



# M1 PRINCES MOTORWAY

MOUNT OUSLEY INTERCHANGE

URBAN DESIGN AND VISUAL IMPACT ASSESSMENT

FINAL 30 OCTOBER 2017

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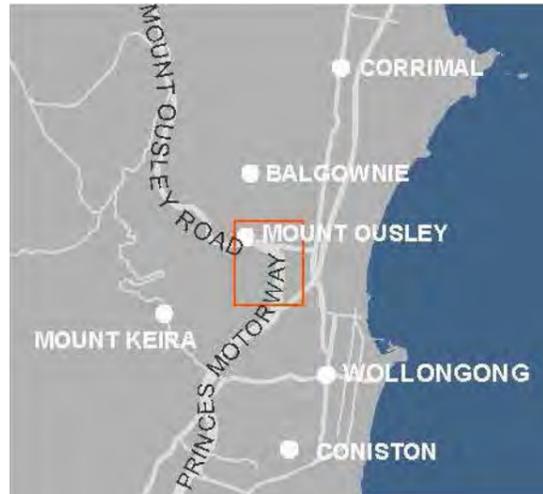


Figure 1. Proposal area  
Source: Jacobs (2017)

# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND

The M1 Princes Motorway is the primary roadway from Sydney to Wollongong and the South Coast of New South Wales. At Mount Ousley Interchange, the northern exit from the Motorway in to Wollongong and its northern suburbs, is through Mount Ousley Road. The intersection of the M1 and Mount Ousley Road is currently experiencing several issues impacting safety and traffic flow. These include:

- A high volume of traffic and congestion with approximately 50,000 vehicles per day, of which 15 per cent are heavy vehicles
- Conflicts in speed limits of light and heavy vehicles, with limits of 80 and 40km/hour respectively. These make it difficult for lighter vehicles to cut across slower moving lanes to exit at Mount Ousley Road reducing safety and traffic flow as well as contributing to low legibility of the exit in to Wollongong
- Vehicles joining the M1 Motorway from Mount Ousley Road are required to cross two southbound lanes including heavy vehicles. This is often difficult due to the traffic volumes and considered dangerous particularly due to the steep descent for southbound traffic on the Motorway
- Congestion along University Avenue, particularly in the morning, is expected in the future to extend onto the Motorway past the Mount Ousley Road intersection blocking access into Wollongong
- 56 crashes were recorded near the intersection during the five year period between July 2011 and June 2016 (inclusive)
- Of the 56 crashes, one crash resulted in one fatality and four injuries, and 25 were injury crashes resulting in 28 injuries. The two most common crash types were intersection and rear end crashes
- Predicated population growth is expected to increase congestion and impede traffic flow further.

In response to the above issues, Roads and Maritime Services (Roads and Maritime) developed a number of strategic design options to improve traffic safety and congestion. In 2015, a Preliminary Environmental Investigation (PEI) was undertaken to identify environmental constraints and opportunities for the study area. Four strategic options were assessed, with Option 4 being selected to provide the best value for money and have the greatest traffic benefits.

Option 4 provided for a complete separation of heavy and light vehicles by creating a new left turn exit for heavy vehicles, and creating a truck bypass at Mount Ousley Road (Figure 2). This option allowed for direct northbound access to the Motorway and eastbound access to Mount Ousley Road from the University. This enhanced option provides better connectivity and improved traffic flow within the university and surrounding road networks. The Concept Design presented in the report is a development of this option and improves upon the traffic flow and legibility of the interchange.

### 1.2 PURPOSE OF THIS REPORT

Jacobs were commissioned by Roads and Maritime in 2016 to develop the Concept Design and prepare the Review of Environmental Factors (REF). The purpose of this report is to describe the urban and landscape Concept Design and document the integrated urban design and engineering process that has underpinned the development of the Concept Design. This report will be a supporting document to the REF for proposal approval. The report describes the study area's built, environmental and cultural factors that would affect the design of the proposal. It also describes the urban design objectives and principles that guide the concept design for the proposal. Finally the report includes the Landscape Character and Visual Impact Assessment which identify the level of impact the proposal has on its environment and propose further mitigation measures to be considered in Detailed Design.



Figure 2. Option 4 - preferred option  
Source: Roads and Maritime (2016)

### 1.3 STRUCTURE OF THE REPORT

Chapter 1 – Introduction: Presents the introduction and background to the proposal.

Chapter 2 – Contextual Analysis: Provides an analysis of the proposal corridor context including landform, land use, road network, flora and fauna, heritage and hydrology in order to establish the appropriate design responses to the context.

Chapter 3 – Urban Design and Landscape Objectives and Principles: Identifies the design objectives for the proposal and supporting key design principles to guide the design development. It also presents the design strategy for the proposal.

Chapter 4 – Concept Design: Presents the urban and landscape Concept Design. It describes how the objectives and design principles established in Chapter 3 are applied in the design development of the proposal, including its setting in the surrounding landscape and use by motorists, pedestrians and cyclists.

Chapter 5 – Landscape Character and Visual Impact Assessment: Identifies impacts on the landscape setting and visual envelope throughout the proposal and compares changes with the existing condition.

Chapter 6 – Mitigation measures: Documents mitigation measures included in the development of the Concept Design, as well as recommends further mitigation measures to be considered during detailed design.

Chapter 7 – Conclusion: Provides a conclusion to the urban design and landscape Concept Design.

## 1.4 THE PROPOSAL

The proposed M1 Princes Motorway, Mount Ousley interchange includes the following key features:

The proposal is situated at the base of the Illawarra escarpment at Mount Ousley, where the M1 Princes Motorway enters Wollongong via an existing at-grade intersection with Mount Ousley Road, as shown in Figure 1. The main features of the proposal include:

- An overpass from Mount Ousley Road to allow northbound traffic to safely access the M1 Princes Motorway
- A dedicated heavy vehicle bypass lane, to separate heavy vehicles from general southbound traffic on the M1 Princes Motorway
- A dedicated southbound heavy vehicle exit ramp to Mount Ousley Road, to separate heavy and light vehicles exiting the M1 Princes Motorway to Mount Ousley Road
- A new entry to the University of Wollongong from the M1 Princes Motorway, for both northbound and southbound vehicles, via a new overpass from Mount Ousley Road and a new (northbound) motorway exit ramp
- A new exit from the University of Wollongong to the M1 Princes Motorway northbound, and to Mount Ousley Road via the new overpass
- New roundabouts at Mount Ousley Road, servicing the new entrance to the University of Wollongong and for vehicles exiting the Motorway (from northbound and southbound lanes) at Mount Ousley Road
- A new southbound service road, which would replace the existing southbound access from the M1 Princes Motorway to University Avenue
- Two new heavy vehicle safety ramps
- A new pedestrian and cyclist bridge over Mount Ousley Road and the M1 Princes Motorway, and a new shared path connecting suburbs to the north with the University of Wollongong and the TAFE Illawarra Wollongong campus
- Upgrades to the existing pedestrian bridge over the M1 Princes Motorway at Northfields Avenue, comprising modifications to the bridge span and the eastern access ramp
- A new commuter car park, relocated to the southern side of the M1 Princes Motorway, with additional formalised parking spaces

- New noise walls along the M1 Princes Motorway, between the motorway and nearby residential areas
- New noise walls along Mount Ousley Road, between the M1 Princes Motorway interchange and Gaynor Avenue.

## 1.5 REFERENCE DOCUMENTS

The design is guided by the overarching best practice urban design principles as set out in Beyond the Pavement: Urban Design Policy, Procedures and Design Principles (Roads and Maritime, 2014). Further relevant urban design guideline documents include:

- EIA Practice Note EIA-N04: Guidelines for landscape character and visual impact assessment, Roads and Maritime, March 2013
- Noise Wall Design Guideline, Roads and Maritime, March 2016
- Bridge Aesthetics, Roads and Maritime, July 2012
- Landscape Guidelines, Roads and Maritime, April 2008
- Guideline for Batter Surface Stabilisation Using Vegetation, Roads and Maritime, April 2015
- Biodiversity Guidelines - Protecting and Managing Biodiversity, RTA Sept 2011.

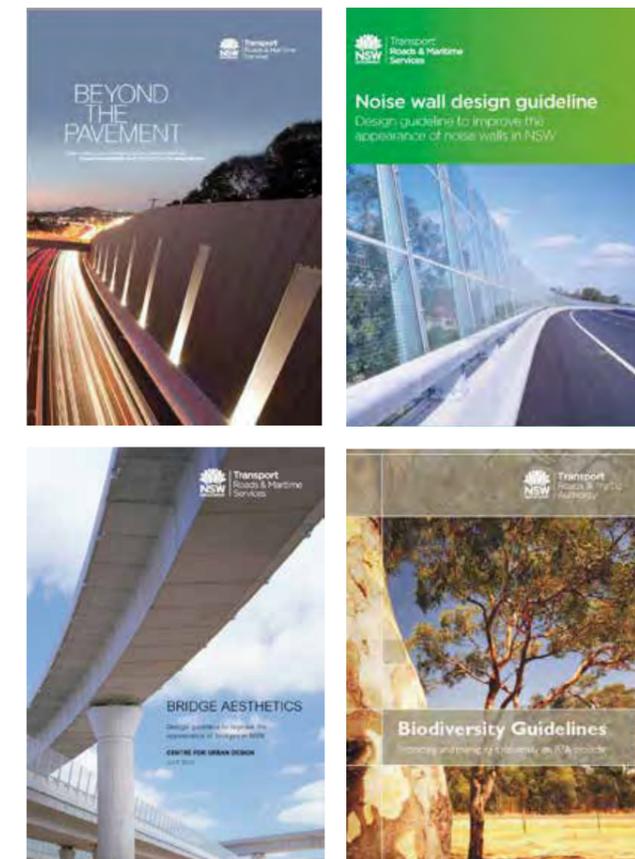


Figure 3. Roads and Maritime Design Guidelines  
Source: Roads and Maritime

# CHAPTER 2

## CONTEXTUAL ANALYSIS

### 2.1 REGIONAL CONTEXT

The proposal is located near the centre of Wollongong, approximately 80 kilometres south of Sydney. Wollongong is a coastal town situated on a narrow stretch of land between the Illawarra Escarpment to the west and the Pacific Ocean to the east. It is a popular tourist destination and the main regional centre of the South Coast (Figure 4).

The Illawarra escarpment is the dominant visual element of the region (Figure 5). Its high sandstone cliffs and plateau-eroded outcrops stretches from Stanwell Park in the north to the Shoalhaven River in the south. The slopes of the escarpment are largely forested and provide a range of recreational activities such as bush walking and mountain biking.

The region is also known for its pristine natural environment including long stretches of coastline and surf beaches. These attract large numbers of visitors to the region, particularly during summer. The beaches are sometimes interrupted by distinct rocky outcrops, of which some have been excavated to create artificial harbours. These are largely seen south of Wollongong and associated with the port areas.

The port areas of Wollongong contribute to its industrial character and history. Wollongong's industrial heritage dates back to the 1850s, largely driven by coal mining in the region. This has resulted in heavy industrial infrastructure and extensive port activity.

