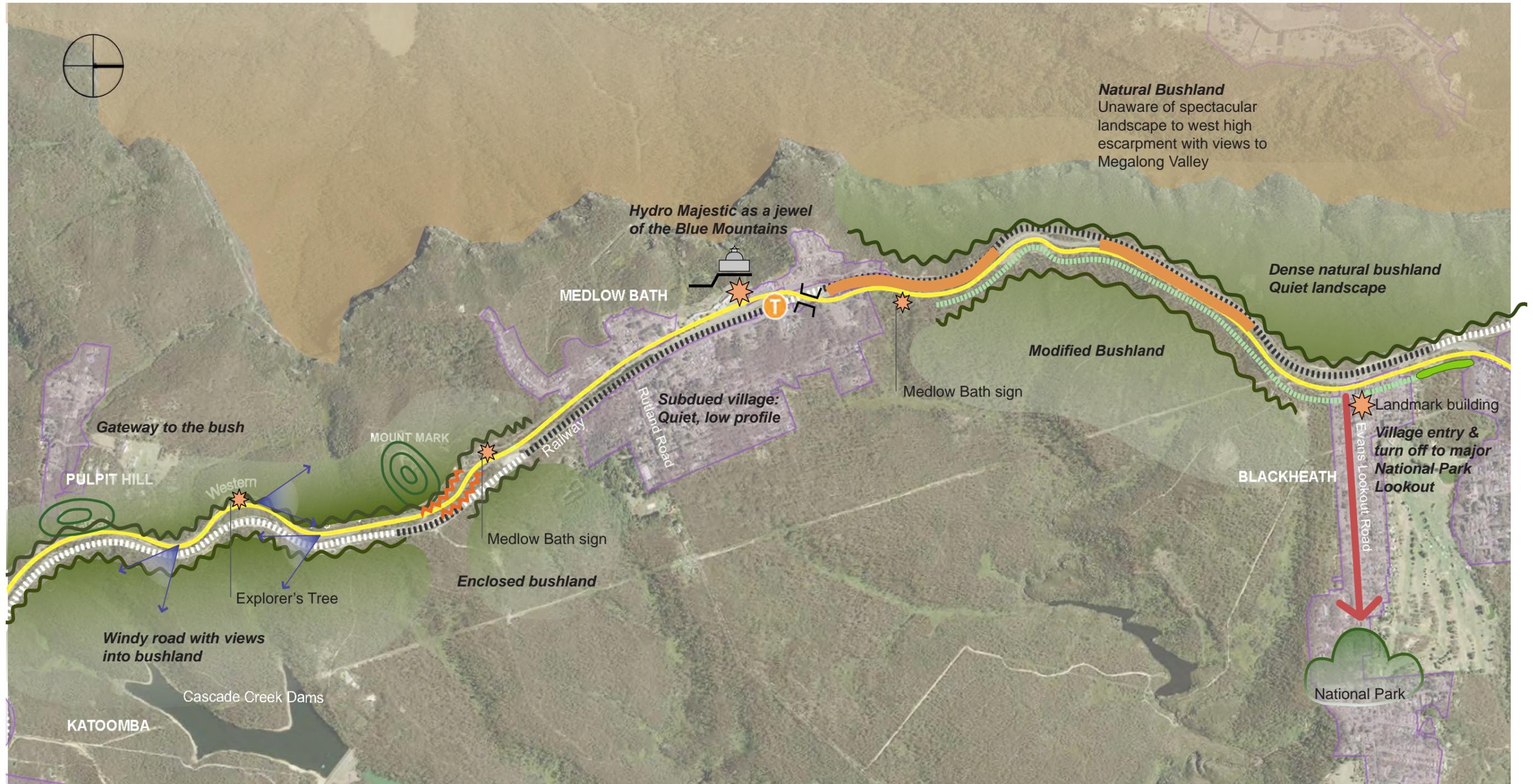


Figure 2.92 Sensitivity mapping of landscape character zones

2.2.3 The Journey

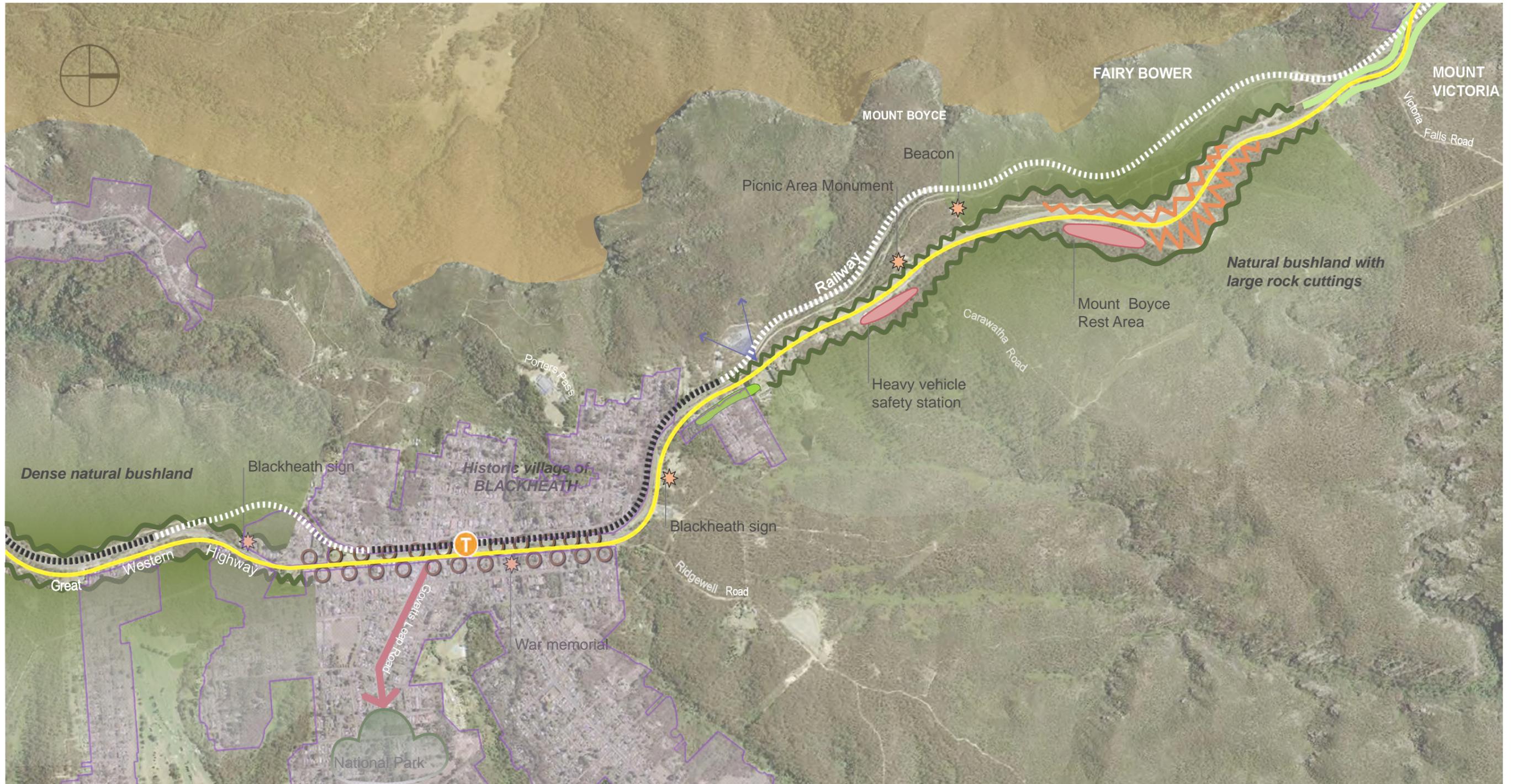
An illustration of key elements and characters of the travel route.



LEGEND

Great Western Highway	Strong presence of railway corridor	Train station	Bushland edge	Maximise retention of existing trees	Disturbed corridor	Maximise view
Railway	Main links to National Park	Escarpment	Interfered bushland edge	Knolls, high point	Natural rock cutting	Landmark

Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria



LEGEND

Great Western Highway	Strong presence of railway corridor	Train station	Bushland edge	Maximise retention of existing trees	Maximise view
Railway	Main links to National Park	Escarpment	Heath vegetation	Natural rock cutting	Landmark

3 CORRIDOR STRATEGY



Figure 3.1 Existing section of the completed upgrade of the Great Western Highway at Wentworth Falls. The upgrade responds well to the topography, finishes are sympathetic to the setting and the road alignment has a dynamic and engaging character.

3.1 Vision

The corridor vision is to create a highway upgrade that fits in the landscape, provides improved travel times, respects the heritage and cultural values of the area and is consistent with the *Great Western Highway Urban Design Framework - Blue Mountains - Lapstone to Katoomba*.

In this regard, the document's vision statement is as relevant for this section of the road as it is for Lapstone to Katoomba and it states:

Within the context of the rugged terrain and bushland setting of the Blue Mountains and the unique natural and cultural landscapes and precincts through which it passes, the Great Western Highway should:

- *Reinforce the journey sequence of bushland and village.*
- *Evoke a sense of its history and heritage.*
- *Provide views and a clear sense of orientation for users*
- *Create a road design that integrates urban design and engineering.*

3.2 Urban Design Objectives & Principles

The following urban design objectives have been identified for the Urban Design Framework.

Objective 1

Minimise impacts to highly sensitive areas including zones of high visual quality or high ecological value

Objective 2

Minimise impacts to the integrity of heritage sites and cultural values of communities the route crosses

Objective 3

Create a route alignment that is responsive and expresses the landscape that it is crossing

Objective 4

Contribute to the functioning of urban areas and enhance local and regional connectivity where possible

Objective 5

Provide a memorable journey experience that positively contributes to the identity of the area in a sensitive way

Objective 6

Respond to natural and cultural patterns by expressing the sequence of villages separated by bushland and reinforce the distinction of the various villages

Objective 7

Avoid or minimise natural and cultural fragmentation of coherent zones

Objective 8

Apply the principles stipulated in RMS urban design policy, procedures and design principles *Beyond the Pavement*.