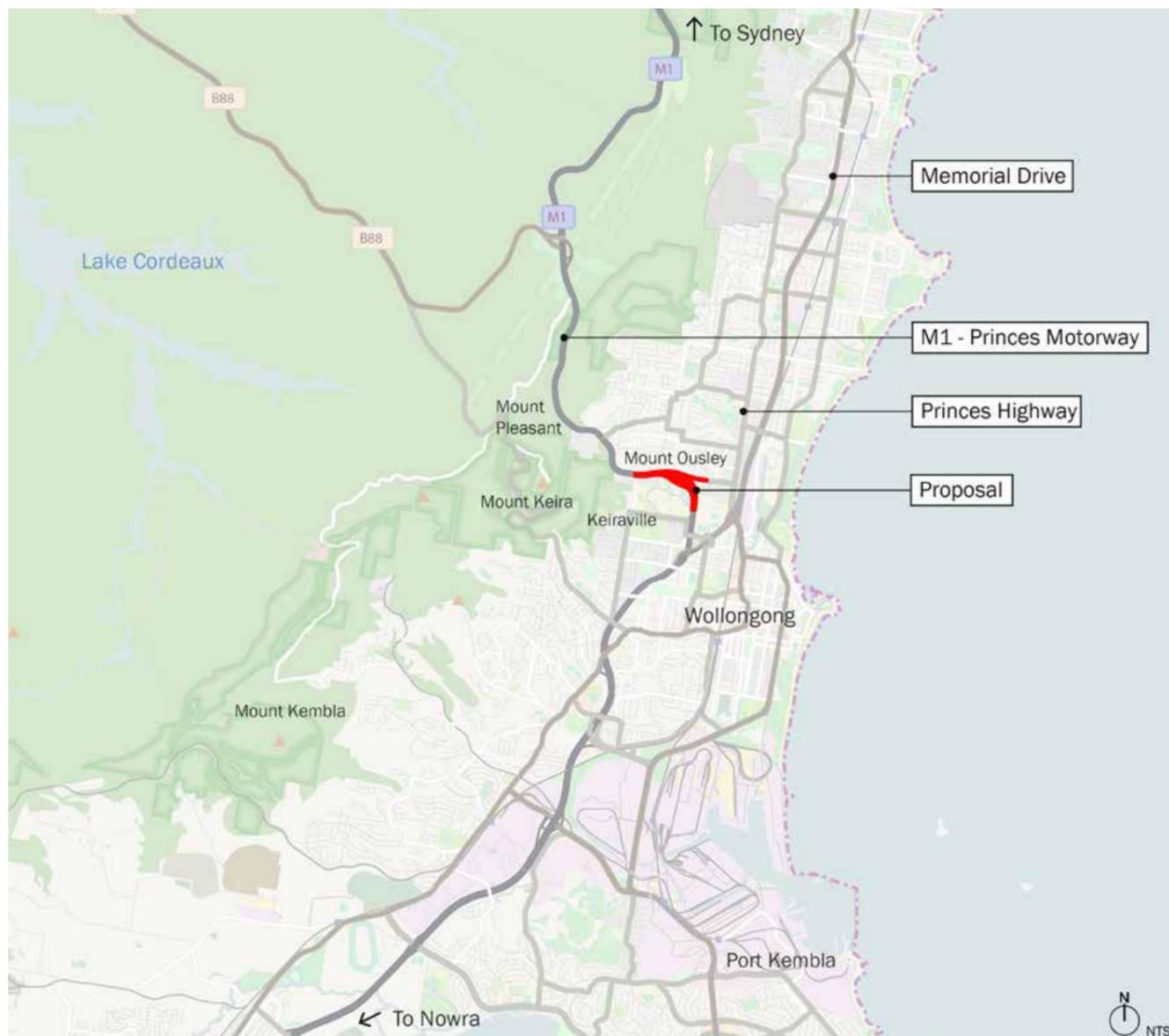


Figure 4. Regional context

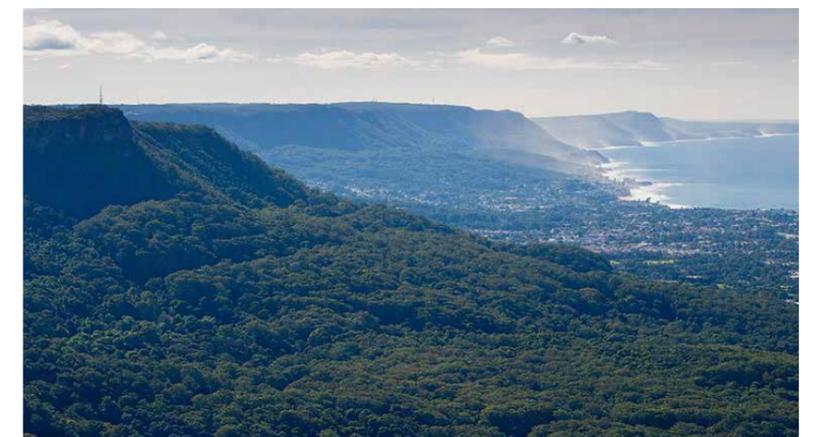


Figure 5. Illawarra Escarpment  
Source: [www.nationalparks.nsw.gov.au](http://www.nationalparks.nsw.gov.au)

## 2.2 LOCAL CONTEXT

The proposal area is located within the outer suburbs of Wollongong, Mount Ousley and Keiraville. The residential suburbs follow the lower slopes and foothills of the Illawarra Escarpment close to Mount Keira (Figure 6). The descending landform provides dramatic views over the lower suburbs of Wollongong to the Pacific Ocean. The topography of the Illawarra Escarpment also provides a scenic backdrop when travelling or facing west.

Due to its proximity to the Illawarra Escarpment, extensive areas of native vegetation also surround the study area. These contribute to an attractive and scenic driving experience through the proposal area as well as accessing the local residential areas and key destinations (Figure 7).

Close to the study area are popular local destinations such as the University of Wollongong, Illawarra TAFE and Wollongong Botanical Gardens. The University has over 30,000 registered students with almost half international in origin (The University of Wollongong, 2016). Additional key destinations include Wollongong High School of the Performing Arts, Keira High School and North Wollongong railway station (Figure 8).

On the northern side of the M1 Princes Motorway, located west of the existing heavy vehicle safety ramp is a large metal sculpture installed by Wollongong City Council.

The M1 Princes Motorway currently forms a physical barrier between the University of Wollongong, TAFE Illawarra and the residential areas of Mount Ousley and Mount Pleasant.

### Design considerations:

- Relocate existing sculpture in consultation with council.



Figure 6. Residential suburb of Mount Ousley following the lower slopes and foothills of the Illawarra Escarpment



Figure 7. Example of extensive areas of native vegetation within the study area (Dumfries Avenue)

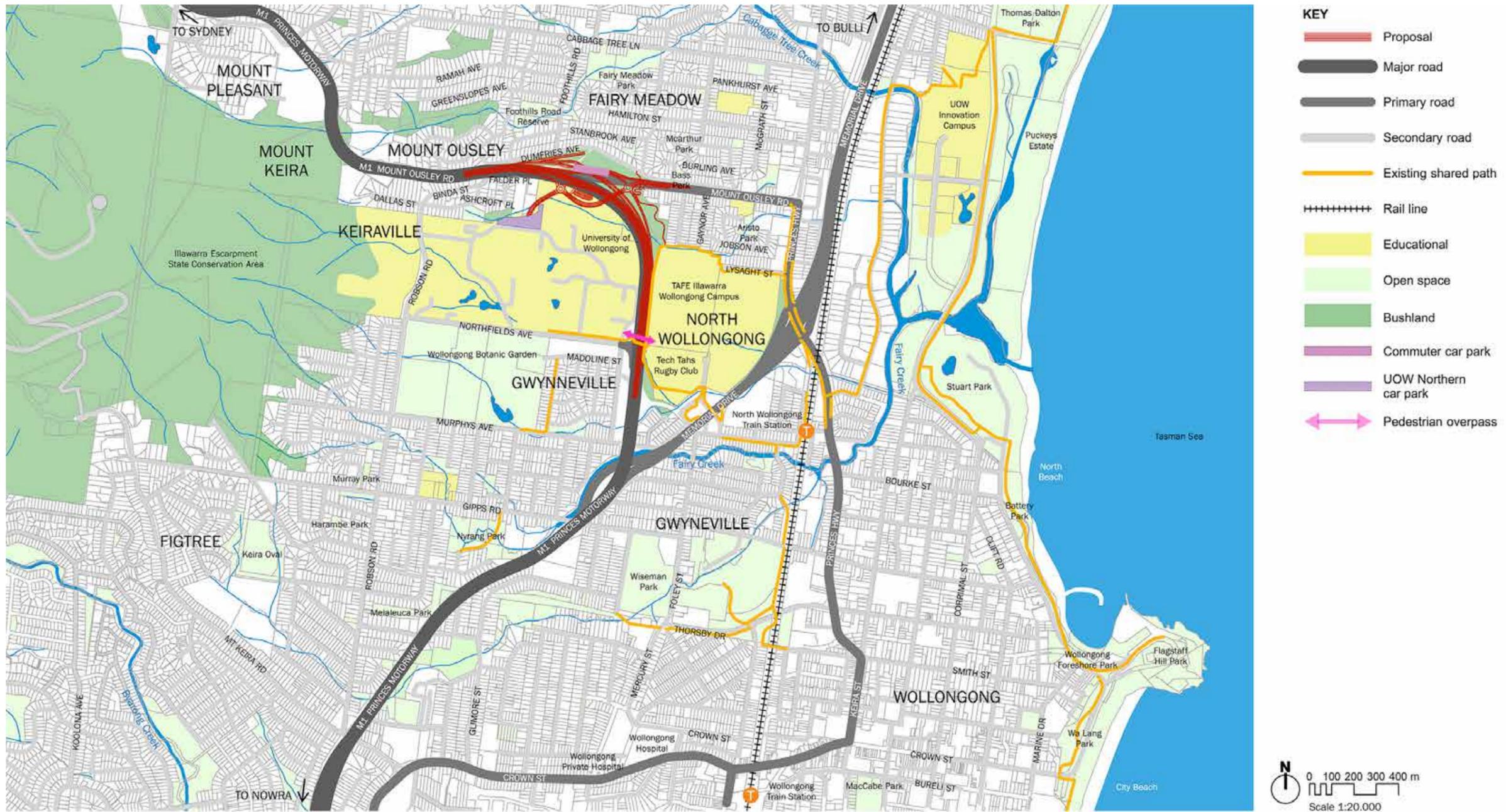


Figure 8. Local context

## 2.3 LAND USES

The land surrounding the proposal area is primarily being used for residential and educational purposes (Figure 9). The residential areas are generally low density and are concentrated on the northern side of the M1 Princes Motorway and both sides of Mount Ousley Road. Northwest of the study area there are vacant parcels of steeply sloping land generally associated with the lower slopes and foothills of the Illawarra Escarpment.

Open space areas close to the study area include areas used for conservation and public recreation. The conservation areas are the Illawarra Escarpment State Conservation Area, and the Illawarra Escarpment Landscape Area in the north. The Illawarra Escarpment Landscape Area is a locally listed heritage conservation area and provides a number of walking tracks. Public recreation is also available in the neighbourhood parks scattered through the residential areas. Larger open space areas include Wollongong Botanic Gardens and the vegetated sections along the creek lines.

The University of Wollongong and TAFE Illawarra Wollongong Campus are located on the southern and eastern sides of the M1 Princes Motorway and occupy significant land holdings close to the proposal. They are key activity areas of the south coast attracting large numbers of local, regional and international students, staff and visitors. A new master plan for the campus is proposed and discussed further in Section 2.10.

### Design considerations:

- Respond to the requirements of the various land uses including visual mitigation, privacy and noise attenuation for residential uses; visual mitigation of vegetation removal and new structures bordering recreational and educational uses.

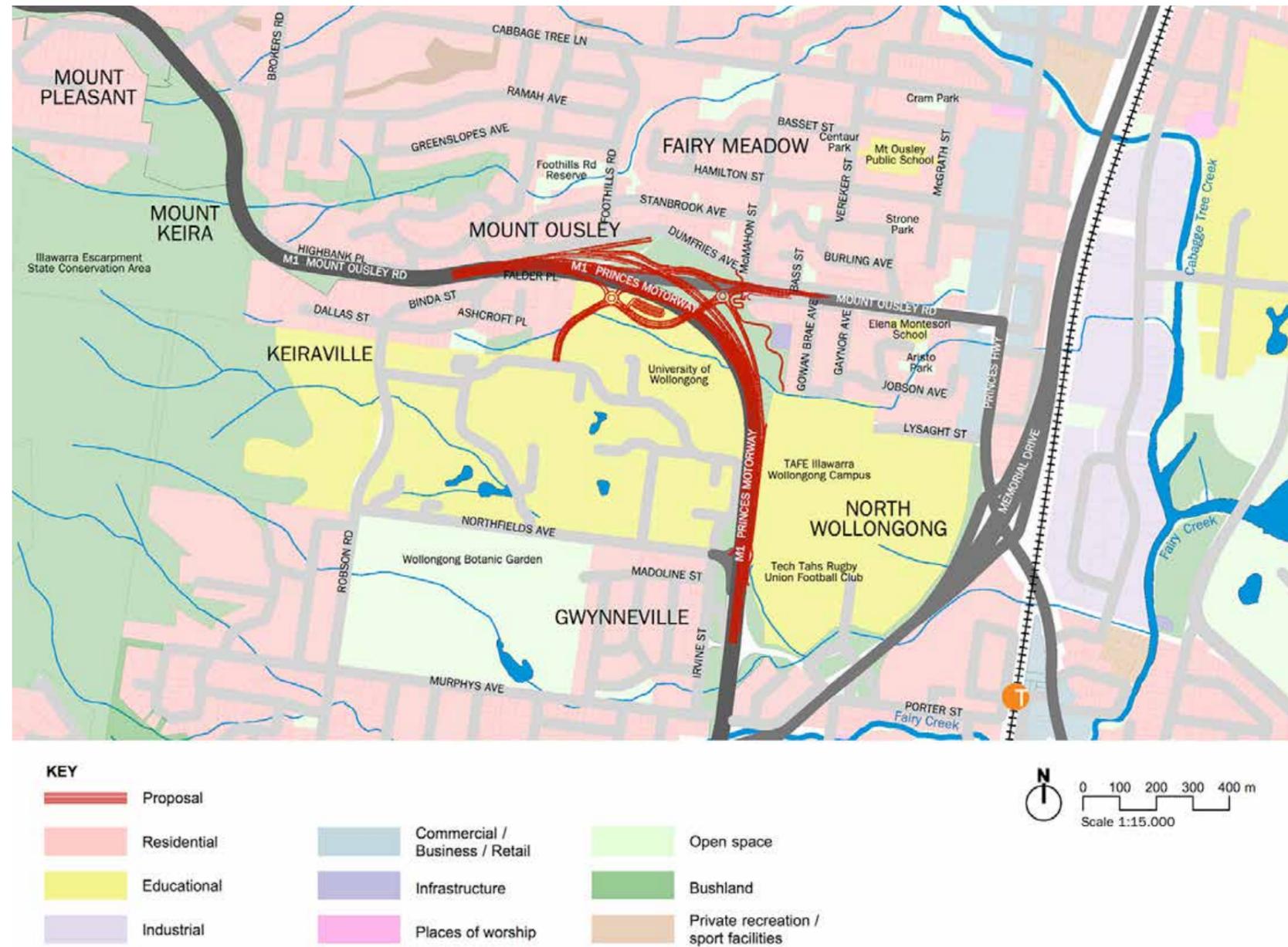


Figure 9. Land use

## 2.4 CONNECTIVITY

### ROAD NETWORK

Mount Ousley Road is the primary access route to the centre of Wollongong, connecting the M1 Motorway with Princes Highway. The M1 forms part of the National Land Transport Network, which is an integrated network of national and inter-regional transport corridors important in supporting economic growth and connectivity in Australia. As a result, the Motorway accommodates large volumes of traffic with an average of approximately 50,000 vehicles per day at the bottom of Mount Ousley within the proposal area. This results in high levels of congestion along the Motorway and Mount Ousley Road particularly during peak times, weekends and holiday periods.

The vehicles using the Motorway and Mount Ousley Road include a large volume of freight (15%). This is attributed to the Motorway, Mount Ousley Road and the Princes Highway being the only approved 25/26 metre long B-double routes near the study area (Figure 10). Vehicles typically travel between the Illawarra region (particularly Port Kembla), the South Coast, Sydney and the northern Illawarra collieries (Roads and Maritime, 2015). The speed limit for heavy vehicles southbound along the M1 within the proposal is 40km/hour.

Access to the residential areas of Mount Ousley and Wollongong CBD from the M1 is primarily along Mount Ousley Road, which is 60km/hour for light vehicles and 40km/hour for freight. The intersection is a key gateway and entry point into Wollongong, however, is not clearly discernible. This intersection is also dangerous for vehicles accessing the M1, as two traffic lanes must be crossed with oncoming traffic travelling at 80km/hour.

In addition to poor road network performance, 56 crashes were recorded near the intersection during the five year period between July 2011 and June 2016 (inclusive). Of the 56 crashes, one crash resulted in one fatality and four injuries, and 25 were injury crashes resulting in 28 injuries. The two most common crash types were intersection and rear end crashes.

Road access to The University of Wollongong and TAFE Illawarra is via exit ramps to University Avenue from the M1 further south of the Mount Ousley intersection. This is a highly congested area particularly for southbound traffic, with projected queues to extend on to the M1 in the future (Roads and Maritime, 2015). University Avenue also provides a connection over Memorial Drive to North Wollongong.

### PARKING

There is a commuter car park that is situated along the northern verge of Mount Ousley Road, serving commuters carpooling to Sydney and various locations (Figure 11).

#### Design Considerations:

- Provide clear identification/gateway on entry to Mount Ousley Road
- Optimise vehicle connectivity to, Wollongong TAFE and University of Wollongong as well as residential areas and Wollongong CBD
- Ensure landscape design allows for clear lines of sight from turning lanes
- Retain commuter car park/replace with adequate parking.



Figure 10. High volume of freight traffic using the M1 Princes Motorway



Figure 11. Commuter car park near Mount Ousley Road intersection

## 2.5 PUBLIC TRANSPORTATION

### CYCLIST AND PEDESTRIAN NETWORKS

The M1 Motorway is a major barrier to pedestrian and cyclist circulation within the study area, with limited opportunities to cross. Access across the Motorway is provided through a dedicated pedestrian and cycle bridge at Northfields Avenue, joining the TAFE Illawarra with the University of Wollongong, and at University Avenue where pedestrian and cycle facilities are provided on the road bridge (Figure 12).

This bridge then connects to an off-road, unmarked shared path around the perimeter of the TAFE campus connecting to Lysaght Street and Mount Ousley Road. A bicycle route along Dumfries Avenue and Gaynor Avenue connects the residential areas to the north. These bicycle routes are unmarked routes that connect key locations to existing shared paths or marked on road cycle facilities (Wollongong City Council, 2015).

The City of Wollongong has produced a 2014–2018 bike plan which proposes a route from the TAFE campus to Mount Ousley Road.

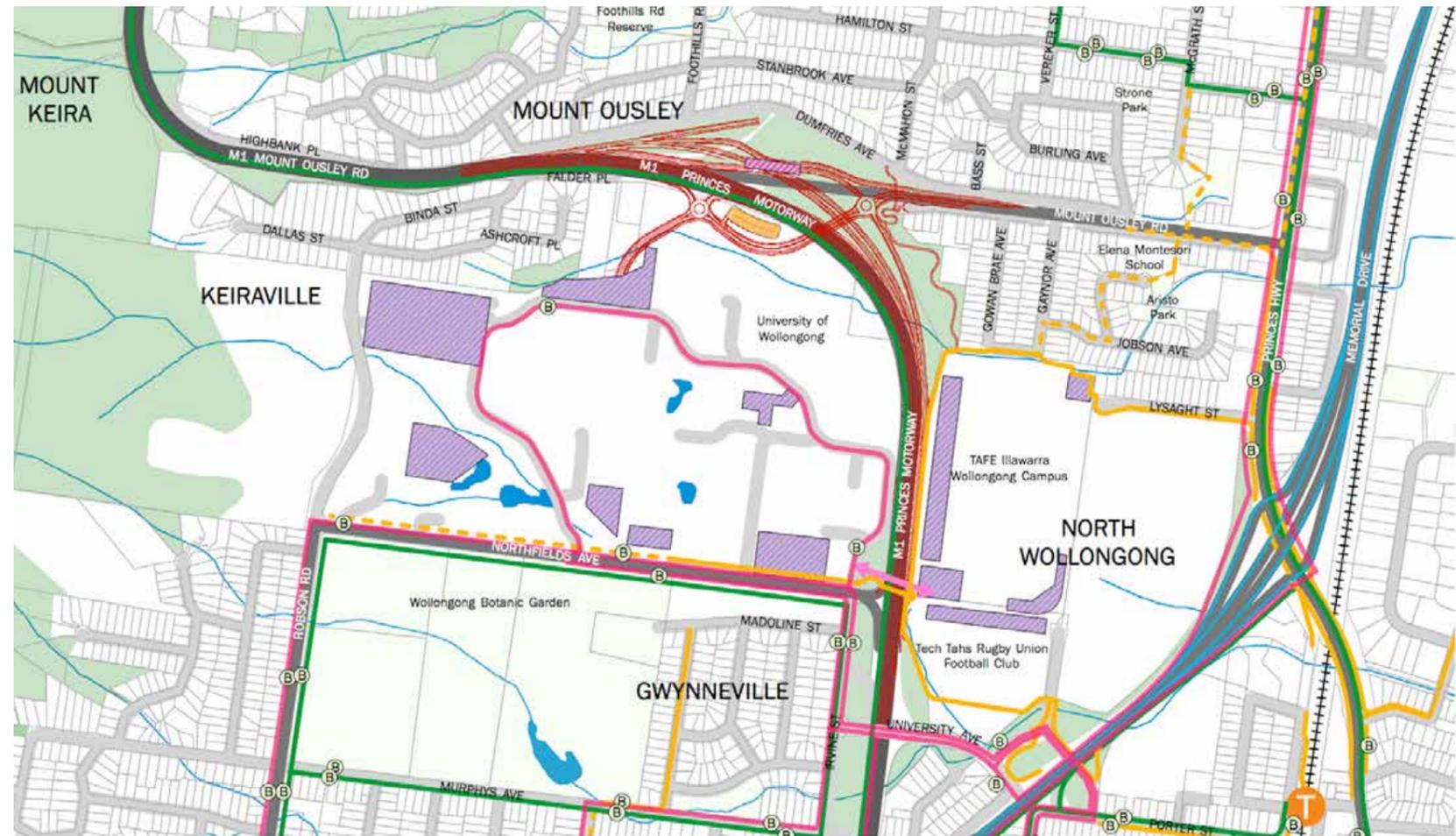
### BUS NETWORK

Public transport in the proposal area is provided by a number of bus services, operated by Premier Illawarra and Busabout, including the free 'Gong' and 'North Gong' shuttle services, and the South Coast Rail Line. Bus services are largely constrained to the east of the Princes Motorway with the only bus services crossing the Motorway at University Avenue (Figure 12). To the north and the east, a number of bus services run from Wollongong CBD north along the Princes Highway as far as Bellambi and serve the residential area north of Mount Ousley Road. West of Princes Motorway bus routes run south as far as Figtree and Mount St. Thomas before returning to Wollongong CBD. The 'Gong' shuttle operates between Wollongong and Wollongong University via University Avenue. The 'North Gong' shuttle is a loop service between North Wollongong and Wollongong University.

The South Coast Rail Line between Sydney and Bomaderry runs parallel to Memorial Drive before continuing south and stops at Fairy Meadow, North Wollongong, and Wollongong.

### Design Considerations:

- Improve pedestrian and cyclist connectivity to key destinations such as educational institutions, train stations and Wollongong CBD
- Connect with existing and proposed shared paths, cycle ways and footpaths
- Maximise safety, convenience and ease of access to public transport, bus stops and shared paths.



### KEY

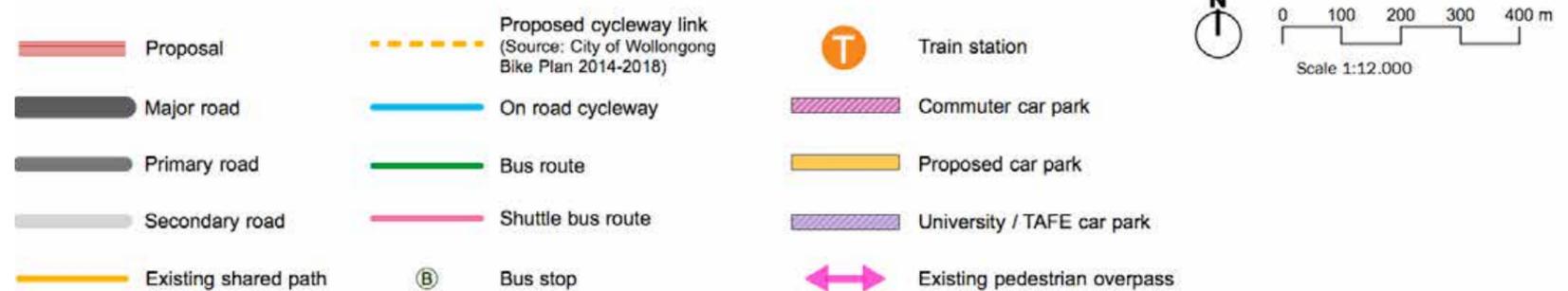


Figure 12. Public transportation network

## 2.6 LAND FORM AND HYDROLOGY

The proposal area is located within the Sydney Basin, on the edge of the Illawarra Escarpment. The area is comprised of steep slopes to the west stemming from the lower reaches of the escarpment before flattening to the east as the base of the escarpment meets the coastal floodplain. The topography of the proposal reflects this form, with the M1 falling steeply towards the proposal area with grades typically around eight percent (and up to 10 percent), prior to the motorway flattening out in the vicinity of the intersection. Mount Ousley Road is also comparatively flat as it traverses east towards the coast

The hydrology of the area is dominated by the sloping topography with many of the creeks and waterways originating in the foothills of the Illawarra Escarpment, running in a generally west to east direction and terminating at the Pacific Ocean. Cabbage Tree Creek and Fairy Creek flow within the proposal area and follow this pattern. Fairy Creek originates in the southwest with a catchment that encompasses Keiraville, Gwynneville, and North Wollongong. The creek flows northeast where it meets the Pacific Ocean at Stuart Park. Cabbage Tree Creek begins in the northwest before travelling southeast, meeting Fairy Creek, and entering the ocean. At least six tributaries to Cabbage Tree Creek and two tributaries to Fairy Creek are located within the study area (Roads and Maritime, 2015) and are illustrated in Figure 17.

*The Fairy and Cabbage Tree Creeks Floodplain Risk Management Study and Plan* (Wollongong City Council, 2010) identifies and maps existing flood extent and depths across the Fairy Creek and Cabbage Tree Creek Catchments during a one in 100 year flood event. For further information on flooding extents see *M1 Mount Ousley Interchange Upgrade Hydrology and Flooding Working Paper* (Jacobs 2017).

### Design Considerations:

- Consider topography in the landscape design to capture views, enable shared path connections and ensure that mitigation of new work is provided where required
- Design of earthworks and embankments to integrate into the existing natural topography to create a seamless fit with the existing setting.

## 2.7 VIEWS AND VISTAS

The drop in elevation across the region provides dramatic views to and from the Illawarra Escarpment ridgelines and peaks. The key views experienced in the area are from the M1 Princes Motorway looking east towards the coast and from the Mount Keira lookout which, facing east, overlooks the entire Wollongong region including the proposal (Figure 15). From the floodplain below scenic views of the steep sandstone cliffs of the Illawarra Escarpment are experienced when looking west. Key views within the proposal area are that from Mount Ousley Road looking west towards the escarpment (Figure 16) and the Princes Motorway looking west as it climbs into the foothills of the Illawarra Escarpment (Figure 13).

Views to and from the existing road corridor as it traverses south are screened on either side by a mix of noise walls, embankments, and dense roadside vegetation (Figure 14).

### Design Considerations:

- Maintain existing key views from the road corridor
- Consider opportunities to enhance the drivers experience with strategic views into the surrounding landscape and water, fostering a sense of place and local connection.