OBJECTIVE	URBAN DESIGN PRINCIPLE
1 Minimise impacts to highly sensitive areas including zones of high visual quality or high ecological value	Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of such environs.
	Maximise retention of the existing alignment to minimise impacts to the environment
	Avoid route corridor through or adjacent to the “Protected Area-escarpment”
	Maximise retention of the existing alignment and of the existing enclosed character of the route at this location
	Consider the introduction of wire rope barriers or tri-beams to minimise vegetation clearing and assist in the retention of mature trees and the enclosed character of the route in sensitive locations
	Utilise areas for the road that are already disturbed and consider abandoned road sections for rest stops
	<i>Identify, retain and enhance the natural and ecological systems and values in the corridor through the Highway planning, design and upgrade</i>
	<i>Provide for fauna links across the highway where appropriate</i>
	<i>Apply WSUD principles to the management of stormwater throughout the planning, design and upgrade of the highway</i>
	<i>Integrate detention basins and water quality ponds and as required, service access discreetly, easy to maintain and design, to be natural in character, appropriate for individual contexts, in keeping with the Blue Mountains environment</i>

2 Minimise impacts to the integrity of heritage sites and cultural values of communities the route crosses	Retain a vegetation buffer with stands of trees between the railway line and the road corridor where possible in urban areas
	Exploit views towards cultural and historic elements to reinforce the identity of townships
	Create a legible arrival sequence into Blackheath that reflects its cultural and historic identity.
	Consider underground tunnel options that minimise impacts to Blackheath
	Minimise impacts to heritage properties
	Introduce sandstone finished retaining walls where these elements are visible from the road or community
	Avoid large retaining structures that appear out of scale with the urban fabric
	Apply vegetative screening where possible between road and private properties
	<i>Avoid or minimise adverse impact of road engineering on indigenous and non-indigenous heritage, historic and culturally significant contexts and settings, items and artefacts</i>
	<i>Interpret heritage of the highway for road users and the local community (including the feats of the early pioneers and explorers in constructing a great route to the west) where possible and consult with RMS Heritage Committee, Blue Mountains City Council and other relevant bodies and parties</i>
<i>In the preparation of any heritage strategies or conservation plans of management design of the highway corridor should consider policies and guidelines prepared by Blue Mountains City Council regarding urban and landscape design, public art and sustainability</i>	

Note: Urban design principles shown in italic writing style have been adopted from the Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, Roads and Traffic Authority, November 2006

OBJECTIVE	URBAN DESIGN PRINCIPLE
3 Create a route alignment that is responsive and expresses the landscape that it is crossing	<p>Utilise a split carriageway wherever feasible to reduce visual and physical impacts on the environment, especially where the topography is steep and rugged. This can mitigate the height of retaining walls and reduce headlight glare issues</p> <hr/> <p>Where possible consider introducing a landscaped zone in front of sandstone cuttings. Use these zones as part of clear zones. For small cuttings omit the landscape zone</p> <hr/> <p>Consider screen planting where appropriate to limit the presence of the highway</p> <hr/> <p>Where concrete retaining walls are required facing the bushland, consider using strong horizontal textures & exposed dark aggregate concrete consistent with other sections of the highway</p> <hr/> <p>Use dark grey oxides in the finish of concrete retaining walls to visually recede these elements</p> <hr/> <p>Terrace retaining walls to reduce their visible size and scale where possible to better integrate with the environment</p> <hr/> <p>Evaluate opportunities to sensitively integrate the road corridor as a holistic approach. For example: consider noise mitigation through cuttings instead of introducing roadside elements such as noise walls.</p> <hr/> <p>Integrate with existing patterns such as the railway line or along the interfaces of different land uses. This will minimise environmental fragmentation.</p> <hr/> <p>Consolidate overhead powerlines or situate underground</p> <hr/> <p>Utilise the topography where possible to limit the visual exposure of the road to areas beyond</p>

3 continued	<p><i>Design major rock cuttings above, and facing, the highway, where feasible, to appear natural and unobtrusive rather than 'engineered'. Cuttings should allow for a landscape zone at the base of the cutting, where space permits</i></p> <hr/> <p><i>Use endemic vegetation only in verges, medians and adjacent areas through bushland</i></p> <hr/> <p><i>Ensure medians are planted with appropriate frangible endemic shrubs, ensuring appropriate sight lines. Where barriers are appropriate, the use of non-frangible vegetation may be considered, ensuring safety criteria are met</i></p> <hr/> <p><i>Open up and exploit views from the highway, especially into the National Park and bushland areas wherever possible, without compromising road user safety through: grading of the highway; 'open' design of parapets and median barriers; by clearing obstructing vegetation and/or avoiding planting that will become an obstruction</i></p> <hr/> <p><i>Retain and enhance views to, and the settings of, the many historic buildings and groups of buildings (railway, hotel, institutional and residential etc.) throughout the Blue Mountains, where appropriate and feasible</i></p> <hr/> <p><i>Retain and enhance views of the railway infrastructure where appropriate</i></p> <hr/> <p><i>Design bridges and other structures, over and above their functional requirements, and use as visual markers or aid to travel orientation</i></p>
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Note: Urban design principles shown in italic writing style have been adopted from the Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, Roads and Traffic Authority, November 2006

OBJECTIVE	URBAN DESIGN PRINCIPLE
4 Contribute to the functioning of urban areas and enhance both local and regional connectivity where possible	Carefully consider property accesses, as these may require additional impacts on the environment
	Evaluate pedestrian movements and design accordingly, in particular for safe movements between the train stations and townships
	Integrate the 2020 BMCC vision for cycling, walking and trails
	Create well-defined intersections to reinforce a sense of entry to townships or mark critical intersections/access points to points of interest
	Retain connectivity within villages and across the road corridor
	Carefully consider access to north Blackheath and ensure the intersection is well defined to reinforce a sense of entry to Blackheath
	<i>Design verges that are sufficient to allow the required clear zone from the travel lane with respect to the design speed and sufficient space behind the kerb for an off-highway shared pedestrian and cycle path (where appropriate), street trees and/or other landscape, services, street lighting, signs, etc.</i>
	Retain the curvilinear alignment to reinforce the presence of the landscape that the road crosses
	Where possible consider introducing a landscaped zone in front of sandstone cuttings
	Recycle sections of abandoned road as potential rest areas or for the shared trail Great Clifftop Walk
5 Provide a memorable journey experience that positively contributes to the identity of the area in a sensitive way	Integrate the historic significance of the area into the planning (possible interpretation strategy) and ensure good access to carparks and walking trails.
	Where concrete retaining walls are required, consider strong horizontal textures consistent with other sections of the highway
	Minimise the footprint of the road corridor and limit any impacts to private properties
	Consolidate overhead powerlines or situate underground

OBJECTIVE	URBAN DESIGN PRINCIPLE
6 Respond to natural and cultural patterns by expressing the sequence of villages separated by bushland and reinforce the distinction of the various villages	Consolidate the road and rail corridor as much as possible in areas where there is limited landscape buffer zones along critical verges (Hydro Majestic)
	Respect the existing streetscape pattern/grid and richness of the townships
	Utilise verge between road and railway corridor for the road upgrade to limit impacts to the local community
	Re-establish a strong entry with appropriately scaled street trees
	Use cultural trees (as nominated by BMCC) to reinforce the village setting, heritage significance and to express the 'pearls on a string' principle set out in the original <i>Great Western Highway Urban Design Framework</i>
	Consider reducing speed in this area to produce a stronger landscape outcome e.g. introduction of kerbs or barriers to minimise clearances to planting
	Create a legible arrival sequence into townships to reinforce their cultural and historic identity
	Instigate streetscape enhancement where appropriate & apply BMCC's streetscape manual
	Consider placement of land bridges in key zones to improve town connectivity and enhance greening of the township
	Apply materiality consistent with existing retaining structures. Walls facing the highway should be finished in sandstone. Walls facing away from the highway should be sympathetic to the surrounding setting and limit their visual presence
<i>Ensure the highway design enhances the uniqueness and character of each village and at the same time have a consistency with the rest of the highway through the Blue Mountains.</i>	

Note: Urban design principles shown in italic writing style have been adopted from the Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, Roads and Traffic Authority, November 2006

OBJECTIVE	URBAN DESIGN PRINCIPLE
<p>7 Avoid or minimise natural and cultural fragmentation of coherent zones</p>	<p>Consolidate road and rail corridors to minimise impacts to natural vegetation zones. It is preferable to impact pockets of disturbed vegetation between the railway and road corridors e.g. Lawson</p> <hr/> <p>Consolidate rail and highway by situating the road either in a tunnel or in an open cut situation whereby the road corridor has a limited presence with limited noise impacts (e.g Eastern Distributor at Moore Park.)This will also allow for better urban permeability</p> <hr/> <p>Respect the urban structure of the township. Avoid alignments that are skewed to the urban grid.</p> <hr/> <p>Avoid impacting local townships as much as possible</p>
<p>8 Apply the principles stipulated in RMS urban design policy, procedures and design principles outlined in <i>Beyond the Pavement</i></p>	<p>Carefully consider maintenance issues and accesses, as these may require additional impacts on the environment.</p> <hr/> <p>Execute any bridge works in accordance with the <i>RMS Bridge Aesthetics</i></p> <hr/> <p>Reflect the BMCC Streetscape Masterplan</p> <hr/> <p>Carefully plan and execute any shotcrete works to allow them to be visually integrated with adjacent cuttings, in accordance with the <i>RMS Shotcrete Design Guidelines, Landscape Design Guideline, Bridge aesthetics Design Guidelines, Noise Wall Design Guideline, and Water sensitive urban design guideline.</i></p>
	<p><i>Note: Urban design principles shown in italic writing style have been adopted from the Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, Roads and Traffic Authority, November 2006</i></p>

3.3 Corridor Wide Applications of Urban Design Principles

3.3.1 Natural Bushland Areas

Strategic Urban Design Principles

- Evaluate opportunities to sensitively integrate the road corridor as a holistic approach. For example: consider noise mitigation through cuttings instead of introducing roadside elements such as noise walls
- Carefully consider maintenance issues and accesses, as these may result in additional impacts on the environment
- Integrate with existing patterns such as the railway line or along the interfaces of different land uses. This will minimise environmental fragmentation
- Consider staggered tunnel portals to minimise footprint (width) of corridor. This may also reduce visual impacts
- Utilise the topography where possible to limit the visual exposure of the road to areas beyond
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of such environs
- Ensure railing and barrier designs, either on retaining walls or on bridges or road edges allows permeability with views into the landscape.