Figure 13. View northbound from M1 Princes Motorway looking west towards the escarpment



Figure 14. View southbound from M1 Princes Motorway showing an existing noise wall and dense roadside vegetation on either side of the corridor



Figure 15. View from Mount Keira lookout of Princes Motorway below



Figure 16. View from Mount Ousley Road looking west

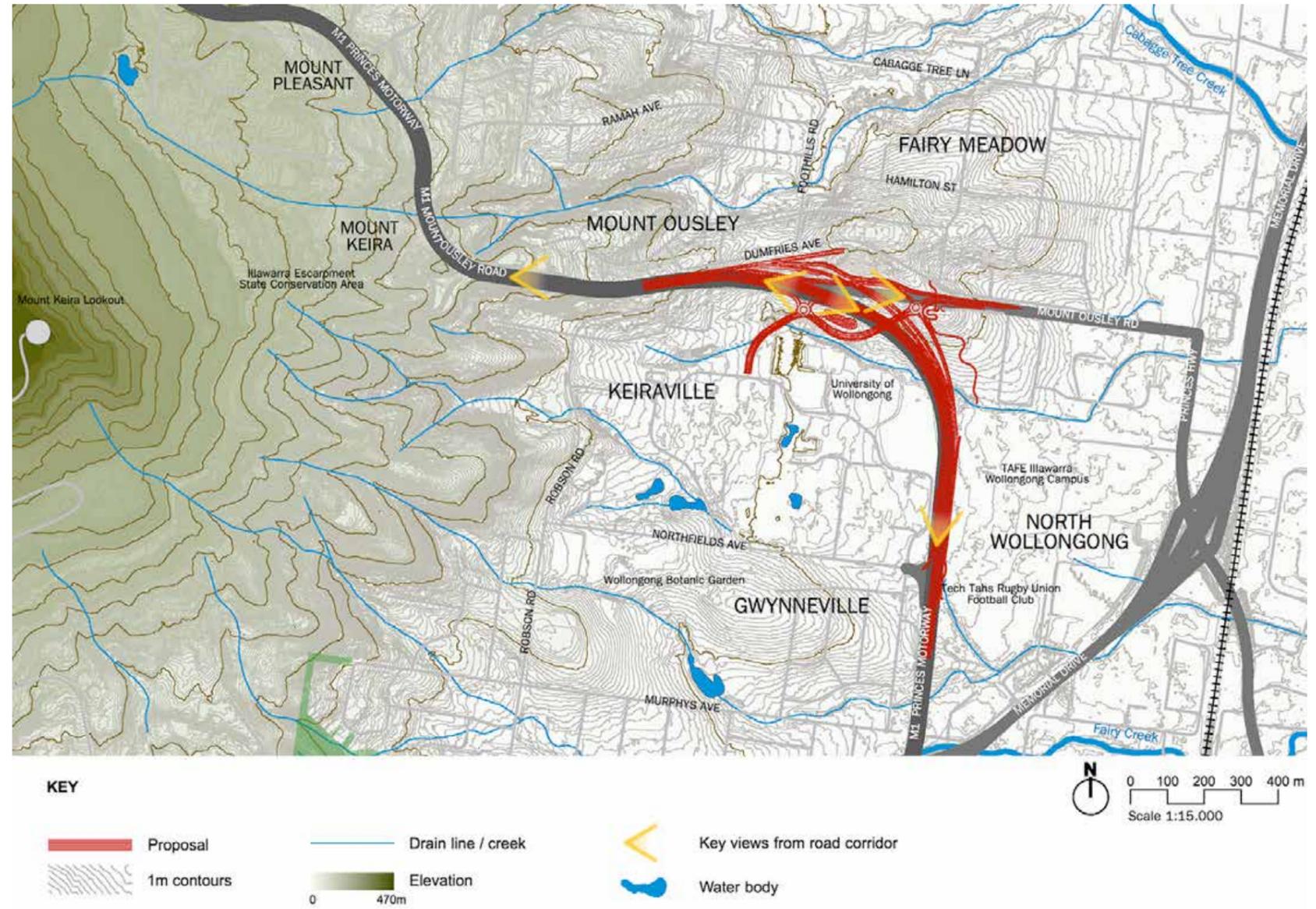


Figure 17. Landform, hydrology and views

## 2.8 BIODIVERSITY

### FLORA

The proposal area contains primarily native bushland vegetation and some exotic species. Field surveys carried out as part of the *M1 Mount Ousley Interchange Upgrade Biodiversity Assessment* (Jacobs 2017) identified two Plant Community Types (PCT) in the study area.

- Blackbutt - Turpentine - Bangalay moist open forest on sheltered slopes and gullies, southern Sydney Basin Bioregion (PCT 694) (Here after referred to as Escarpment Blackbutt Forest in this report)
- Sydney Blue Gum x Bangalay - Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion (PCT 1245) (Here after referred to as Escarpment Moist Blue Gum Forest in this report).

The *M1 Mount Ousley Interchange Upgrade Biodiversity Assessment* (Jacobs 2017) has mapped and categorized each of the two PCT's into sub-condition classes (Figure 18). This report also identifies areas of roadside landscape plantings and disturbed vegetation dominated by weeds within the study areas. Additionally no threatened ecological communities were identified within the study area however the study area did provide habitat for the threatened plant species *Syzygium paniculatum* of which four plants were recorded.

### FAUNA

*M1 Mount Ousley Interchange Upgrade Biodiversity Assessment* (Jacobs 2017) details a total of 58 fauna species recorded within the study area as part of the surveys undertaken, comprising 42 birds, six terrestrial mammals, one bat, five frogs, four reptiles and one fish species. Three threatened fauna species were recorded in the study area; the Grey-headed Flying Fox, Eastern Bentwing-bat and Little Bentwing-bat. Six more threatened fauna species are considered moderately likely to occur within the study area due to the presence of suitable habitat. For further information refer to *M1 Mount Ousley Interchange Upgrade Biodiversity Assessment* (Jacobs 2017).

### Design Considerations:

- Protect existing mature trees where possible
- Establish a planting strategy which responds to the existing vegetation communities
- Re-establish plant communities in areas disturbed by the proposal or construction activities to restore ecological and habitat value and assist in biodiversity protection and recovery.

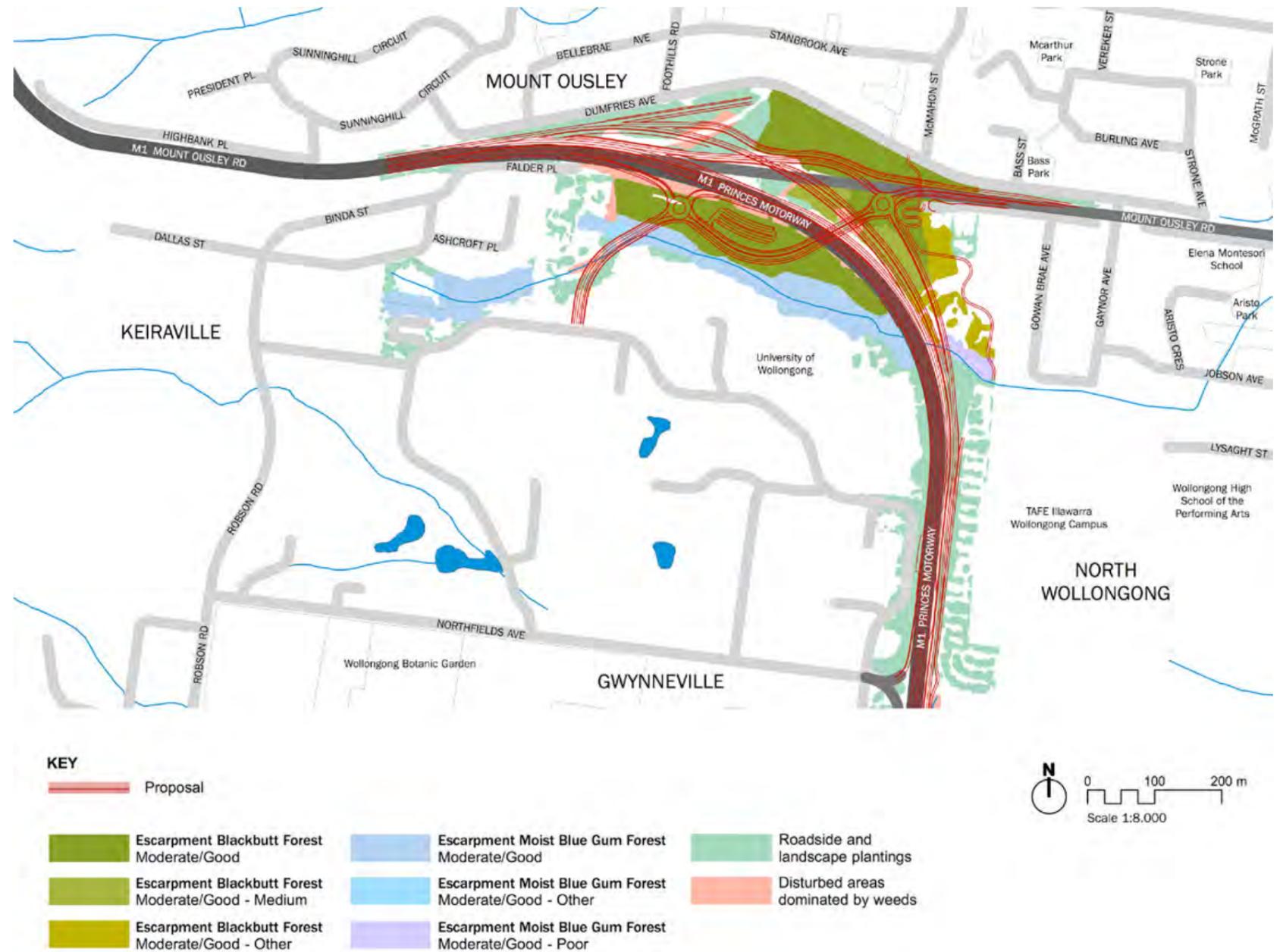


Figure 18. Biodiversity

## 2.9 HERITAGE

### ABORIGINAL HERITAGE

The study area was occupied by the Wodi Wodi people of the Dharawal language group prior to European settlement (Kass, 2010). A preliminary search of the AHIMS register indicated a lack of known registered Aboriginal heritage sites or sensitive landforms within the vicinity of the proposal (Roads and Maritime, 2015). It is noted however that seven sites were identified within one kilometre of the proposal area, shown in Figure 19. Roads and Maritime Preliminary Environmental Investigation also confirms the absence of any previously unrecorded Aboriginal sites or sensitive landforms around the proposal area from a site walk over. Due to past disturbances it is considered unlikely that aboriginal artefacts, sites, structures or art would be found.

### NON-ABORIGINAL HERITAGE

European settlement in the Wollongong region began in the early 19th century. The first land grants were issued in 1817, driven by timber harvesting and land clearing for agriculture (Wollongong City Council, 2013; Kass, 2010). Coal mining, which began in 1849, had a considerable impact on local employment as well as the port at Wollongong Harbour, which was expanded in 1868 to facilitate the growing coal industry, exporting coal from the region via the Pacific Ocean (Wollongong City Council, 2013).

There are no registered heritage items or conservation areas located within the proposal area. The Wollongong Local Environmental Plan (2009) identifies three houses with local heritage significance located close to the proposal area. One registered conservation area is also located near the proposal area (Figure 19). The houses are located north of Mount Ousley Road, northeast of the intersection while the landscape conservation area is generally located west of the proposal area.



Figure 19. Heritage

## 2.10 THE WOLLONGONG CAMPUS MASTER PLAN

The University has developed a campus Master Plan that is aligned to the University's 2016–2020 Strategic Plan. Its goal is to “sustain a vibrant environment for engagement, inquiry and creativity by providing world-class academic facilities, recreational and social amenities, and residences within planned, efficient campuses that stand out for their natural beauty” (MGS Architects, 2016).

Some of the key features of the master plan are:

- Introduce pedestrian-friendly gateways to provide a welcoming entrance to the campus that connects to the neighbourhood
- Introduce a series of pedestrian walks and improve pedestrian safety throughout the campus
- Improve access to the campus for cyclists and upgrade bike infrastructure
- Maintain and enhance landscape areas and regional environmental connections
- Support introduction of a new northern entrance to the campus
- Continue key sustainability initiatives to reduce the campus' energy and water consumption, waste production and embodied energy use in materials.

### Design considerations:

- Respond to the proposed The University of Wollongong Master Plan to integrate pedestrian and cyclist connectivity, vehicle access, structures and landscape design.

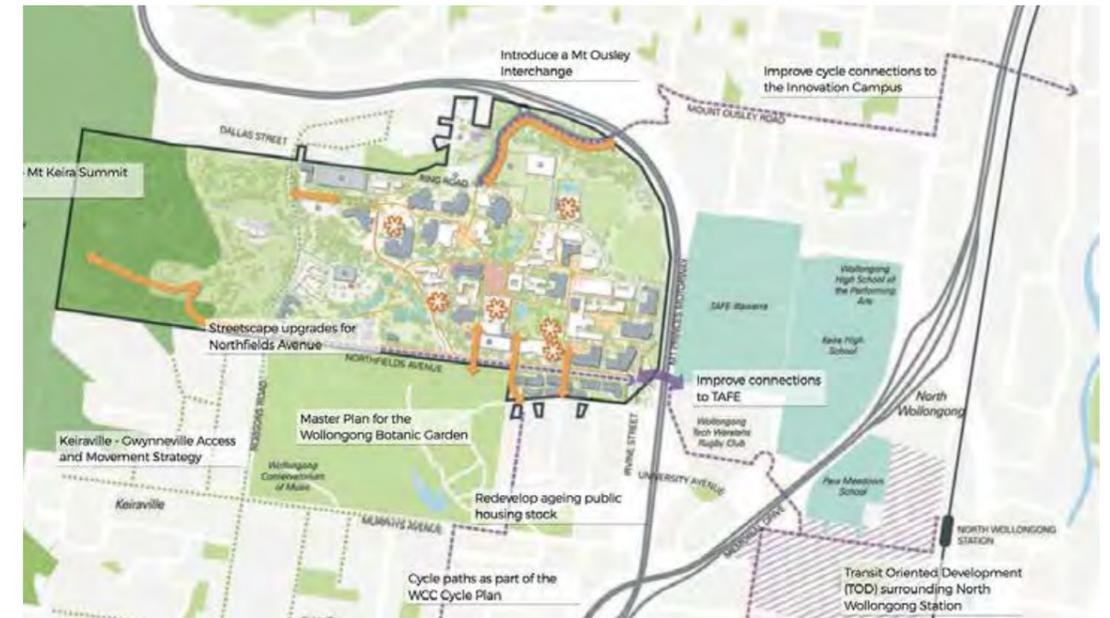


Figure 20. Wollongong Campus Master Plan  
(Source: MCS Architects, 2016)



Figure 21. Sporting precinct - Wollongong Campus Master Plan  
(Source: MCS Architects, 2016)

## 2.11 LANDSCAPE CHARACTER ZONES

The landform and vegetation, views and vistas, settlement pattern and built structures within and adjoining the study area combine to define the landscape character of the study area. The landscape character defines a set of visual values associated with areas that shape the experience of both motorists and viewers in surrounding areas. As can be expected, there are a number of different Landscape Character Zones (LCZs) within the study area. They are identified in Figure 22 and are listed and described below.

### Zone 1: Mount Ousley – North Residential

Situated north of the interchange, Mount Ousley is a residential suburb located at the foothills of Mount Keira. The topography is undulating and creates an intimate character and from the higher grounds towards the west, panoramic and district views are attainable towards the CBD and the Tasman Sea. Mount Keira provides an elevated, vegetated backdrop to the west of the suburb. A densely vegetated natural drainage line originating in Mount Keira travels through the suburb. Vegetation is mostly limited to exotic trees and shrubs within front setbacks of private properties. A commercial strip is concentrated along the Princes Highway to the east of the residential area.

### Zone 2: Vegetation – North of M1 Motorway

This zone is the area lying central to the study area and north of the interchange where the M1 Motorway and Mount Ousley Road converge. There is a mix of both young and dense remnant forest to the north and east of the Motorway alignment that contribute to the forest character and amenity of surrounding zones. A commuter carpark lies on the northern verge of the Mount Ousley Road. The topography generally rises from south to north.

### Zone 3: Keiraville Residential

This zone is the small residential suburb of Keiraville at the foot of Mount Ousley, situated in a steeply undulating gully between the M1 Motorway and the University of Wollongong. Mount Keira provides the backdrop to this well-established residential area. The suburb overlooks the University grounds, while some properties enjoy district views toward the CBD and the Tasman Sea due to a more elevated position. Vegetation is mostly limited to mature exotic trees and shrubs within front setbacks of private properties and a dense band of vegetation to the rear of the properties adjacent to the Motorway alignment.

### Zone 4: Vegetation – South of M1 Motorway

This zone is the area lying central to the study area and south of the interchange where the M1 Motorway and Mount Ousley Road converge. This zone sits east of LCZ 3 and directly north of the University of Wollongong and generally slopes away from the Motorway alignment in a north-west to south east direction. This zone is densely vegetated and includes a creekline running west to east

and crossing the Motorway and is the general low point west of the Motorway corridor. The vegetation provides a visual screen to the areas beyond the Motorway and contributes to the character and amenity of the surrounding character zones.

### Zone 5: Mount Ousley - South Residential

This character zone is the residential suburb of Mount Ousley, located south of Mount Ousley Road. The topography falls from west to east. Vegetation is mostly limited to exotic trees and shrubs within front setbacks of private properties. A small commercial strip is located along the eastern edge of the suburb along the Princes Highway.

### Zone 6: Institutional - University of Wollongong

This zone is the campus of the University of Wollongong, lying east of Mount Keira and the state conservation area and is bounded by the M1 Motorway to the north and east. The campus consists of a variety of multi-storey buildings in a landscape setting within a simple ring road design. There are sport fields,

open grassed areas, generous landscaped building setbacks and established streetscapes. Vegetation is predominantly native tree plantings that provide established screening to surface and multi-storey carparks and campus buildings. The topography is generally flat with a gentle east-west slope. A densely vegetated creekline draining from Mount Keira crosses the south-west corner of the campus at its low point and feeds into ponds throughout the campus.

### Zone 7: Institutional - TAFE Illawarra

This character zone is the Wollongong campus of TAFE Illawarra, located east of the M1 Motorway corridor and the University of Wollongong. The topography of this zone is generally flat. The campus consists of numerous multi-storey buildings arranged in a grid like layout with central courtyards, green spaces and paved pedestrian zones between buildings. Large car parking areas sit along the entire length of the boundaries eastern and western edges of the site. Established vegetation consists predominantly of native tree species, while Mount Keira provides a densely vegetated backdrop to the west.

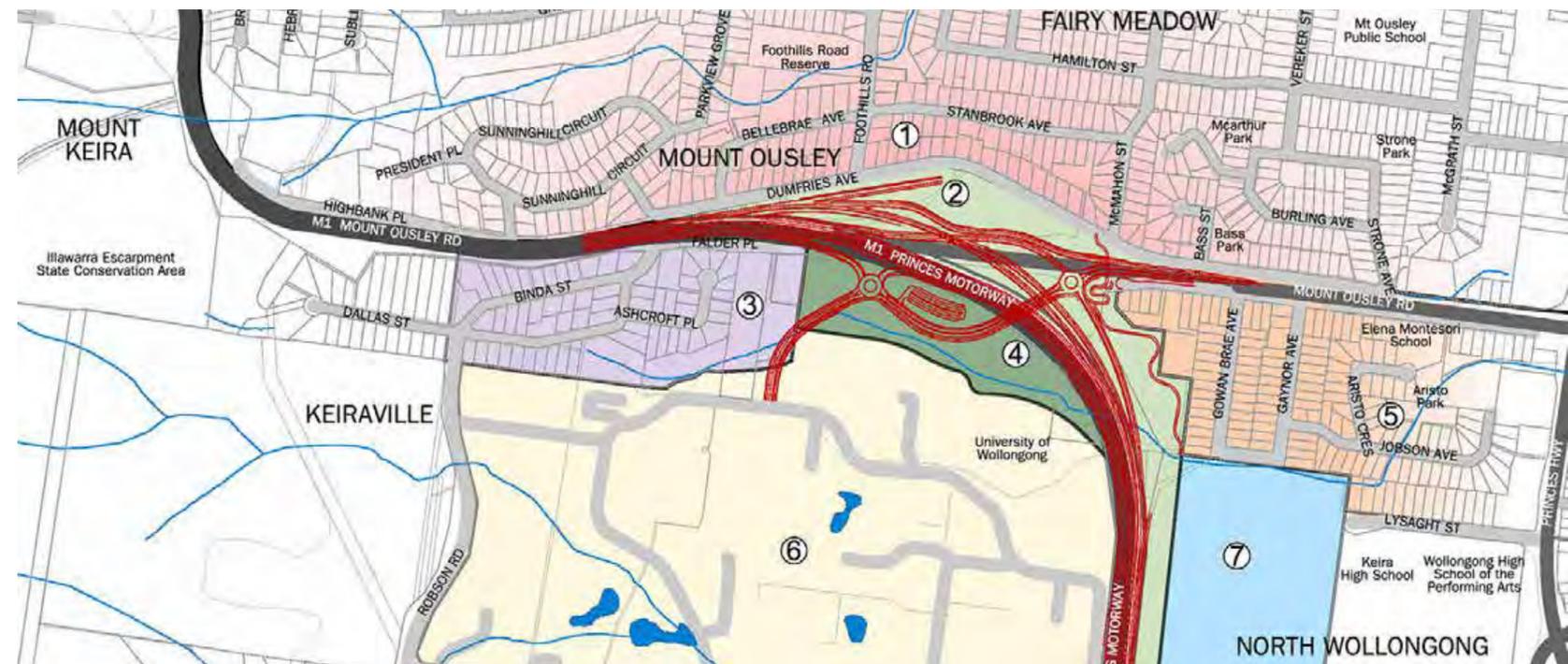
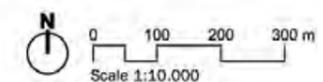
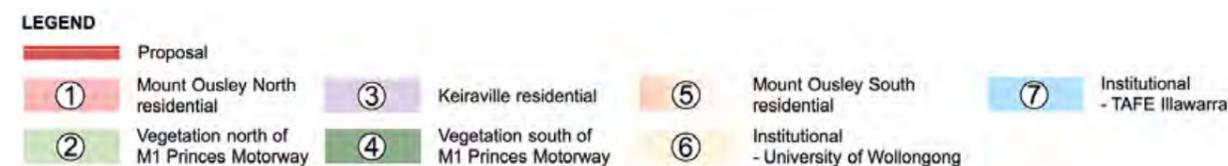


Figure 22. Landscape Character Zones



## 2.12 ISSUES - SUMMARY

This section outlines the key issues identified in the assessment of the contextual analysis which will be addressed in the Urban Design objectives and principles discussed in Chapter 3.

### KEY ISSUES:

- Lack of legibility or sense of arrival to Wollongong from the M1 Motorway at Mount Ousley
- Traffic safety for vehicles exiting the Motorway onto Mount Ousley Road and entering the Motorway from Mount Ousley Road
- Poor traffic efficiency and vehicular connection to the University of Wollongong and surrounding residential areas
- Lack of pedestrian and cyclist connectivity between residential areas and key destinations such as educational institutions, train stations and Wollongong CBD. More specifically connections over the Motorway and Mount Ousley Road to the University of Wollongong and TAFE Illawarra
- Inefficient connections into existing shared paths, cycleways and footpaths
- Safety, convenience and ease of access to public transport, bus stops and shared paths
- Integration of the proposal into existing context including the design of earthworks and consideration of topography
- Maintaining existing key views both from the Motorway and from residential areas
- Enhancing drivers experience and fostering a sense of place and local connection
- Visual impacts to and from the road corridor as a result of the increased pavement area
- Visual impacts of new structures such as noise walls and retaining walls
- Impact on existing vegetation and habitat along the proposal corridor
- Noise impacts on adjoining properties.

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# CHAPTER 3

## URBAN DESIGN AND LANDSCAPE OBJECTIVES

### 3.1 OVERALL PROPOSAL OBJECTIVES

The overall proposal objectives are to develop and present an integrated engineering and urban design outcome that will:

- Improve safety by addressing conflicting movements and the interaction between light and heavy vehicles.
- Improve travel time and efficiency for vehicles travelling on this length of the M1 Princes Motorway (Mount Ousley Road)
- Provide for the growing freight task including supporting the expanding port
- Enhance accessibility to/from the M1 Princes Motorway and the Wollongong CBD.

While achieving the above objectives Roads and Maritime would seek to:

- Consider enhanced accessibility to/from the M1 Princes Motorway and the University of Wollongong
- Maintain or improve the visual driving experience and amenity in this section of the M1 Princes Motorway
- Improve amenity by considering the needs of pedestrians, cyclists and public transport
- Minimise disruptions and delays to traffic during construction and ensure that road users are kept informed of travel conditions during works
- Minimise the broader social and environmental impacts of the development
- Achieve an overall proposal result that provides the best value for money for the entire proposal lifecycle.

### 3.2 URBAN DESIGN VISION

The vision for the corridor is proposed as follows:

**“To establish a safe and legible interchange, well integrated within its context while establishing a strong identity as the northern gateway to Wollongong.”**

### 3.3 URBAN DESIGN OBJECTIVES AND PRINCIPLES

The following objectives and design principles form the basis of the development of the concept design and should be carried through to detailed design and construction.

#### OBJECTIVE 1

**To provide a highly legible and easy to navigate interchange with clear visual cues in relation to direction and destination within the interchange.**

##### Design principles:

- Identify the visual hierarchy of structural elements and ensure the design of structures support legibility at the interchange
- Strengthen the visual cues to identify Mount Ousley Road as the northern entry to Wollongong city centre through suitable urban design treatments to retaining walls, noise walls, road safety barriers and pedestrian bridge design
- Landscape planting to strengthen the road hierarchy and legibility, whereby providing visual cues for the M1 alignment, Mount Ousley Road and entry to the University of Wollongong.

#### OBJECTIVE 2

**To provide a unique experience to the entry in to North Wollongong and the CBD from the Motorway.**

##### Design principles:

- Establish a clear identity for the interchange through the integrated design of the various structural elements and landscape
- Design of the interchange to relate to, and be inspired by, the culture and history of Wollongong
- Promote the experience of place and maximise views east towards the Pacific Ocean and peripheral views to surrounding areas, which are naturally forested
- Landscape planting to strengthen the road hierarchy, and legibility whereby providing visual cues for the M1 alignment, Mount Ousley Road and entry to the University of Wollongong

- To promote a sense of journey and context for motorists
- Provide views out to the distant mountains and Pacific Ocean for pedestrians and cyclists where possible from shared path and bridges.

#### OBJECTIVE 3

**To ensure that connectivity is enhanced for pedestrians and cyclists between Mount Ousley, North Wollongong and Keiraville residential areas, and the key land uses of the University of Wollongong and TAFE Illawarra.**

##### Design principles:

- Retain and enhance the accessibility and connectivity between surrounding communities for all users including pedestrians, cyclists and motorists
- Ensure enhanced connectivity to the local road and cycle network from new shared path and footpaths
- Urban design to incorporate CPTED (Crime Prevention Through Environmental Design) principles in the design of structures and planting near paths
- Maximise the visibility of pedestrian and shared paths from adjoining residential areas and from the road to provide passive surveillance
- Ensure the improved connections are safe and comfortable for people to use and respond to natural desire lines
- Optimise vehicle and pedestrian connectivity and legibility to University of Wollongong and TAFE Illawarra.

#### OBJECTIVE 4

**To ensure that the various structural and functional elements – retaining walls, noise walls, bridges, road safety barriers, gantries, fences and arrester beds – are integrated in design and contribute positively to the overall identity of the interchange.**

##### Design principles:

- The design of the various structural elements of the interchange should support the overall design intent for the upgrade
- The design of various structures adjacent to each other should be considered in relation to each other and present an integrated design outcome
- Design of structures to assist in ensuring the road corridor design is self-explanatory, legible and easy to navigate.

#### OBJECTIVE 5

To ensure that visual impacts on surrounding residents, as well as motorists, are considered and mitigated, as far as possible, in the design of structures and planting.