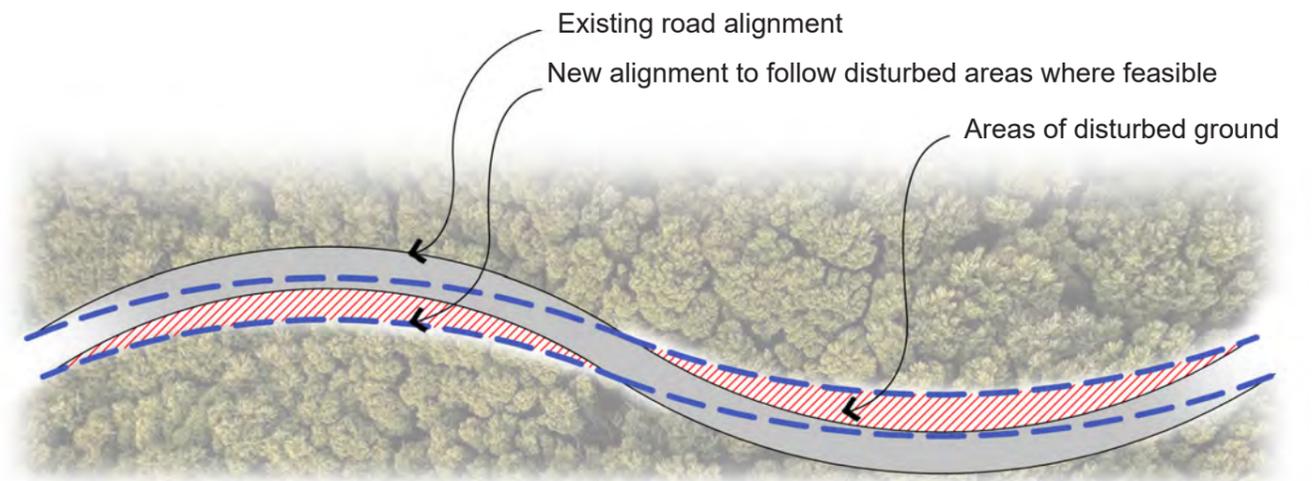


Figure 3.2 Alignment maximising disturbed areas

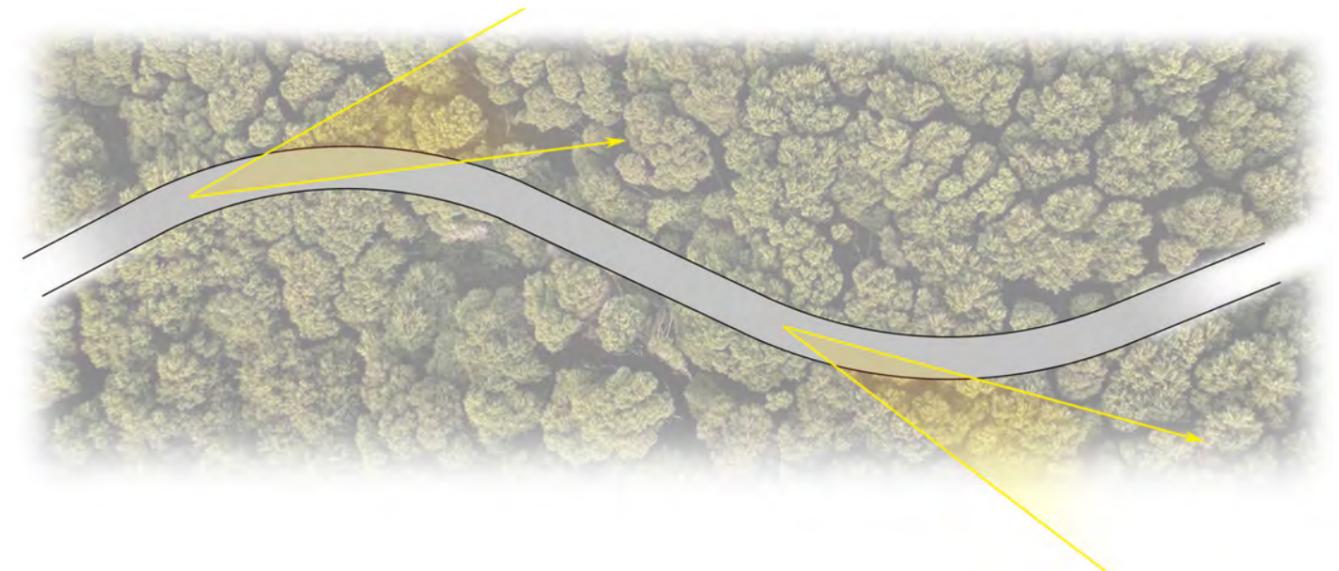


Figure 3.3 Curvilinear alignment allows the traveller to visually engage with the bushland

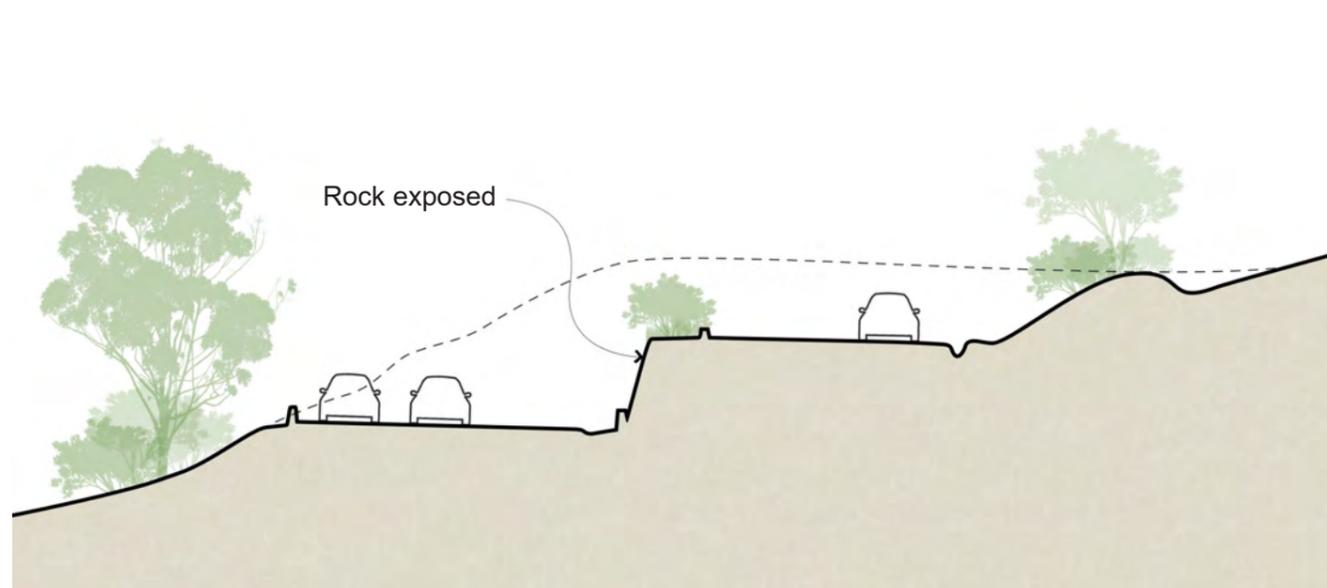


Figure 3.4 Split carriageways to minimise earthworks, expose rock as retaining elements and improve aesthetic outcome

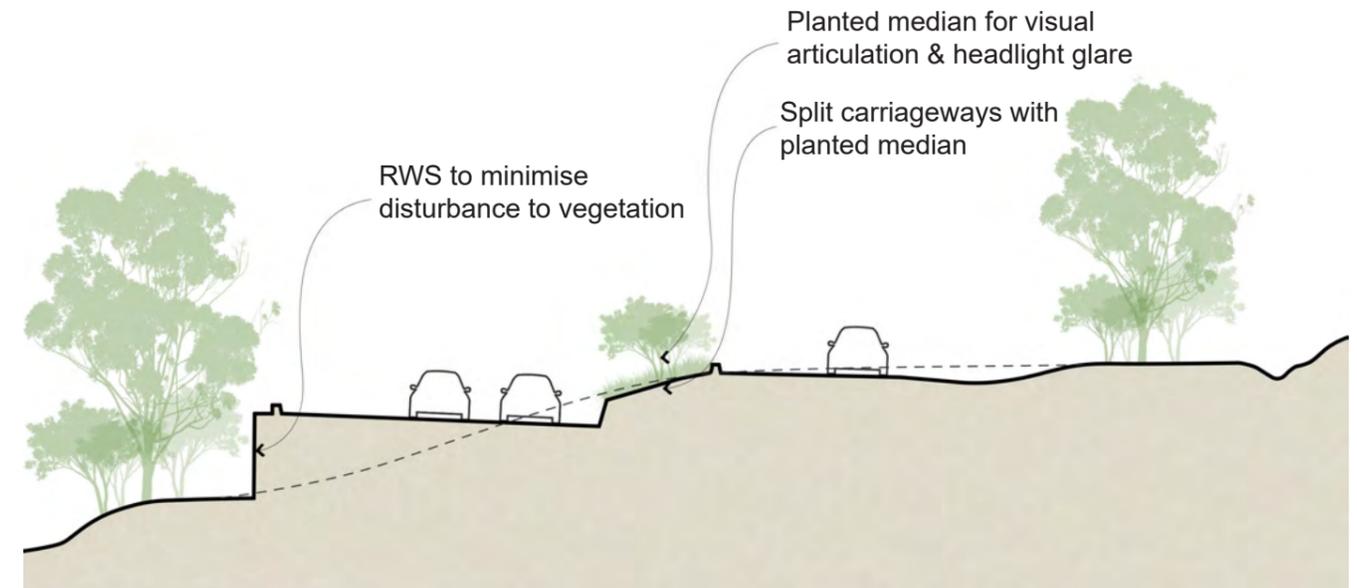


Figure 3.5 Split carriageways with use of retaining walls to maximise retention of existing vegetation and planted medians to articulate road and provide headlight glare reduction

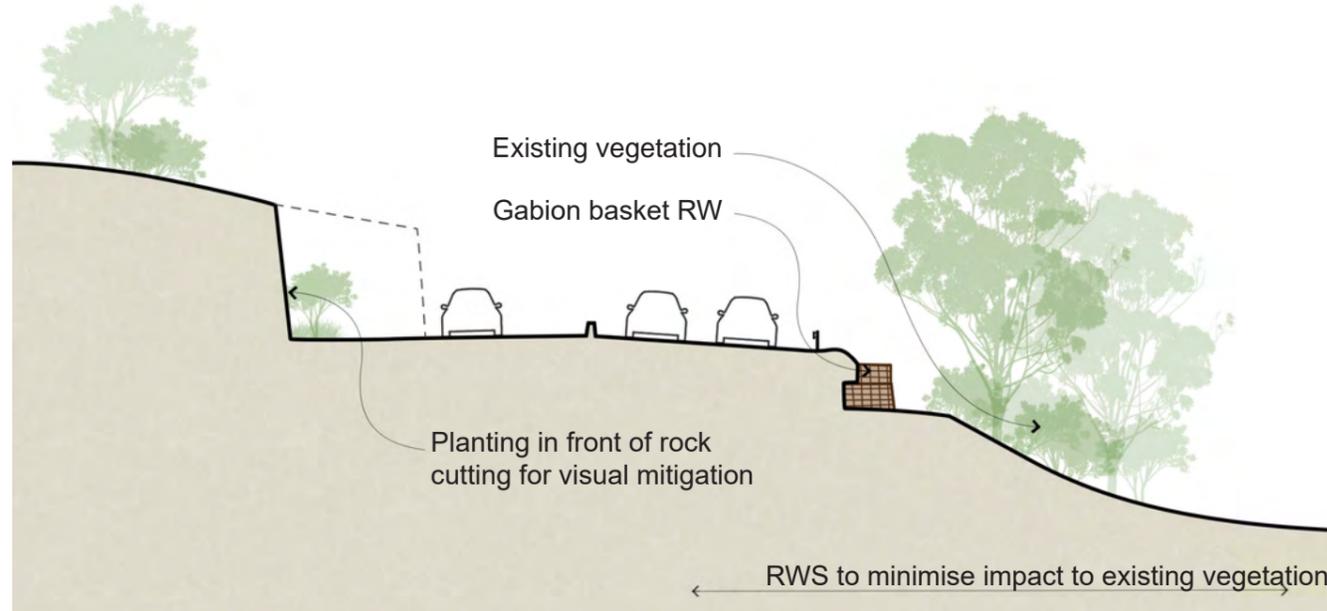


Figure 3.6 Planting in front of high rock cuttings and use of retaining walls to minimise earthworks to maximise retention of existing vegetation