##### Design principles:

- Mitigate visual impacts on the public realm through the considered design of structural elements and the provision of new planting and retention of key established vegetation groupings, where possible
- Maximise space for planting adjacent to new noise walls to screen and soften their appearance and reinstate/reinforce a planted interface towards residential properties
- Rationalise the height and extent of retaining walls and noise walls to reduce the impact on the residential and institutional setting
- Views to the road are to be screened as far as possible from immediate residential areas
- Privacy to residential properties is to be considered in the design of shared paths.

#### OBJECTIVE 6

To ensure that the character of the interchange sits well within the dramatic slopes and natural remnant forests of the local area.

##### Design principles:

- Enhance and reinstate indigenous vegetation - to integrate the proposal with the existing setting, enhance the sense of place, restore ecological values and assist in biodiversity protection and recovery
- The design of bridges, noise walls and retaining walls are to maximise and encourage views to the surrounding environment and broader distant views
- Reinforce indigenous planting to disturbed areas to reinforce the sense of place and natural forested setting
- Design major earthworks and embankments to integrate with the existing natural topography of the setting where feasible.

### 3.4 SUMMARY - DESIGN APPROACH AND KEY STRATEGIES

The urban design strategy (Figure 23) has been developed in response to the proposal context and the urban design vision and objectives. The overall aim is to establish the interchange as a gateway to Wollongong, increase legibility of Mount Ousley Road and access to University of Wollongong and create an interchange that sits well within its existing context. Key to its success is the presentation of a cohesive design to the many structural elements at the interchange.

The approach to the design of landscape planting complements the design of structures and assists in fulfilling the urban design objectives of the proposal.

Key strategies adopted to achieve the proposal objectives are:

- Improve legibility at the interchange by highlighting key visual elements complemented by strategic planting, to provide visual directional cues to the various destinations:
  - Heighten the visual experience of the highly visible structures through the incorporation of a strong identity to their design and reduce the visual presence of other visible elements through the considered use of finishes
  - The landscape planting adjacent to key visual elements, complement their design intent by establishing a strong visual identity and sightlines
  - Noise walls facing the Motorway could be composed partly or wholly of clear transparent panels to reduce their visual presence and provide views through to the surrounding landscape.

- Retaining walls and noise walls facing local roads, Mount Ousley Road, Dumfries Avenue and Falder Place, would be softened in appearance to fit in with their local road character through their design, finish and provision of screen planting where possible
- Noise walls adjacent to shared paths, would be finished to a finer level of detail to complement the human scale and provide a more interesting experience. These walls may potentially incorporate local artwork and poetry
- Landscape planting leading to Mount Ousley Road complements planting strategies adopted by Council on Mount Ousley Road further east of the interchange
- The presence of the University of Wollongong is acknowledged on the Motorway through the planting of Illawarra Flame trees at both the new entry and existing entry to the University
- Planting design and lighting adjacent to shared paths and commuter car park incorporates Crime Prevention Through Environmental Design (CPTED) principles to provide passive surveillance and maximise safety
- Retaining walls that are largely screened from view would be detailed to ensure that their exposure to graffiti is minimised and ease of maintenance considered
- The design of the two steel pedestrian bridges – to the north east over Mount Ousley and the south over the main alignment – would be consistent to ensure a cohesive pedestrian and cyclist experience at the interchange
- The design of overbridges would be of a single family of bridges, with the finishes differentiated to identify their different roles at the interchange
- Landscape design adopts existing tree and plant species to ensure seamless integration with the existing vegetation communities.

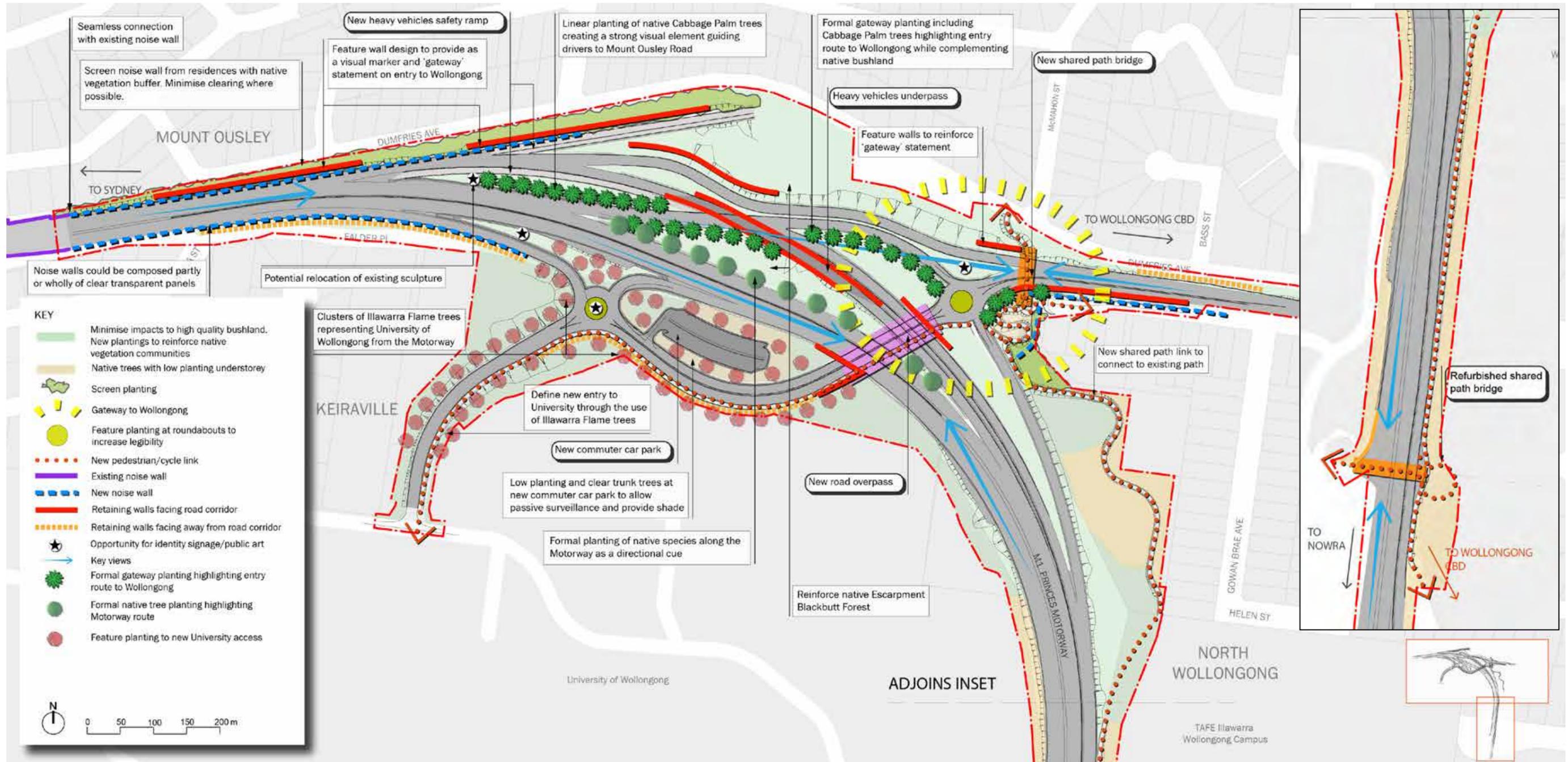


Figure 23. Strategy plan

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# CHAPTER 4

## URBAN AND LANDSCAPE CONCEPT DESIGN



Figure 24. View of Wollongong harbour and city centre  
Source: <http://www.visitwollongong.com.au/things-to-do/attractions/chilby-photography>

### 4.1 INTRODUCTION

This chapter describes the concept design, demonstrating how an integrated design for the proposal is achieved, including the relationship between the proposed roads, structures, vegetation treatments and their integration into the existing setting.

The design analysis is described together with the adopted design and its justification. Detailed principles are identified for further consideration in the Detailed Design stage of the proposal.

### 4.2 APPROACH TO DESIGN

The new interchange presents a large number of new structures and expansive roadway that would be seen and experienced, within a short span of time and area.

The design approach has been to firstly, to clearly identify the visual hierarchy of structural elements in order to establish the key visual elements (foreground elements) and those that should be 'softened' or receded from view (background elements).

This hierarchy is considered in relation to how these elements interface and interact with the users of the interchange, shaping their overall experience of passing through, or views towards it. The users in this context comprise of drivers, pedestrians, cyclists, residents of the areas surrounding the interchange, the University and TAFE community and commuter car park users. The approach to the design of landscape planting complements the design of structures and assists in fulfilling the urban design vision and objectives of the proposal.

Secondly, the design of all structural elements is simple and elegant, and responds to functional and contextual requirements/ constraints. Beyond this, there is an added layer of design and meaning, in relation to the primary

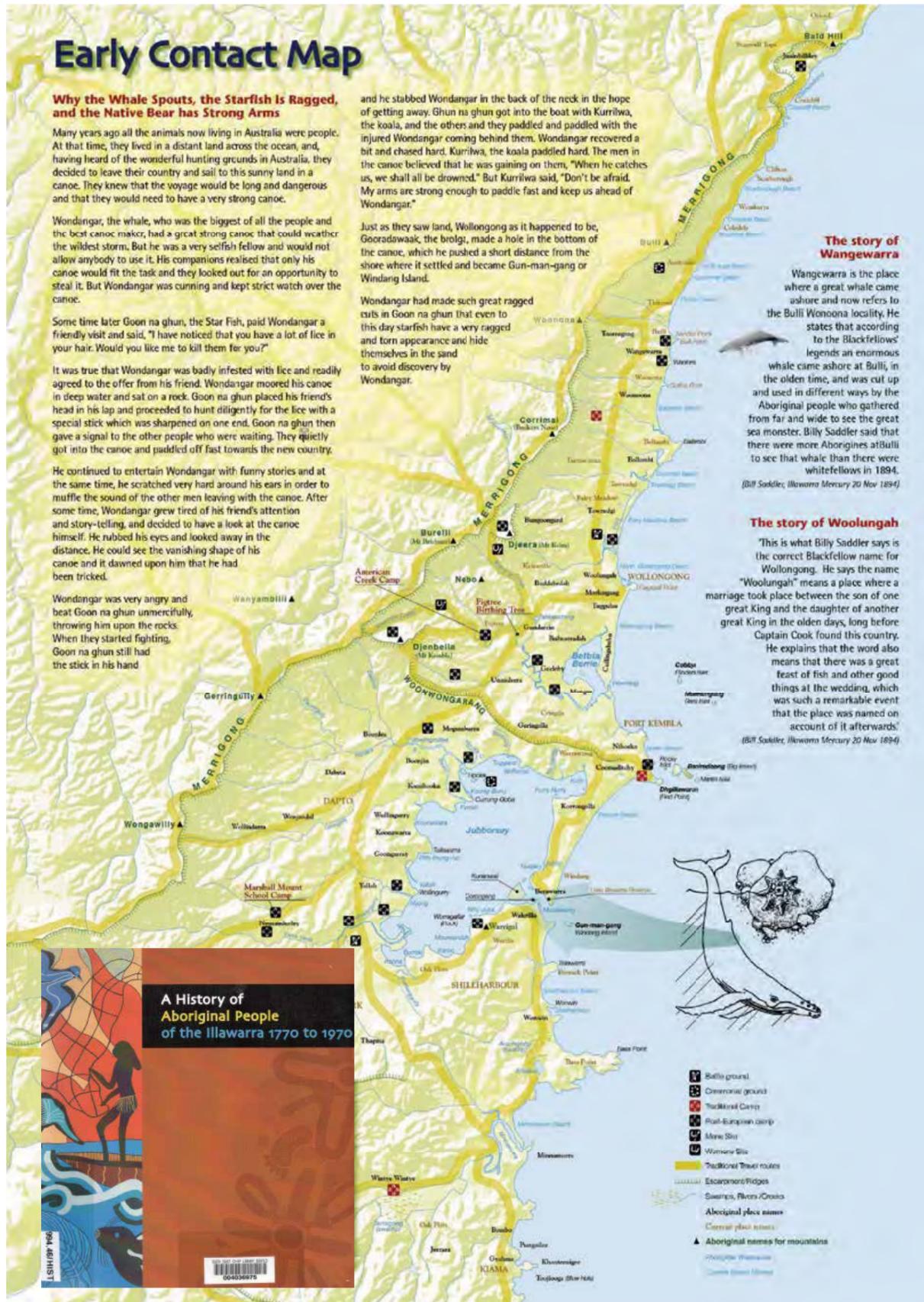


Figure 25. 'Great Feast of Fish'  
 Source: [http://www.simplyrecipes.com/feast\\_of\\_the\\_seven\\_fishes/](http://www.simplyrecipes.com/feast_of_the_seven_fishes/)

*'This is what Billy Saddler says is the correct Blackfellow name for Wollongong. He says the name "Woolungah" means a place where a marriage took place between the son of one great King and the daughter of another great King in the olden days, long before Captain Cook found this country. He explains that the word also means that there was a great feast of fish and other good things at the wedding, which was such a remarkable event that the place was named on account of it afterwards.'*

(Bill Saddler, Illawarra Mercury 20 Nov 1894)

Figure 26. Illawarra Aboriginal History poster  
 Source: Department of Environment and Conservation, NSW (2005)



Figure 27. 'Sound of the waves'

Source: <http://www.hautstyle.co.uk/wave-photography/>

*Other interpretations of the name Wollongong include 'seas of the south'<sup>1</sup>, 'song of the sea'<sup>2</sup>, 'sound of the waves'<sup>3</sup>*

*(Sources: 1. "place Names of Wollongong" Wollongong City Library; 2. Illawarra Historical Society Bulletin, Illawarra Historical Society, Wollongong, 1945; 3. Cousins, Arthur, The Garden of New South Wales, Producers' Co-op. Distributing Society Ltd, Sydney, 1948).*



Figure 28. Port Kembla steel plant which fuelled the growth of Wollongong

Source: <http://www.illawarramercury.com.au/steel-story2/>

context of the interchange, which is the city of Wollongong.

The Mount Ousley Interchange is the gateway in to Wollongong, the third largest city in New South Wales, after Sydney and Newcastle; and the tenth largest city in Australia. It has a long and rich aboriginal history spanning over 30,000 years. The name 'Wollongong' is an aboriginal name and there are several interpretations of the name. In the local language it is believed to refer to 'Seas of the South' whilst other interpretations include 'great feast of fish', 'song of the sea', 'sound of the waves', 'hard ground near water', 'many snakes' and 'five islands'.

In addition, the modern history of Wollongong since European settlement is heavily influenced by its steel industry, which commenced operations at Port Kembla in 1930. The growth of the steel industry has continued to fuel the growth of the city's economy, lifestyle and culture.

It is proposed that design features would be introduced to the key visual elements, with the detailing inspired by the interpretations of the name Wollongong, and the materials used inspired by the steel industry. A potential design approach is described in the following sections of this chapter. It is recommended that this concept design approach be further explored and developed in the Detailed Design stage of the project in consultation and collaboration with local Aboriginal communities and Wollongong Council.

#### 4.2.1. GATEWAY INTERCHANGE EXPERIENCE

The interchange, due to its complex functional requirements and steep topography, has numerous large to small structures. These comprise primarily of retaining walls, noise walls and bridge structures. The highly visual design elements or 'foreground elements' as discussed above comprise of these structures (RW01, RW02 and NW01, RW10, RW11 and NW04a, Bridge 1, 2, and 4), as well as landscape elements in strategic locations complementing the structural design.

The design of the above structural elements may incorporate features that are inspired by Wollongong itself - the interpretations of its name, and the association of the settlement with the sea and the waves. A potential idea is to design the wall features in the form of a simple and dramatic wave. In the development of the Concept Design, we have assumed that this feature pattern may be completed in weathering steel. The following discussions explore these themes. The final form and material of these features may be developed further at Detailed Design stage.

**Gateway experience – Eastbound motorist entering Wollongong**

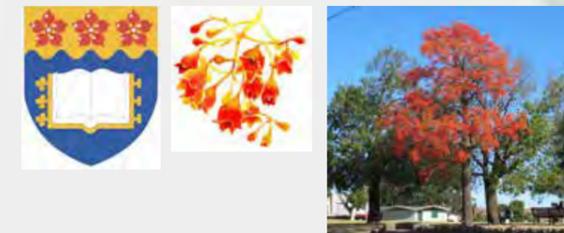
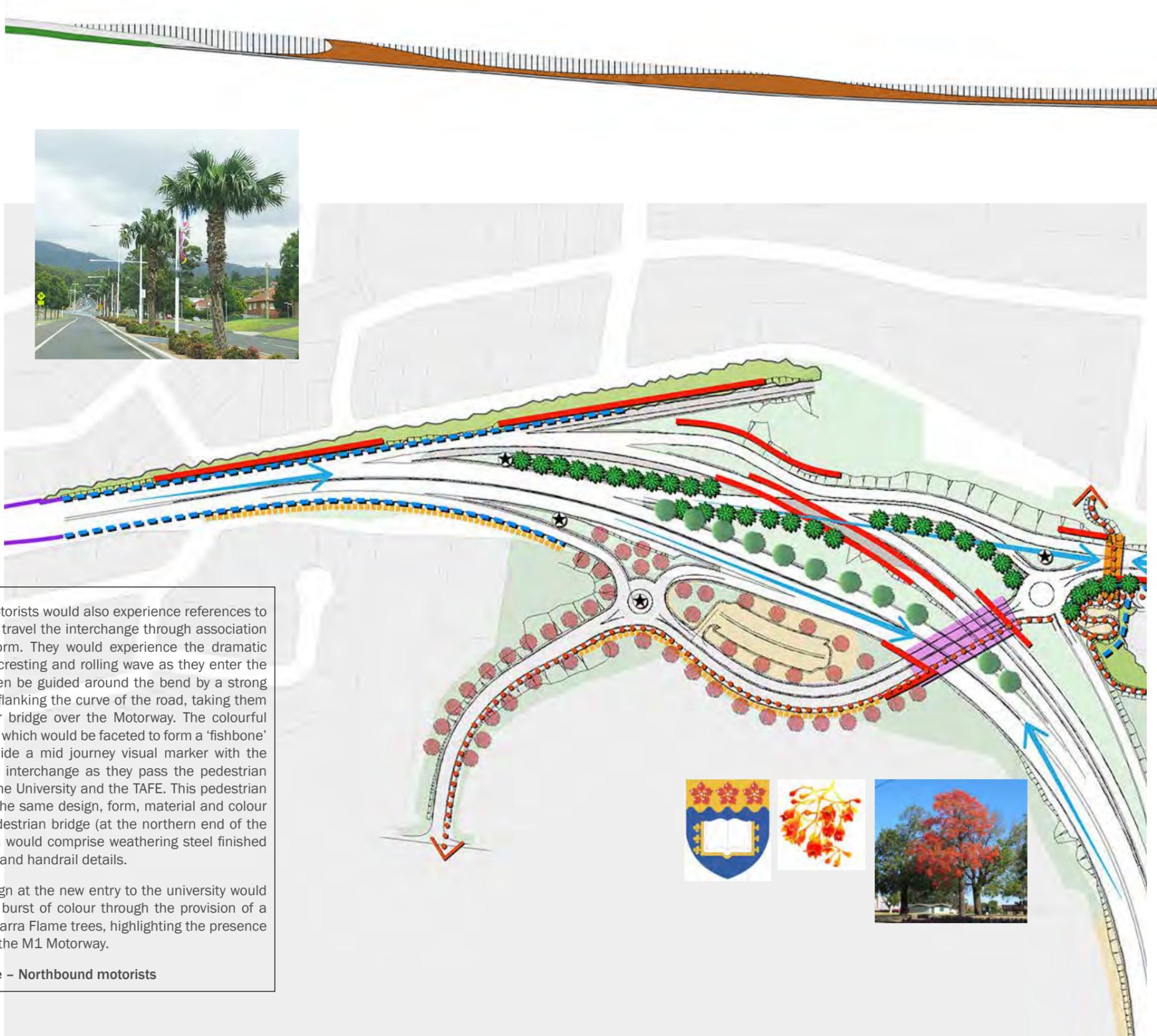
Retaining wall (RW01) could be clad in weathered steel taking the form of a wave. The 'wave' (or billow) crests, troughs and peaks along the length of the wall, going up in height to the full height of the noise wall at one point for dramatic effect. The form may be simple, large and dramatic, to be in scale with the width of the interchange and speed of travel through the interchange. The crest and peak of the wave being placed strategically in terms of travel direction and sightlines.

This wall, together with a strong line of Palm trees, would guide the driver along to Mount Ousley Road. Two retaining walls at the commencement of the local road, both with tall noise walls on top, could be finished in sandstone to soften the impact of the walls and are proposed to have a feature pattern, potentially a weathering steel cladding in the form of a smaller wave, taking the driver in to North Wollongong.

The experience of leaving the interchange and entering Wollongong and the local road network would culminate in the passing of the feature pedestrian overbridge, which is also proposed to comprise safety screen posts in weathering steel (See section 4.5.3 for more detail)

The landscape design at the new entry to the university would provide a seasonal burst of colour through the provision of a large cluster of Illawarra Flame trees, highlighting the presence of the university at the interchange.

**Gateway experience – Southbound motorists**



The southbound motorists would also experience references to Wollongong as they travel the interchange through association of materials and form. They would experience the dramatic feature wall with a cresting and rolling wave as they enter the interchange and then be guided around the bend by a strong line of native trees flanking the curve of the road, taking them under the vehicular bridge over the Motorway. The colourful safety screen posts, which would be faceted to form a 'fishbone' pattern, would provide a mid journey visual marker with the motorist exiting the interchange as they pass the pedestrian bridge connecting the University and the TAFE. This pedestrian bridge would have the same design, form, material and colour as the northern pedestrian bridge (at the northern end of the shared path), which would comprise weathering steel finished safety screen posts and handrail details.

The landscape design at the new entry to the university would provide a seasonal burst of colour through the provision of a large cluster of Illawarra Flame trees, highlighting the presence of the university on the M1 Motorway.

**Gateway experience – Northbound motorists**

**KEY**

- New plantings to reinforce native vegetation communities
- Native trees with low planting understorey
- Screen planting
- New pedestrian/cycle link
- Existing noise wall
- New noise wall
- Retaining walls facing road corridor
- Retaining walls facing away from road corridor
- Key views
- Formal gateway planting highlighting entry route to Wollongong
- Formal native tree planting highlighting Motorway route
- Feature planting to new University access

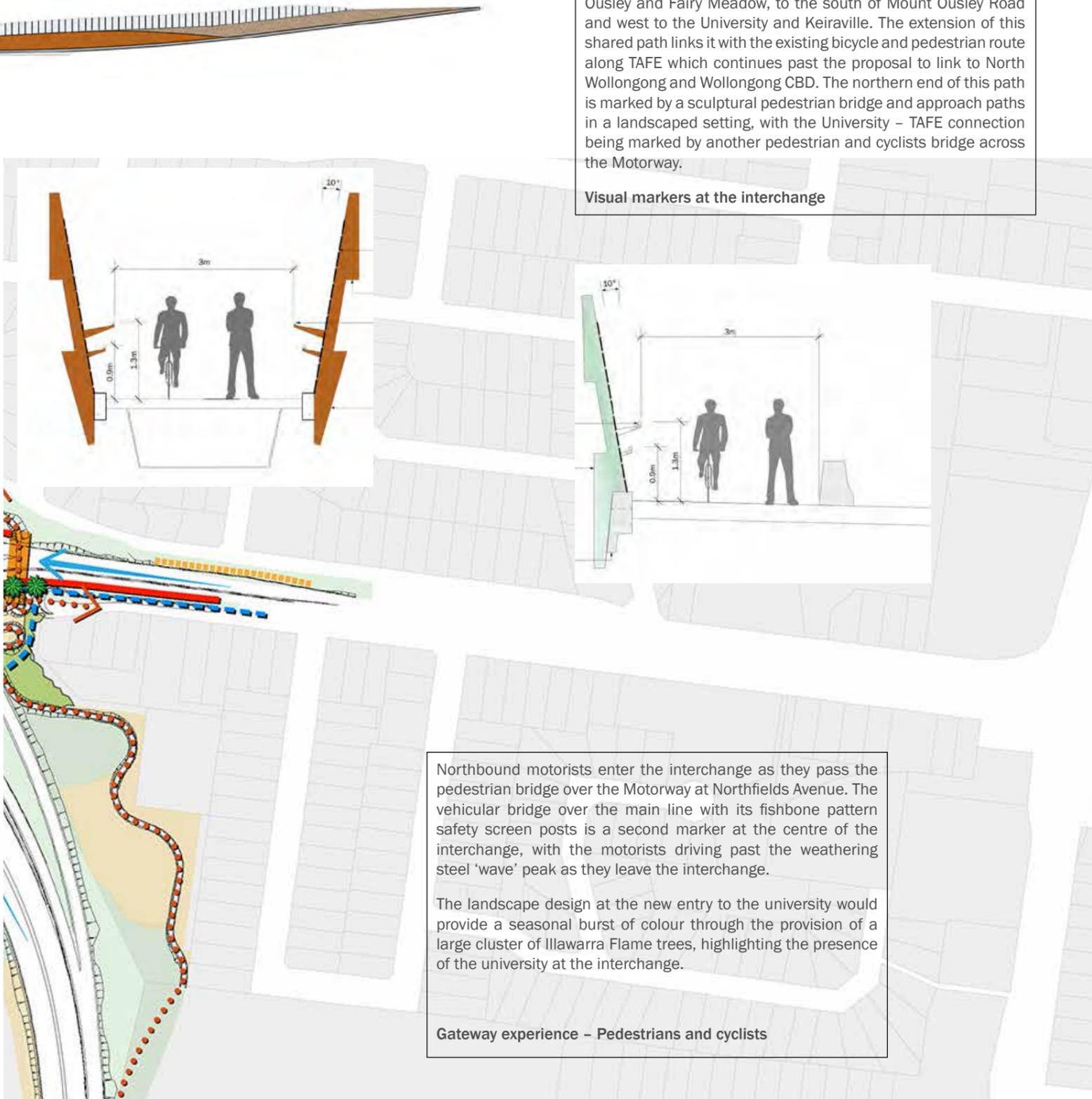
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Figure 29. Design approach plan

Pedestrian and cyclists connectivity is an important feature at the interchange connecting suburbs to the north such as Mount Ousley and Fairy Meadow, to the south of Mount Ousley Road and west to the University and Keiraville. The extension of this shared path links it with the existing bicycle and pedestrian route along TAFE which continues past the proposal to link to North Wollongong and Wollongong CBD. The northern end of this path is marked by a sculptural pedestrian bridge and approach paths in a landscaped setting, with the University – TAFE connection being marked by another pedestrian and cyclists bridge across the Motorway.

**Visual markers at the interchange**



Northbound motorists enter the interchange as they pass the pedestrian bridge over the Motorway at Northfields Avenue. The vehicular bridge over the main line with its fishbone pattern safety screen posts is a second marker at the centre of the interchange, with the motorists driving past the weathering steel 'wave' peak as they leave the interchange.