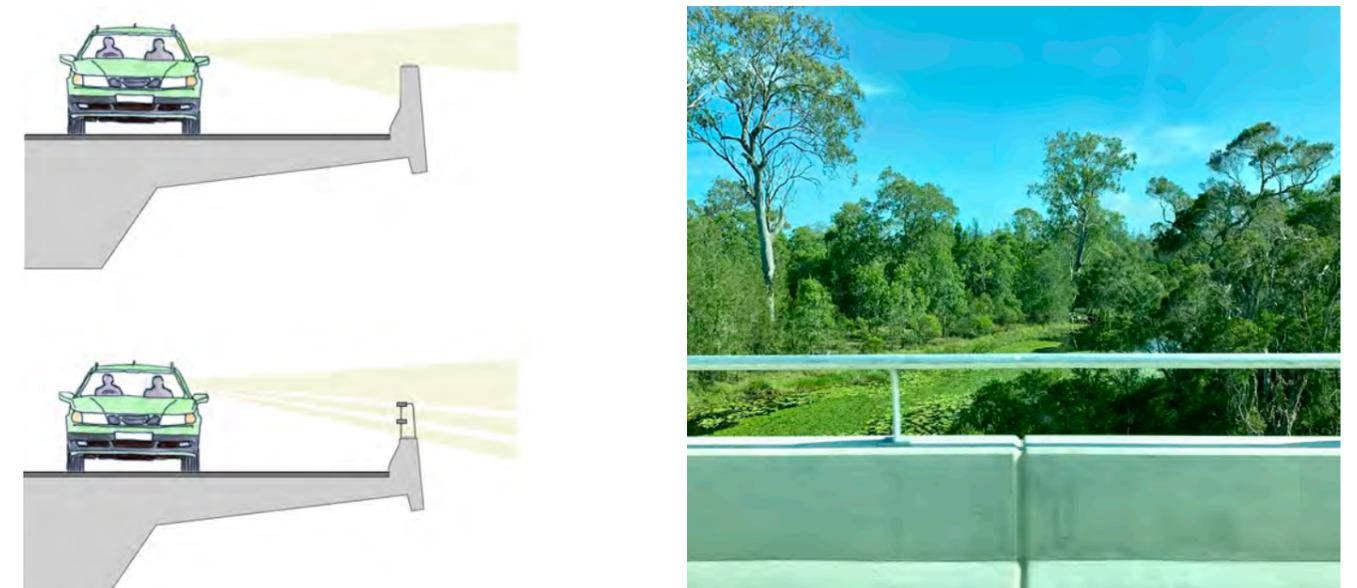


Figure 3.7 Barriers should allow for open views into the landscape beyond as shown in the lower left image. The top left image has a full height opaque barrier which restricts views into the landscape. The photo on the right shows a single barrier allowing views into the adjacent landscape from the Pacific Highway, Grafton Bypass project. Source for latter- RMS



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Figure 3.9 Groups of indigenous trees between road corridor and local roads should be retained where possible



Figure 3.10 Barriers can maximise retention of existing trees close to road pavement edge- the overlapping canopies reinforce the natural bushland setting



Figure 3.8 Maximising views to adjacent bushland requires careful planting design so not to block these views. The top image has low plantings beside the road enabling views to adjacent bushland. The lower image has higher shrub plantings that obstruct views into the adjacent bushland.



Figure 3.11 Care needs to be taken to minimise impacts from local residents- in this photo the existing indigenous trees provide dense screening to the highway corridor



Figure 3.12 Maximising views of "borrowed landscapes" will form an important part of the urban design principles for this project where natural bushland, and world heritage landscapes are key elements

MATERIALS IN NATURAL SETTINGS

To achieve a consistent corridor wide character, this report adopts a similar approach for the application of materials and finishes as stipulated in the 2006 Great Western Highway Urban Design Framework, Blue Mountains - Lapstone to Katoomba. The treatments have worked successfully and are considered suitable for this framework. Key treatments include:

- The use of dark oxides and strong horizontal ribbing for retaining walls facing the bush
- The use of sandstone gabion baskets to screen shotcrete treatments
- Retaining walls facing the highway should be site responsive (sandstone clad if possible) with smooth top edges.
- Small retaining walls (1 m or less in height) should be finished in natural sandstone
- Concrete swales should be stone pitched to visually recede and appear more natural
- Any visible fencing to be finished in black.



Figure 3.13 Dark receding colours are recommended for walls facing the bush as seen in Den Hogan Drive, Leura. Photo credit: Catherine Dung.



Figure 3.14 Sandstone gabion baskets complement the geology of the area in situations of cuttings as seen in Boddington Hill, Great Western Highway.



Figure 3.15 Smooth top edges of retaining walls provide a flowing character as seen near Wentworth Falls. Source: RMS.



Figure 3.16 Use of sandstone rock in swales limits the visual exposure of concrete drains.

LANDSCAPE DESIGN APPROACH & REVEGETATION STRATEGIES

Maximise retention of existing vegetation

Significant input is required from a landscape planning perspective for input into the road alignment options or road widening proposals. Critical assessment to review opportunities to maximise retention of existing vegetation, beside the road and in between highway and local roads will be required to create successful outcomes.

Maximise views to “borrowed landscapes”

The principle of retaining and enhancing existing views from the road to areas of natural bushland or cultural elements rather than providing an “introduced” landscape design must be adopted to suit this strongly natural landscape environment.

Adopt an indigenous planting palette

To reflect the ecology and aesthetic of the surrounding bushland areas, the planting palettes need to promote the indigenous species of each area and with that its textures, green hues and range of ecological forms and layers.

Contribute to biodiversity and visual mitigation

Ensure the landscape design approach through this sensitive environs will contribute to bio-diversity, visual impact mitigation, and also will assist in minimising landscape maintenance & life cycle costs. Planting palettes and sensitive water design approaches need to be applied.

Adopt appropriate revegetation approaches

Reinforce revegetation approaches to suit the natural site and adopt the following principles:

- Apply the principles of “natural regeneration” rather than importing topsoil which would bring weed species etc and exotic plants to the area.
- Minimise interference into the natural bushland setting. For narrow areas disturbed beside road pavement, apply “natural revegetation” principles, e.g. use narrow strips of mulch only rather than narrow strips of planting; and do not apply topsoil/planting in areas of rock.
- Expose the local geology of the area.

- Utilise natural rock surfaces as the base for drainage systems and do not introduce engineered material unless necessary for stability or soil erosion.
- Accept that any new areas of planting will require maintenance and access, along with WHS issues.
- Exploit views to the natural bushland and limit plantings (or seeding) of large shrubs that form hedges and monoculture visual lines in an otherwise diverse, and beautiful natural bushland/mountains landscape.
- Ensure any cover crop is sterile, that will not re-seed into the bushland areas.
- Maintain a high diversity of plant mix to reflect the local provenance and to be able to respond to wide climatic changes.
- Wherever possible, apply areas of mass planting, rather than seeding, to ensure the permanent plants are more suited to the area. (The issue with seeding is that the native

shrubs that succeed are limited and normally higher and would create more “monoculture” effect in a diverse, indigenous landscape. Also the seeding would require more maintenance, and WHS issues.

- Utilise plant mixes from the indigenous vegetation communities (relating to the original soil landscapes) that would reflect the natural patterns and textures and support biodiversity and provide refuge and food sources for birds and animals, as well as requiring minimal water, and be predominantly self-sustaining in the long term.
- Consider the Bush Fire Hazard Reduction requirements (NSW Rural Fire Service’s document ‘Planning for Bush Fire Protection, 2006’) and the need for fire retardant species, that also reinforce the ecological species associations.



Figure 3.17 Views into this natural bushland edge on the left should be retained, hence if any planting is required to this edge in the future, ideally it should be of low height e.g. native grasses and low shrubs to enable the natural bushland feel to dominate.



Figure 3.18 This photo shows planting of low shrubs under power lines beside the road edge, adjacent a bushland area. In this case, whilst greens of the shrubs do compliment the bush, the resulting uniform height due to dominance of one species being planted is out of character with the bushland vegetation.

3.3.2 Town & village areas

Strategic Urban Design Principles

- Maintain existing pedestrian/cycle connectivity along and across the highway and review enhancement opportunities in consideration of desire lines and the BMCC Bike Plan
- Reinforce village entry zones to create a contrasting setting with bushland zones. Incorporate cultural landscape to visually reinforce the principle of 'pearls on a string'
- Respect cultural landscapes and minimise impacts to historic and heritage elements whether built form or vegetation
- Consider the integration of utilities as part of the planning process and identify strategies to consolidate utility corridors
- Minimise impacts to residences and commercial property owners
- Evaluate clear zones and safety assessments and mitigate vegetation removal where possible through strategies such as dispensations, posted speed/design speed considerations, retention of existing kerb lines etc.
- Minimise medians to avoid disturbing streetscape character along the verges. Evaluate signage strategies in this context
- Create legible intersections that reinforce wayfinding to links that access points of interest
- Provide adequate buffers to important areas, sites, vegetation materials & finishes to reflect the cultural values of the township



Figure 3.19 The use of quality material and finishes that are sympathetic to the cultural environment is important. Example near Wentworth Falls.



Figure 3.20 Informal pattern of a sandstone clad retaining wall along the Great Western Highway.



Figure 3.21 This railing is typical along the Great Western Highway.



Figure 3.22 Vertically split carriageways along the Great Western Highway near Leura. The wall helps integrate the road with the topography and articulates the scale of the road. The median retaining wall has been constructed from sandstone blocks salvaged from a pre-existing heritage wall, demonstrating a sensitive design response to the setting. Photo credit: Catherine Dung.

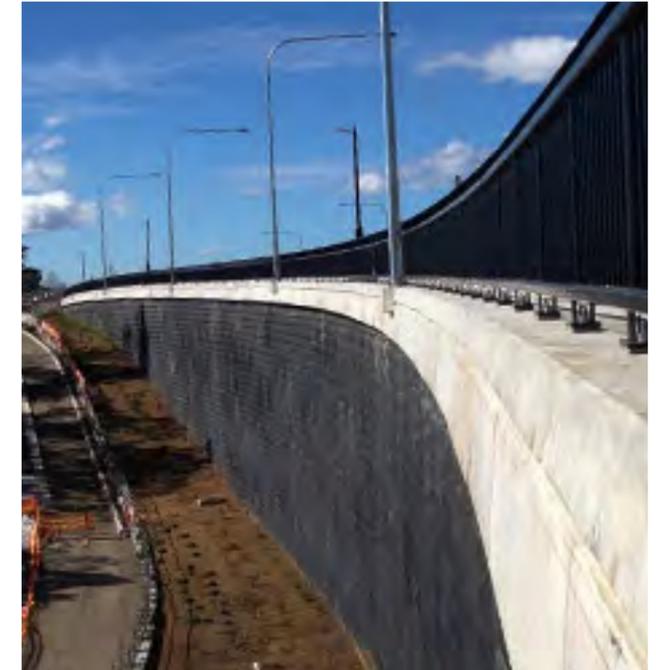


Figure 3.23 This section of the Great Western Highway at Woodford to Hazelbrook illustrates the typical treatment for retaining walls facing away from the highway.



Figure 3.24 Exposed aggregate was used for the retaining walls facing Katoomba Showground. Careful detailing and material selection are important urban design considerations. Photo credit: Catherine Dung.

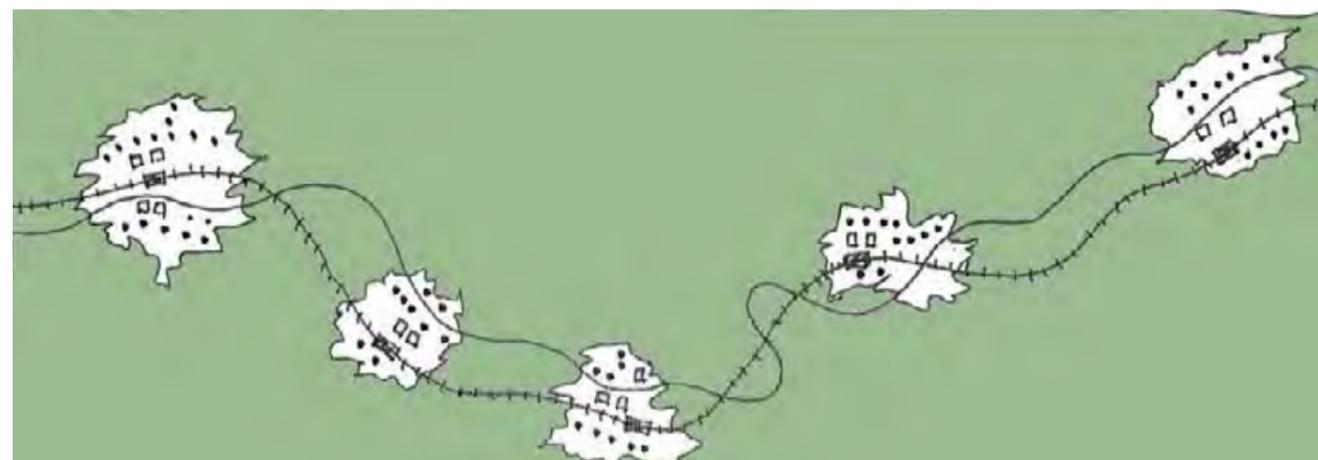


Figure 3.25 Excerpt from the original Great Western Highway Urban Design Framework, illustrating the principle of 'Pearls on a string'. The interplay between villages and bushland is an important part of the journey experience and helps to reinforce the individuality and identity of each township.

3.4 Plant Selection Strategy

To further explain the principles and information as outlined in section 4.1 Landscape Design Approach and Revegetation Strategies, there needs to be a process for plant selection- as shown below and as outlined in the RTA's 2006 GWH framework.

3.4.1 Natural bushland area palette

In addition to the 2006 Great Western Highway - Urban Design Framework, Blue Mountains – Lapstone to Katoomba, we have added an approach to further enrich and guide the application of indigenous plant communities. The following pages demonstrate the approach and examples of planting palettes suitable for the sections of the highway through the natural bushland areas of the corridor.

3.4.2 Cultural landscape palette

Proposed species selection for the various vegetation types and street trees for the transition into urban areas and for the urban areas of each historic village, especially for Blackheath and Medlow Bath must follow the principles and guidelines as set out in the **Blue Mountains Council Streetscape Masterplan**.

- Corridor landscape should be:
 - Robust, non-invasive, of species that are not fire promoting, low maintenance, accessible and easy to maintain.
 - Preferably grown from seeds collected from local area to maintain ecological integrity.
 - Densely planted to reflect the bushland environment, minimise maintenance and weed infestation.
 - Designed to minimise effects on pavements and paths, and not interfere with traffic.
- Species selection must exclude environmental weeds, and consider the Blue Mountain City Council's plant species and weed schedules.
- The term 'exotic' is used in this framework to mean a species which provides distinction and contrast within a village context (to complement its unique cultural and historical setting), and which may originate from a different country or region. This may also include an appropriate species from a different region within Australia (that is, a native, non-endemic species).



Figure 3.26 Corridor plant selection process as outlined in the 2006 GWH Urban Design Framework, Blue Mountains-Lapstone to Katoomba

3.4.3 Adjacent natural bushland areas

Soil Landscapes, should drive the planting selection for the project, where space permits, to ensure a sustainable landscape evolves long term. This would also ensure a lower maintenance landscape evolves over time, as species are chosen for correct soil / water conditions. The indigenous species also support local fauna/bird species, hence promoting biodiversity.

Any revegetation strategy should investigate utilising the majority of the indigenous species within these groups, provided they can be easily propagated, and are low maintenance. Abilities of vegetation communities to be self sustaining would be a key aim for this project.

The key document that provides invaluable information of the vegetation communities of the corridor, as well as BIONET information published on line is the following document:

Flora and Fauna Study for Blue Mountains Environmental Management Plan, Study Area 1, Bell to Medlow Bath, and Study Area 2- Katoomba to Wentworth Falls; Peter & Judy Smith, April 1995

Examples of suitable species, previously used on road projects in the area are included in the following pages. The images portray the character of some of the species from each vegetation community type.

<i>Eucalyptus oreades</i> - <i>Eucalyptus piperita</i> Open-forest /Tall Open- forest	
Species	Common Name
Trees:	
<i>Callicoma serratifolia</i>	Black Wattle
<i>Eucalyptus oreades</i>	Blue Mountains Ash
<i>Eucalyptus piperita</i>	Sydney Peppermint
<i>Eucalyptus sieberi</i>	Sydney Top Ash
Shrubs:	
<i>Baeckea linifolia</i>	Swamp Baeckea
<i>Banksia spinulosa</i>	Hairpin Banksia
<i>Banksia cunninghamii</i>	Cunningham's Banksia
<i>Bursaria spinosa</i>	Native Blackthorn
<i>Callistemon sieberi</i>	River Bottlebrush
<i>Callicoma serratifolia</i>	Black Wattle
<i>Dampiera stricta</i>	Blue Dampiera
<i>Grevillea acanthifolia</i>	Acanthus Grevillea
<i>Hakea dactyloides</i>	Finger Hakea
<i>Leptospermum juniperinum</i>	Prickly Teatree
<i>Leptospermum trinervium</i>	Paperbark Teatree
<i>Petrophile pulchella</i>	Conesticks
Grasses and Groundcovers:	
<i>Dianella caerulea</i>	Blue flax Lily
<i>Gahnia microstachya</i>	Slender Saw-sedge
<i>Lomandra longifolia</i>	Mat Rush
<i>Microleana stipoides</i>	Weeping Grass



Eucalyptus oreades 'Blue Mountains Ash' *Eucalyptus piperita* 'Sydney Peppermint' *Eucalyptus sieberi* 'Sydney Top Ash' *Banksia cunninghamii* 'Cunningham's Banksia' *Grevillea acanthifolia* 'Acanthus Grevillea'

Figure 3.27 Typical plants appropriate for sections of GWH road corridors from the *Eucalyptus oreades*-*Eucalyptus piperita* Open-forest/Tall Open-forest vegetation community

<i>Eucalyptus piperita</i> - <i>Eucalyptus sieberi</i> Open-forest	
Species	Common Name
Trees:	
<i>Eucalyptus mannifera</i>	Brittle Gum
<i>Eucalyptus piperita</i>	Sydney Peppermint
<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
<i>Eucalyptus sieberi</i>	Sydney Top Ash
<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark
Shrubs:	
<i>Acacia obtusifolia</i>	Blunt Leaf Wattle
<i>Acacia terminalis</i>	Sunshine Wattle
<i>Allocasuarina nana</i>	Dwarf She-Oak
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Banksia spinulosa</i>	Hairpin Banksia
<i>Bursaria spinosa</i>	Blackthorn
<i>Callistemon sieberi</i>	River Bottlebrush
<i>Dillwynia retorta</i>	Heathy Parrot Pea
<i>Hakea dactyloides</i>	Finger Hakea
<i>Hakea teretifolia</i>	Dagger Hakea
<i>Kunzea ambigua</i>	Tickbush
<i>Kunzea capitata</i>	Pink Kunzea
<i>Leptospermum juniperinum</i>	Prickly Teatree
<i>Leptospermum rupicola</i>	Cliff Teatree
<i>Petrophile pulchella</i>	Conesticks
Grasses and Groundcovers:	
<i>Chionochloa pallida</i>	Silvertop Wallaby Grass
<i>Dianella caerulea</i>	Blue flax Lily
<i>Gahnia microstachya</i>	Slender Saw-sedge
<i>Microleana stipoides</i>	Weeping Grass



Eucalyptus piperita 'Sydney Peppermint' *Eucalyptus sclerophylla* 'Hard-leaved Scribbly Gum' *Eucalyptus sieberi* 'Sydney Top Ash' *Acacia obtusifolia* 'Blunt Leaf Wattle' *Hakea dactyloides* 'Finger Hakea'

Figure 3.28 Typical plants appropriate for sections of GWH road corridors from the *Eucalyptus piperita*-*Eucalyptus sieberi* Open-forest vegetation community

Blue Mountain Swamps	
Species	Common Name
Trees:	
<i>Eucalyptus moorei</i>	Little Sally
Shrubs:	
<i>Acacia ptychoclada</i>	Swamp Wattle
<i>Acacia rubida</i> *	Red-leaved Wattle
<i>Almaleea incurvata</i>	Epacris hamiltonii
<i>Baeckea linifolia</i> *	Swamp Baeckea
<i>Banksia ericifolia</i>	Heath-leaved Banksia
<i>Grevillea acanthifolia</i>	Acanthus Grevillea
<i>Hakea teretifolia</i>	Dagger Hakea
<i>Leptospermum juniperinum</i>	Prickly Teatree
<i>Leptospermum grandifolium</i>	Woolly Teatree
<i>Leptospermum polygalifolium</i> *	Yellow Teatree
<i>Lomatia myricoides</i> *	River Lomatia
<i>Olearia quercifolia</i>	Oak-leaved olearia
Grasses, Herbs and Sedges:	
<i>Celmisia longifolia</i>	A snow daisy
<i>Drosera spatulata</i>	Common Sundew
<i>Empodisma minus</i>	Spreading Rope-rush
<i>Gymnoschoenus sphaerocephalus</i>	Button Grass
<i>Juncus planifolius</i>	Broad-leaf Rush
<i>Lepidosperma limicola</i>	Razor Sedge
<i>Xyris ustulate</i>	New South Wales Yellow-eye
Ferns:	
<i>Blechnum nudum</i> *	Fishbone Water Fern
<i>Gleichenia dicarpa</i>	Pouched Coral Fern
<i>Todea barbara</i> *	King Fern

* Species from Creepline Vegetation Community



Eucalyptus moorei 'Little Sally' *Leptospermum juniperinum* 'Prickly Teatree' *Banksia ericifolia* 'Heath-leaved Banksia' *Gymnoschoenus sphaerocephalus* 'Button Grass' *Juncus planifolius* 'Broad-leaf Rush'

Figure 3.29 Typical plant species appropriate for the Blue Mountains Swamp areas within the corridor

Wetland filter mix in infiltration areas	
Species	Common Name
<i>Bothriochloa macra</i>	Red Grass
<i>Carex appressa</i>	Wild Sedge
<i>Isopelis nodosa</i>	Knobby Club Rush
<i>Juncus usitatus</i>	Common Rush
<i>Microleana stipoides</i>	Weeping Grass

Wetland filter mix in swales	
Species	Common Name
<i>Carex appressa</i>	Wild Sedge
<i>Carex gaudichaudiana</i>	Tufted Sedge
<i>Dianella caerulea</i>	Blue Flax Lily
<i>Juncus planifolius</i> *	Broad-leaf Rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Poa sieberiana</i>	Small blue Tussock Grass

* or substitute *Juncus usitatus*



Carex appressa 'Wild Sedge' *Lomandra longifolia* 'Spiny-headed Mat-rush' *Poa sieberiana* 'Small blue Tussock Grass' *Bothriochloa macra* 'Red Grass' *Juncus usitatus* 'Common Rush'

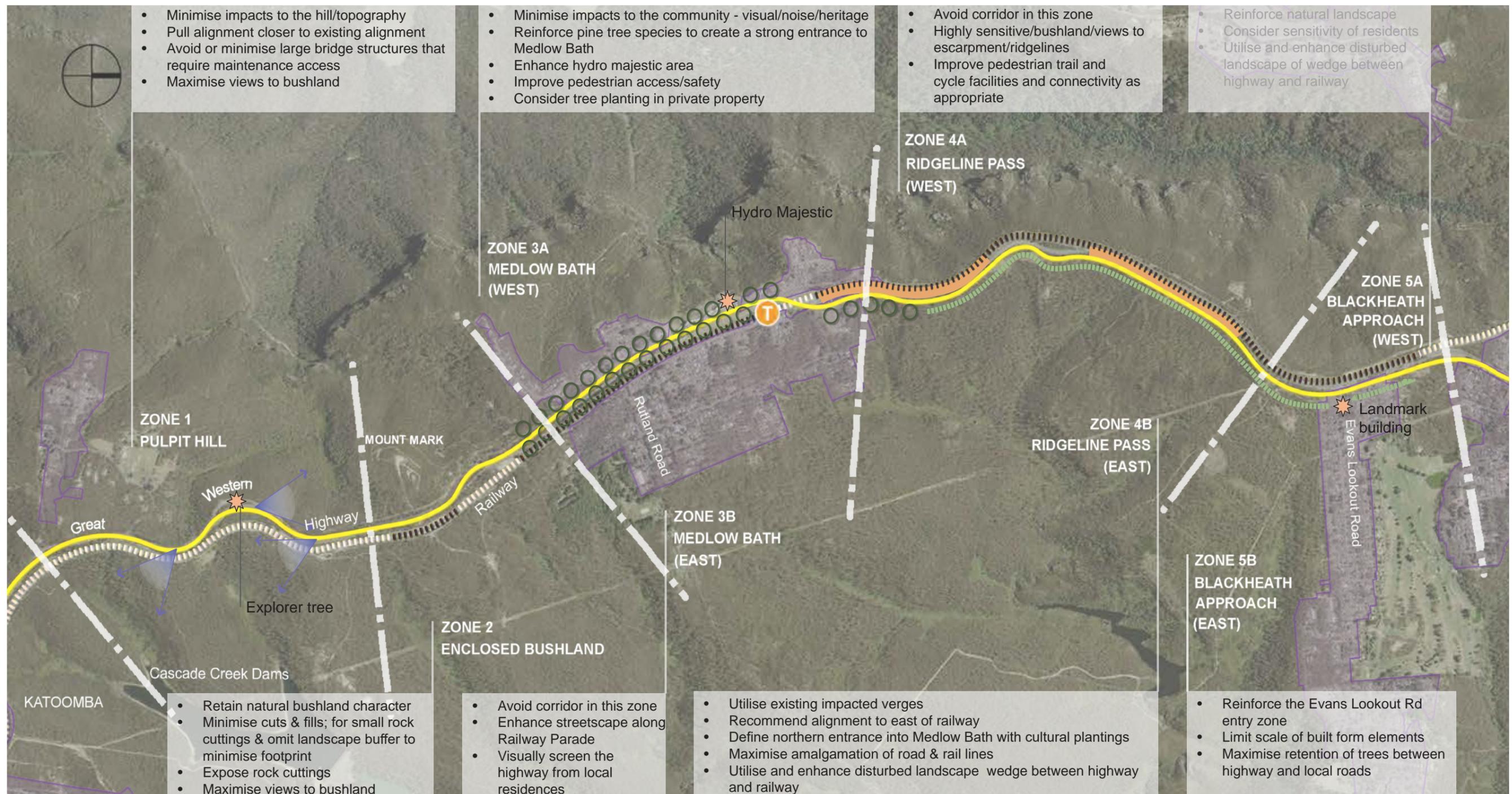
Figure 3.30 Typical wetland filter plants suitable swales, infiltration areas within the corridor

4.0 ZONE SPECIFIC CHALLENGES & PRINCIPLES

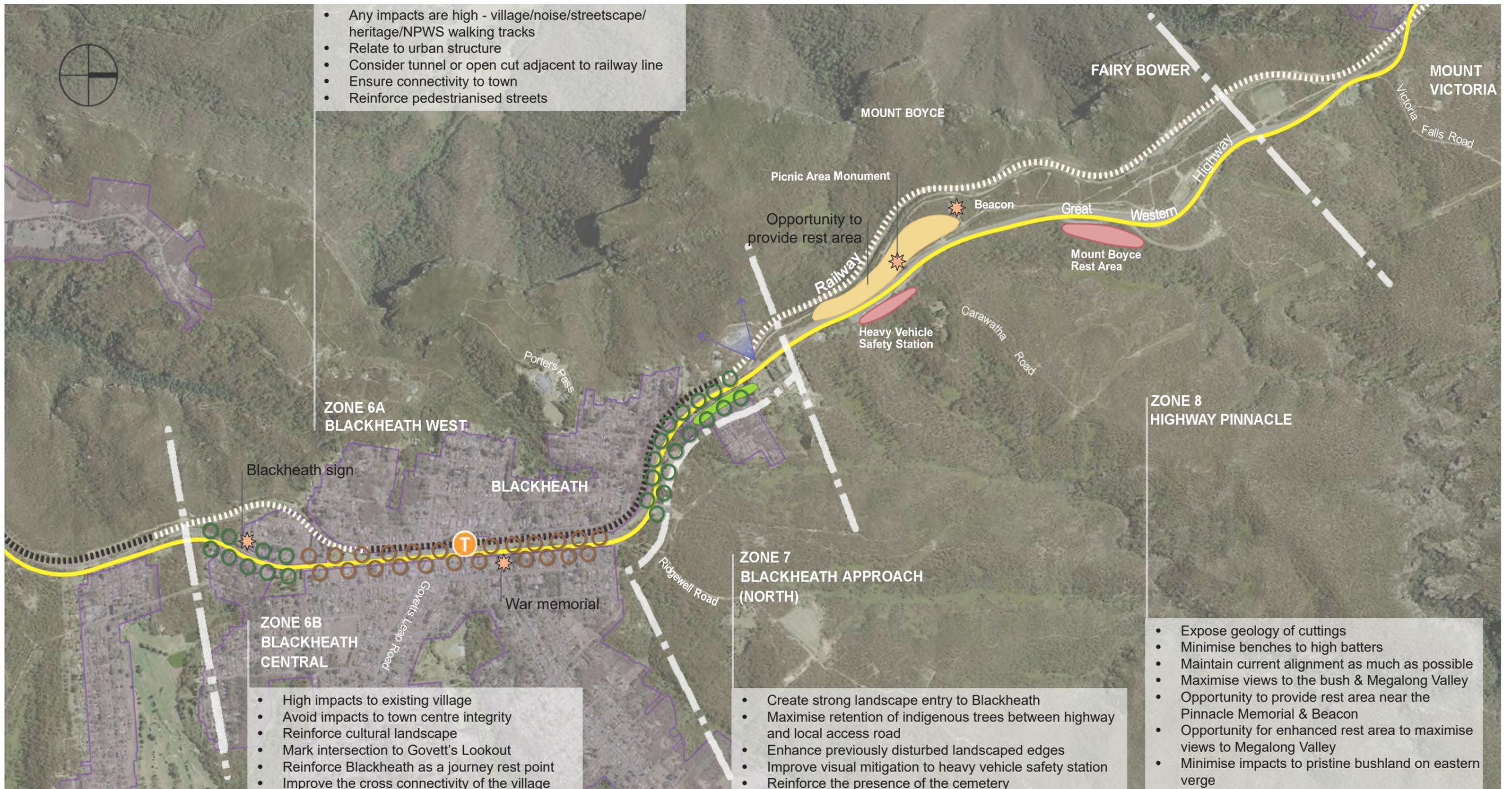


4.1 Framework Overview

Key principles, challenges and opportunities are identified on this figure. More detail is outlined in section 4.2.



Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria



LEGEND

- Great Western Highway
- Railway
- Strong presence of railway corridor
- Train station
- Interfered bushland edge
- Maximise retention of existing trees
- Entry streetscape
- Cultural landscape (indigenous dominant)
- Disturbed corridor
- Landmark
- Maximise view

4.2 Challenges, Opportunities & Principles

This section discusses the key anticipated design challenges and opportunities and identifies a series of urban design principles to help guide the design. These principles should influence any route options in future assessment processes and provide informative guidance for the design team. The issues and principles have been described according to the actual landscape character zones as outlined previously in this report.



4.2.1 Zone 1: Pulpit Hill

This area has moderate sensitivity.

Key Issues

- Retaining the curvilinear character of the road
- Limiting impacts to the natural and cultural environment
- Avoiding or minimising impacts to the “Protected areas-escarpment”, and land between towns”
- Avoiding or minimising large structures that require extensive construction footprints



Figure 4.1 Some road verges have been impacted and may be utilised for the upgrade



Figure 4.2 The winding character of the road should be retained as much as feasible as this contributes to the journey experience

Strategic Urban Design Principles

- Utilise the topography where possible to limit the visual exposure of the road to areas beyond
- Maximise retention of the existing alignment to minimise impacts to the environment
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of such environs
- Retain the curvilinear alignment to reinforce the presence of the landscape that the road crosses
- Maximise views to bushland
- Integrate the historic significance of this area into the planning (possible interpretation strategy) and ensure good access to carparks and walking trails.
- Recycle sections of abandoned road as potential rest areas or for the shared trail Great Clifftop Walk
- Utilise a split carriageway wherever feasible to reduce visual and physical impacts on the environment, especially where the topography is steep and rugged. This can mitigate the height of retaining walls and reduce headlight glare issues
- Where possible consider introducing a landscaped zone in front of sandstone cuttings
- Where concrete retaining walls are required, consider using strong horizontal textures consistent with other sections of the highway
- Use dark grey oxides in the finish of concrete retaining walls to visually recede these elements
- Any shotcrete works shall be carefully planned and executed to allow them to be visually integrated with adjacent cuttings, in accordance with the RMS Shotcrete Design Guidelines
- Any bridge works shall be executed in accordance with the RMS Bridge Aesthetics.



4.2.2 Zone 2: Enclosed Bushland

This area has moderate sensitivity.

Key Issues

- Avoiding or minimising impacts to the “Protected areas-land between towns”
- Retaining the enclosed character of the road, framed by tree canopies, formed by the trees flanking the road edge
- Keeping a visual separation between the railway corridor and the road
- Limiting impacts to the natural environment
- Avoiding deviating from the existing alignment as much as possible.



Figure 4.3 The enclosed character of this section should be retained as much as possible. It contributes to the bushland journey experience. Consider barriers where appropriate to retain mature vegetation



Figure 4.4 Where small rock cuttings occur, leave this exposed with no vegetation strip in front. This expresses the existing situation and maximises retention of trees

Strategic Urban Design Principles

- Maximise retention of the existing alignment and retain the existing enclosed bushland character of the route at this location
- Maximise views to bushland
- Retain a vegetation buffer with stands of trees between the railway line and the road corridor where possible
- Carefully consider access issues, as these may require additional impacts on the environment
- Minimise cuts and fills
- For small rock cuttings omit landscape buffers in front to minimise footprint
- Where possible, consider introducing a landscaped zone in front of sandstone cuttings. Use these zones as part of clear zones. For small cuttings omit the landscape zone
- Consider the introduction of wire rope barriers or tri-beams to minimise vegetation clearing and assist in the retention of mature trees and the enclosed character of the route in this location
- Where concrete retaining walls are required, consider strong horizontal textures consistent with other sections of the highway
- Any shotcrete works shall be executed in accordance with the RMS Shotcrete Design

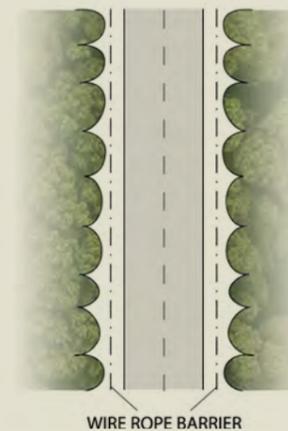


Figure 4.5 To maximise the enclosed bushland character, wire rope barrier or other barriers could be applied to enable trees closer to road pavement

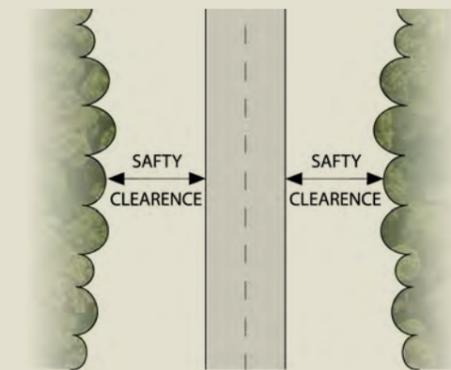


Figure 4.6 Illustrating how safety clearances impact on tree setbacks to road pavement, hence not achieving an enclosed bushland character for the corridor



4.2.3 Zone 3A: Medlow Bath - West

This area has moderate sensitivity.

Key Issues

- Avoiding or minimising impacts to the "Protected area-escarpment"
- Minimising impacts to the Hydro Majestic site
- Reinforcing the sense of arrival into the village to improve the village identity
- Promoting slower speeds
- Introducing large scale tree planting along the road verges to provide a visual buffer and settle the road in its setting
- Considering access issues to private properties
- Mitigate the dominance of the highway

Strategic Urban Design Principles

- Carefully consider property accesses, as these may have additional impacts on the environment
- Consolidate the road and rail corridor as much as possible to maximise landscape buffer zones
- Exploit views towards the Hydro Majestic to reinforce the historic and unique cultural identity of Medlow Bath
- Use cultural trees (as nominated in the BMCC Streetscape Masterplan) to create an avenue to reinforce the Medlow Bath historic landscape setting and to express the 'pearls on a string' principle set out in the 2006 *Great Western Highway Urban Design Framework*
- Consider reducing speed in this area to produce a stronger landscape outcome e.g. introduction of kerbs or barriers to minimise clearances to planting
- Use materials consistent with existing retaining structures. Walls facing the highway should be finished in sandstone. Walls facing away from the highway should be sympathetic to the surrounding setting and limit their visual presence
- Avoid or minimise impacts to heritage properties along Station Street
- Evaluate pedestrian movements and design accordingly, in particular for safe movements between the train station and the Hydro Majestic
- Consider tree plantings in private frontages to enhance streetscape



Figure 4.7 Cultural trees - pine dominant- should be considered along the western verge to reinforce the 'string of pearls' character



Figure 4.8 The location and re-location of certain elements such as paths, historic sandstone walls and planting need to be carefully considered in context to property boundaries, sight lines, amenity etc.

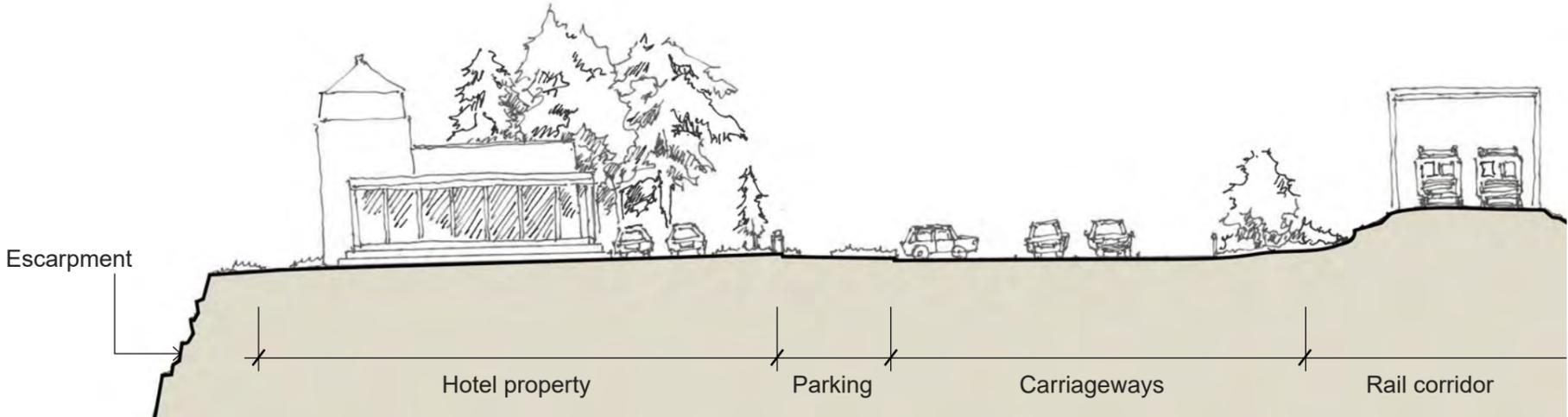


Figure 4.9 Existing situation - section through Hydro Majestic area showing young pines plantings against rail corridor

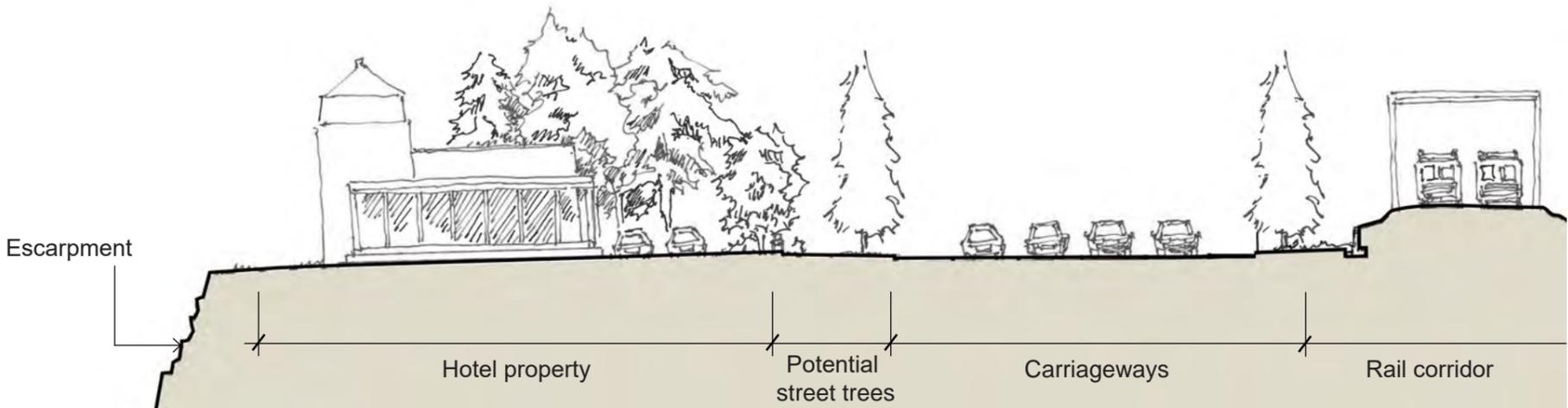


Figure 4.10 Illustrating the opportunity/urban design principle for creating an avenue by introducing pines (*Thuja plicata*) as planted by Council to the Hydro Majestic side of the road corridor, and potentially reinforcing the pines adjacent the rail corridor to reinforce the historic setting of both Medlow Bath and the Hydro Majestic and to create a visual buffer between the highway and the heritage items. This image shows pines at maturity.



4.2.4 Zone 3B: Medlow Bath - East

This area has high sensitivity.

Key Issues

- Minimising any impacts to this zone as it is a sensitive, low scale residential area and removed from the highway corridor



Figure 4.11 Planting strategies should be considered to potentially screen the upgrade along Railway Parade. This would also limit visual impacts at night time



Figure 4.12 The existing retaining wall along Coachhouse Lane is visually imposing. Avoid relocating this wall towards Coachhouse Lane

Strategic Urban Design Principles

- Retain the road alignment to the west of the railway corridor
- Consider screen planting where appropriate to limit the presence of the highway
- Reinforce streetscape enhancement along Railway Parade to mitigate impact of the railway and road corridors





4.2.5 Zone 4A: Ridgeline Pass - West

This area has high sensitivity.

Key Issues

- Avoiding or minimising impacts to the "Protected area-escarpment"
- Limiting any impacts of the road development close to pristine environment in this highly sensitive zone with natural bushland and views to escarpment and beyond.



Figure 4.13 The existing access track should be retained as part of the Great Blue Mountains Trail



Figure 4.14 There should be minimal impact to this zone

Strategic Urban Design Principles

- Avoid situating the road corridor along this section
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of the natural setting
- Maintain existing pedestrian and cycle tracks within this section.



4.2.6 Zone 4B: Ridgeline Pass - East

This area has low sensitivity.

Key Issues

- Retaining the curvilinear character of the road
- Limiting impacts to the natural environment, in particular the eastern verge
- Avoiding or minimising large structures that require extensive construction footprints and maintenance access



Figure 4.15 Careful attention is required in the placing of the road to utilise areas already impacted



Figure 4.16 Extensive areas along the verge have been impacted which should be incorporated into the upgrade works

Strategic Urban Design Principles

- Retain the curvilinear alignment to reinforce the presence of the landscape that the road crosses- this may impact upon road speeds
- Maximise retention of the existing alignment to minimise impacts to the environment
- Consolidate road and rail corridors to minimise impacts to natural vegetation zones. It is preferable to impact pockets of disturbed vegetation between the railway and road corridors.
- Utilise and enhance disturbed landscape wedge between highway and rail corridors
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of the natural setting.
- Utilise areas for the road that are already disturbed and consider abandoned road sections for rest stops
- Utilise a split carriageway wherever feasible to reduce visual and physical impacts on the environment, especially where the topography is steep and rugged. This can mitigate the height of retaining walls and reduce headlight glare issues
- Define the entrance into Medlow Bath with cultural plantings
- Where concrete retaining walls are required, consider strong horizontal textures consistent with other sections of the highway
- Use dark grey oxides in the finish of concrete retaining walls to visually recede these elements
- Consolidate overhead powerlines or situate underground
- Any shotcrete works shall be carefully planned and executed to allow them to be visually integrated with adjacent cuttings, in accordance with the RMS Shotcrete Design Guidelines.



4.2.7 Zone 5A: Blackheath Approach - West

This area has high sensitivity.

Key Issues

- Avoiding impacts to the “Protected area-escarpment”
- Limiting any impacts of the road development to the natural environment
- Improving existing track and cycle facilities.

Strategic Urban Design Principles

- Avoid situating the road corridor within this zone
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of the natural setting
- Evaluate whether there are any opportunities to improve existing walking/cycling tracks
- Reinforce the natural landscape character
- Be sensitive to residents
- Utilise and enhance the disturbed landscape between highway and rail corridor



Figure 4.17 There may be opportunities to enhance the existing track to provide a better amenity



Figure 4.18 Any impacts should be limited in this zone



4.2.8 Zone 5B: Blackheath Approach - East

This area has moderate sensitivity.

Key Issues

- Limiting impacts to private properties facing the corridor
- Retaining large mature street trees where possible and re-establish street trees
- Retaining a scale of built form elements that is sympathetic to the setting.



Figure 4.19 Limiting impacts to mature trees in urban areas is important to help retain the identity and character of these townships



Figure 4.20 The careful integration of retaining walls can articulate their scales and express the topography. Sympathetic materials should be used for these elements facing the road or community

Strategic Urban Design Principles

- Utilise the existing sections of the road safety upgrade project as much as possible to limit any further adverse visual and landscape character impacts to the area
- Minimise the footprint of the road corridor and limit any impacts to private properties
- Apply vegetative screening where possible between road and private properties and maximise retention of existing trees between highway and local roads
- Create well-defined intersections - e.g. with Evans Lookout Road to reinforce a sense of entry to Blackheath and link to the National Park entry
- Introduce sandstone finished retaining walls where these elements are visible from the road or community
- Avoid or minimise large retaining structures that appear out of scale with the urban fabric
- Limit scale of built form elements
- Consider split carriageways to limit visual impacts to local residences
- Consolidate overhead powerlines or situate underground
- Create a legible arrival sequence into Blackheath to identify the township and reflect its cultural and historic identity
- Avoid or minimise impacting the northern end of this zone due to the residential area



Figure 4.21 Respecting both the natural landscape patterns (e.g. ridges, creeks) and the cultural pattern (e.g. town grid) assists in consolidating corridors to provide improved integrated outcomes

4.2.9 Zone 6A: Blackheath West

This area has high sensitivity.

Key Issues

- Avoiding impacts to the “Protected area-escarpment”
- Minimising impacts to private properties
- Achieving a railway crossing with a strong skew angle
- Minimising fragmentation of the urban environs/village
- Respecting the heritage fabric of the township
- Avoiding impacts to the cultural heritage including street trees
- Mitigating noise impacts



Figure 4.22 Situating a road in a cutting such as the Eastern Distributor, limits visual and landscape character impacts to adjacent communities



Figure 4.23 Limiting impacts to mature trees in urban areas is important to help retain the identity and character of these townships

Strategic Urban Design Principles

- Avoid route corridor through or adjacent to the “Protected Area- escarpment”
- Consolidate rail and highway by situating the road either in a tunnel or in an open cut situation whereby the road corridor has a limited presence with limited noise impacts (precedent Eastern Distributor). This will also allow for better urban permeability
- Consider placement of land bridges in key zones to improve town connectivity and enhance greening of the township
- Respect the urban structure of the township.
- Avoid alignments that are skewed to the urban grid.
- For crossings situations where a consolidated corridor is desirable, create a strong skew between road corridor and railway in order to limit the project footprint and consolidate railway and road corridor
- Apply vegetative screening where possible between road and private properties
- Consolidate overhead power lines or situate underground to reduce visual clutter
- Retain the existing connectivity between west and east Blackheath
- Reinforce pedestrianised street networks.

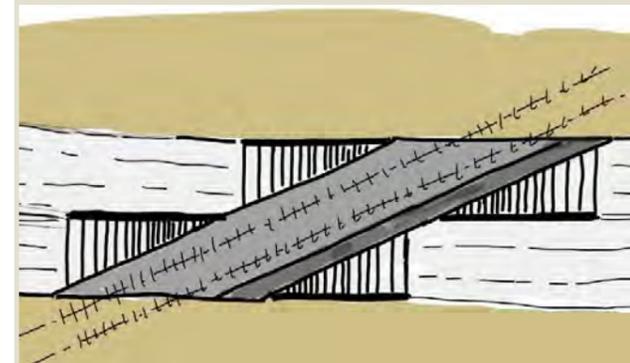


Figure 4.24 Plan view of a railway and highway crossing with a strong skew



Figure 4.25 Example of a railway and highway bridge interface with a strong skew. Pacific Highway at Warrell Creek



4.2.10 Zone 6B: Blackheath Central

This area has high sensitivity.

Key Issues

- Avoiding impacts to the “Protected area-escarpment”
- A tight, narrow corridor with high urban use, commercial, utilities, significant street trees, school zones etc
- Existing intersection at Govetts Leap Rd creates a challenge due to space constraints and existing heritage elements including trees



Figure 4.26 The Michaels tunnel in Baden Baden, Germany, crosses beneath the town in order to avoid impacts to the heritage village and thermal baths

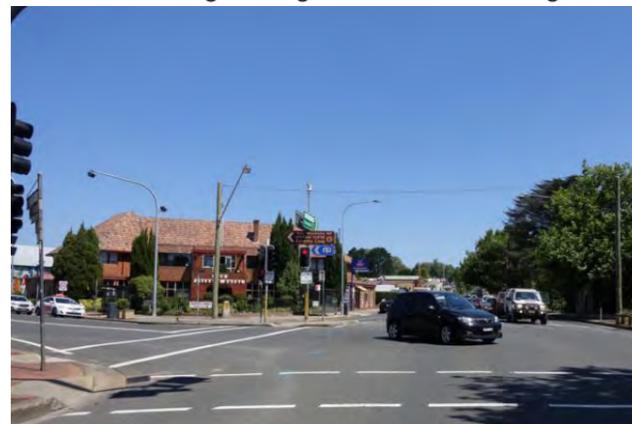


Figure 4.27 The careful integration of retaining walls can articulate their scales and express the topography. Sympathetic materials should be used for these elements facing the road or community

Strategic Urban Design Principles

- Minimise any impacts to this sensitive zone
- Consider underground corridor or situate west of the railway line
- Respect the existing streetscape pattern/grid and richness
- Identify potential improvements for pedestrian facilities
- Where tunnelling the road is a consideration, consider staggering the portals of each carriageway to minimise the footprint’s width of the corridor and mitigate impacts to adjacent bushland/properties
- Reinforce Blackheath as a journey rest point
- Improve cross connectivity of the village
- Reinforce the cultural landscape
- Reflect the BMCC Streetscape Masterplan for this zone

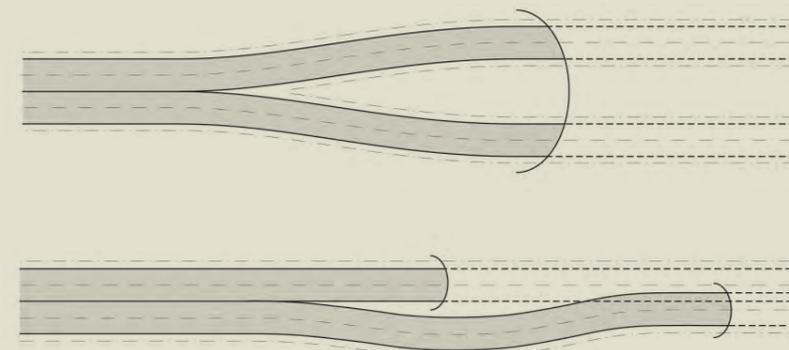


Figure 4.28 The top image reflects a double portal tunnel entry which tends to require a wider footprint. The bottom image illustrates a staggered portal arrangement that would limit the footprint width of the corridor to help reduce impacts to adjacent bushland areas



4.2.11 Zone 7: Blackheath Approach (North)

This area has moderate sensitivity.

Key Issues

- Limiting impacts to private properties facing the corridor
- Retaining large mature street trees where possible
- Retaining a scale of built form elements for the corridor that is sympathetic to the setting.



Figure 4.29 Limit impacts to the eastern verge, as the vegetation along the western verge is of lesser quality (left of photograph).



Figure 4.30 There is the opportunity to capitalise on the views towards the Megalong Valley from this rest stop.

Strategic Urban Design Principles

- Utilise verge between road and railway corridor for the road upgrade to limit impacts to the local community
- Carefully consider access to north Blackheath, maintain safe, legible access to residents and ensure the intersection is well defined
- Maximise tree retention between road corridor and access road to community
- Apply vegetative screening where possible between road and private properties
- Re-establish a strong entry with appropriately scaled street trees to reinforce a sense of entry to Blackheath
- Introduce sandstone finished retaining walls where these elements are visible from the road or community
- Avoid or minimise large retaining structures that appear out of scale with the urban fabric
- Consolidate overhead powerlines or situate underground
- Create a legible arrival sequence into Blackheath that reflects its cultural and historic identity
- Minimise impacts to the more natural bushland areas on the east
- Consider undergrounding power lines along both verges to allow a strong streetscape entry into Blackheath
- Highlight the cemetery site with cultural landscape plantings
- Provide landscape separation between the existing rest area and the road corridor and exploit views towards the Megalong Valley
- Enhance previously disturbed landscaped road edges
- Reflect the BMCC Streetscape Masterplan.



4.2.12 Zone 8: Highway Pinnacle

This area has moderate sensitivity.

Key Issues

- Avoiding or minimising impacts to the “Protected area-land between towns”
- Retaining the curvilinear character of the road
- Limiting impacts to the natural environment
- Avoiding or minimising large structures that require extensive construction footprints



Figure 4.31 Some screen planting between the heavy vehicle testing station and the road corridor would mitigate the station's visual presence



Figure 4.32 The road's pinnacle is nearby Mount Boyce. This location should be highlighted as part of the journey experience

Strategic Urban Design Principles

- Highlight the pinnacle of the highway to add interest to the journey
- Utilise the topography where possible to limit the visual exposure of the road to areas beyond
- Maximise retention of the existing alignment to minimise impacts to the environment
- Avoid or minimise routes through untouched landscapes in order to retain the integrity and beauty of such environs
- Retain existing rock cuttings where possible
- Maximise exposed natural rock cuttings
- Exploit views to the adjacent bushland and to valley beyond from rest areas
- Retain the curvilinear alignment to reinforce the presence of the landscape that the road crosses
- Utilise a split carriageway wherever feasible to reduce visual and physical impacts on the environment, especially where the topography is steep and rugged
- Improve visual mitigation of the heavy vehicle testing station area
- Introduce landscaped zones in front of sandstone cuttings
- Where concrete retaining walls are required, consider strong horizontal textures consistent with other sections of the highway
- Use dark grey oxides in the finish of concrete retaining walls to visually recede these elements
- Any shotcrete works shall be carefully planned and executed to allow them to be visually integrated with adjacent cuttings, in accordance with the RMS Shotcrete Design Guidelines (March 2016)

5 HOW TO USE THIS FRAMEWORK

The urban design framework shall be adopted on all stages of development and delivery of this section of the Great Western Highway and for all methods of procurement.

The following table describes the minimum level of urban design involvement and the application of the framework for the different stages of any future projects.

Phase	Stage	Key Urban Design Actions
Development	Strategic Design	<ol style="list-style-type: none"> Centre for Urban Design to review urban design brief for development phase of work. Registered urban design contractor to be engaged to carry out contextual analysis, review Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria and assess route options against the objectives & principles of the Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria.
	Environmental Assessment & Approvals Concept Design Development	<ol style="list-style-type: none"> Registered urban design contractor to be engaged with engineers to develop concept design as best practice integrated urban design and engineering in line with Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria. Registered urban design contractor to be engaged to carry out landscape character and visual impact assessment in parallel with concept development. Centre for Urban Design to review concept design and landscape character and visual impact assessment.
Delivery	Delivery Readiness	<ol style="list-style-type: none"> Centre for Urban Design to review urban design brief or Scope of Works and Technical Criteria. Registered urban design contractor to be engaged with engineers to develop detailed design in line with concept design, Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria and RMS urban design policy and guidelines. Centre for Urban Design to be involved in the review of tender submissions.
	Delivery	<ol style="list-style-type: none"> Project built in accordance with integrated urban design and engineering design. Centre for Urban Design to be involved in monitoring of implementation and KRA assessment against the objectives & principles of the Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria.
Finalisation/ operation	Finalisation	<ol style="list-style-type: none"> Centre for Urban Design to be involved in post completion review. Centre for Urban Design to be involved in monitoring of landscape maintenance. For all additions to the Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria such as rest areas, variable message signs, gantries, new bridges and interchanges refer to the Centre for Urban Design for advice on the application of the Great Western Highway Urban Design Framework Blue Mountains-Katoomba to Mount Victoria and other urban design guideline documents.

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