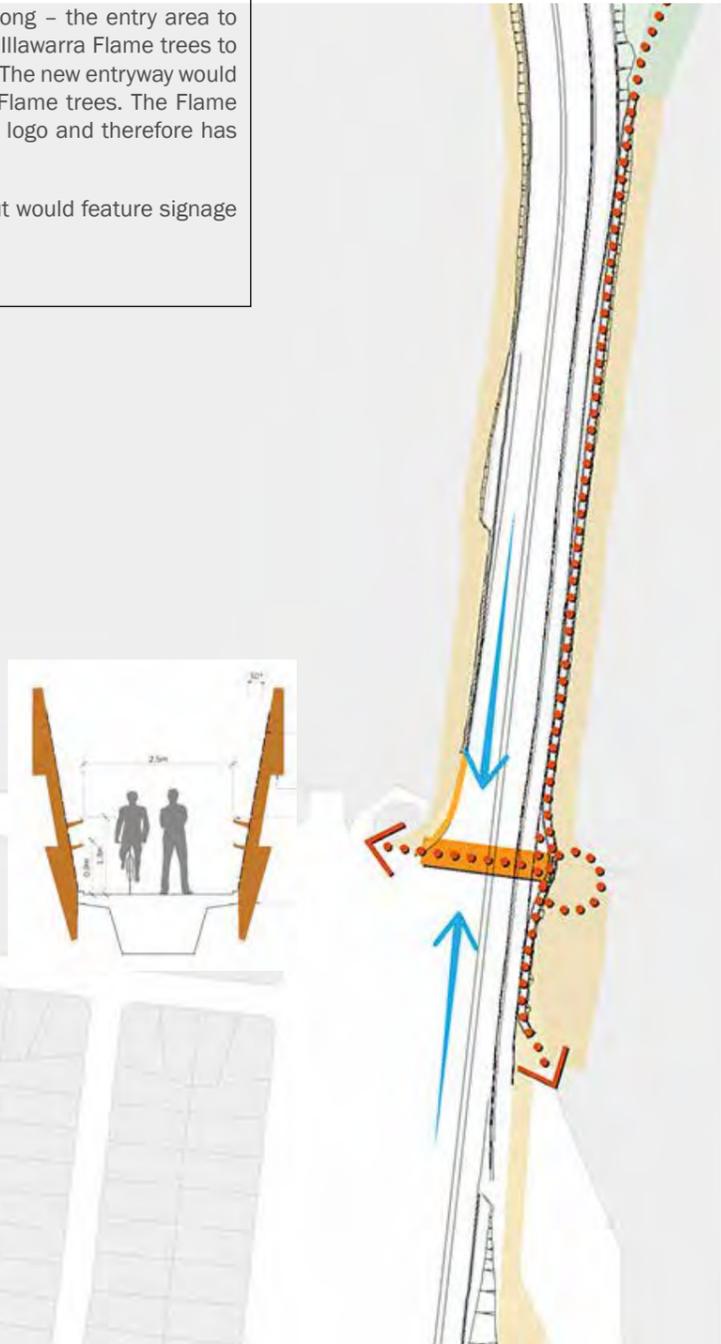
The landscape design at the new entry to the university would provide a seasonal burst of colour through the provision of a large cluster of Illawarra Flame trees, highlighting the presence of the university at the interchange.

**Gateway experience – Pedestrians and cyclists**

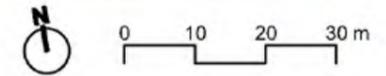
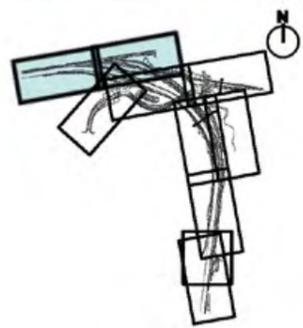
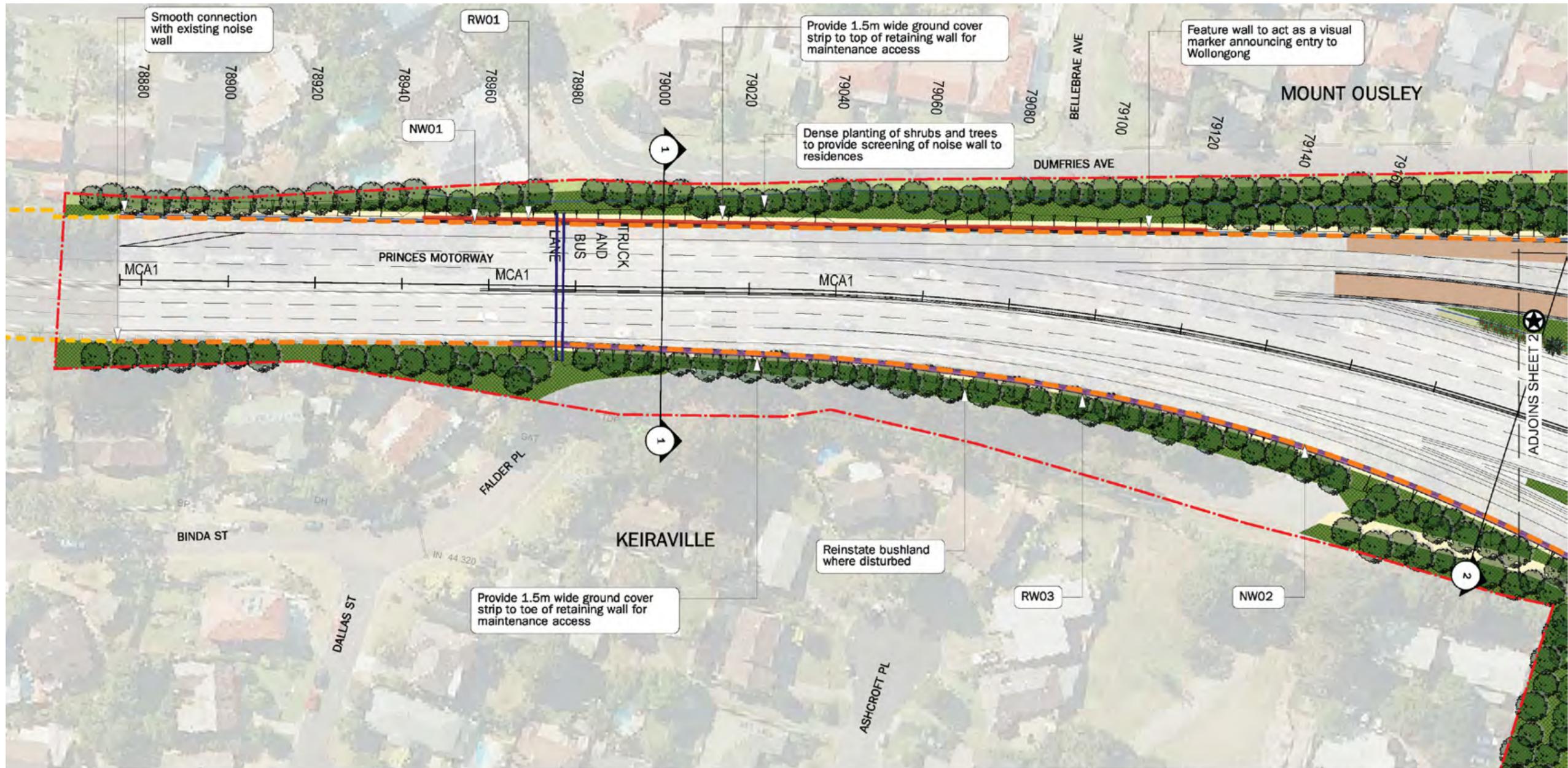
Apart from the structural elements, there would be several visual markers at the interchange to highlight the key 'events' at the interchange. These would be,

1. The existing metal sculpture to be relocated at the gore area leading in to Mount Ousley Road
2. Entry into North Wollongong – a 'Welcome to Wollongong' sign and artwork located at the roundabout framed in view by the pedestrian bridge in the near distance
3. Entry in to the University of Wollongong – the entry area to the university would be populated with Illawarra Flame trees to highlight the presence of the university. The new entryway would also be flanked by an informal line of Flame trees. The Flame tree flower is featured in the university logo and therefore has great significance to the university.

Other than the planting, the roundabout would feature signage for the University of Wollongong.

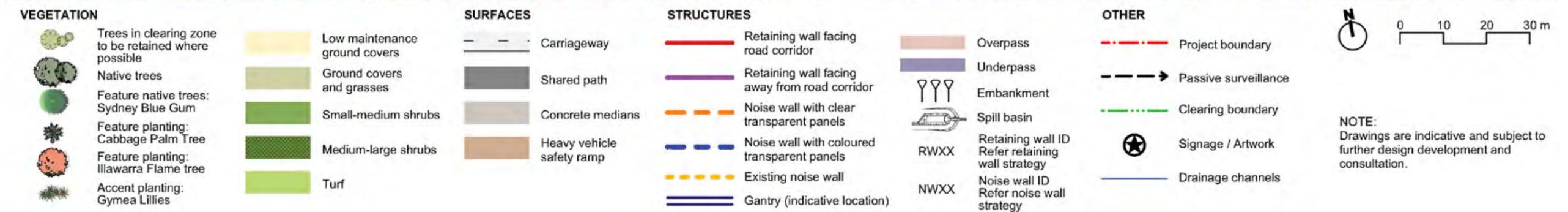
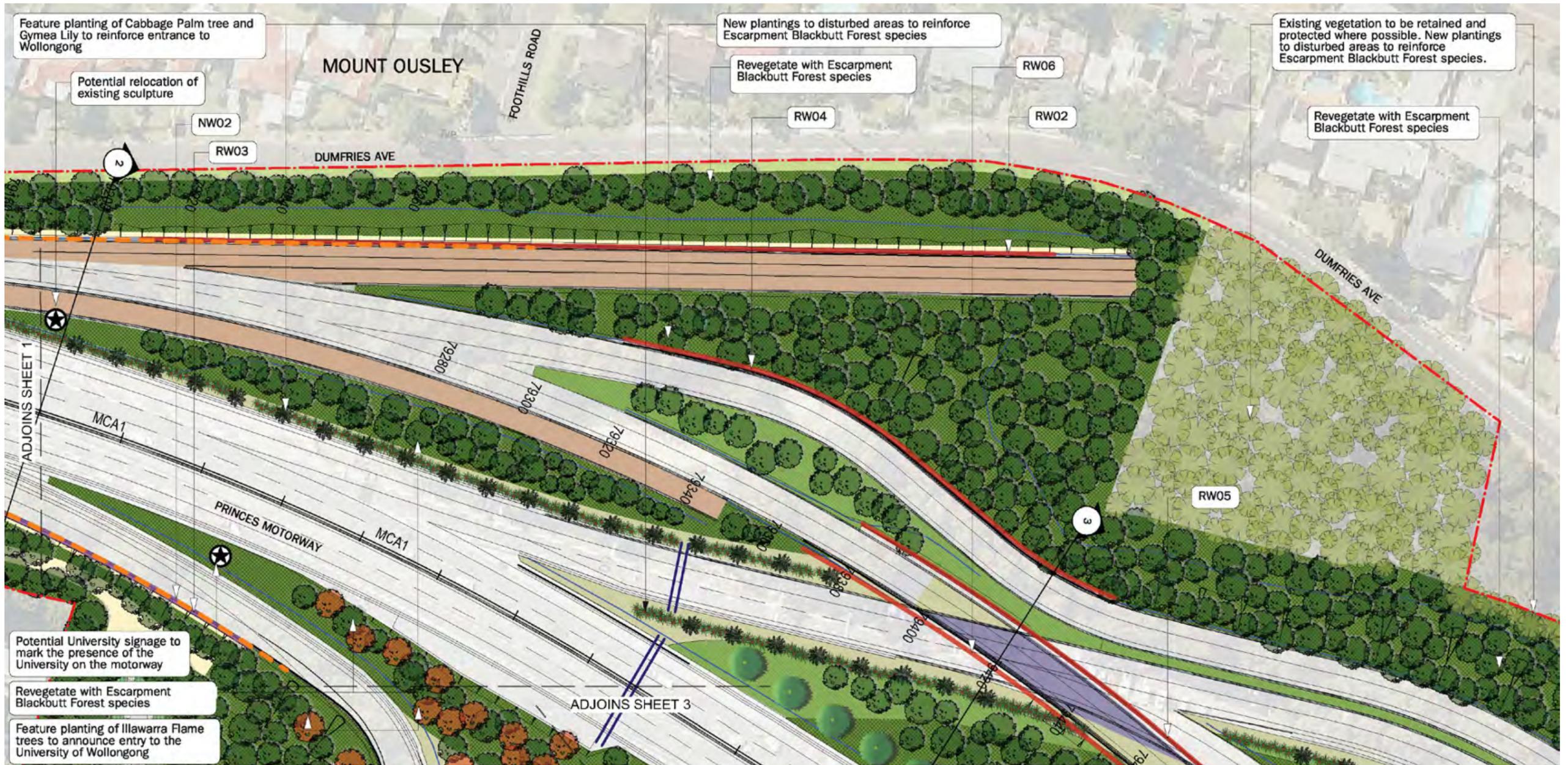


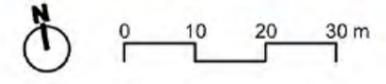
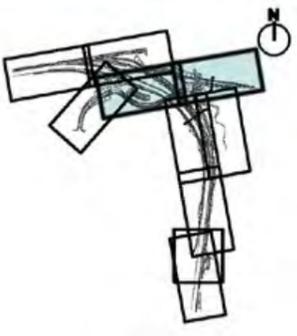
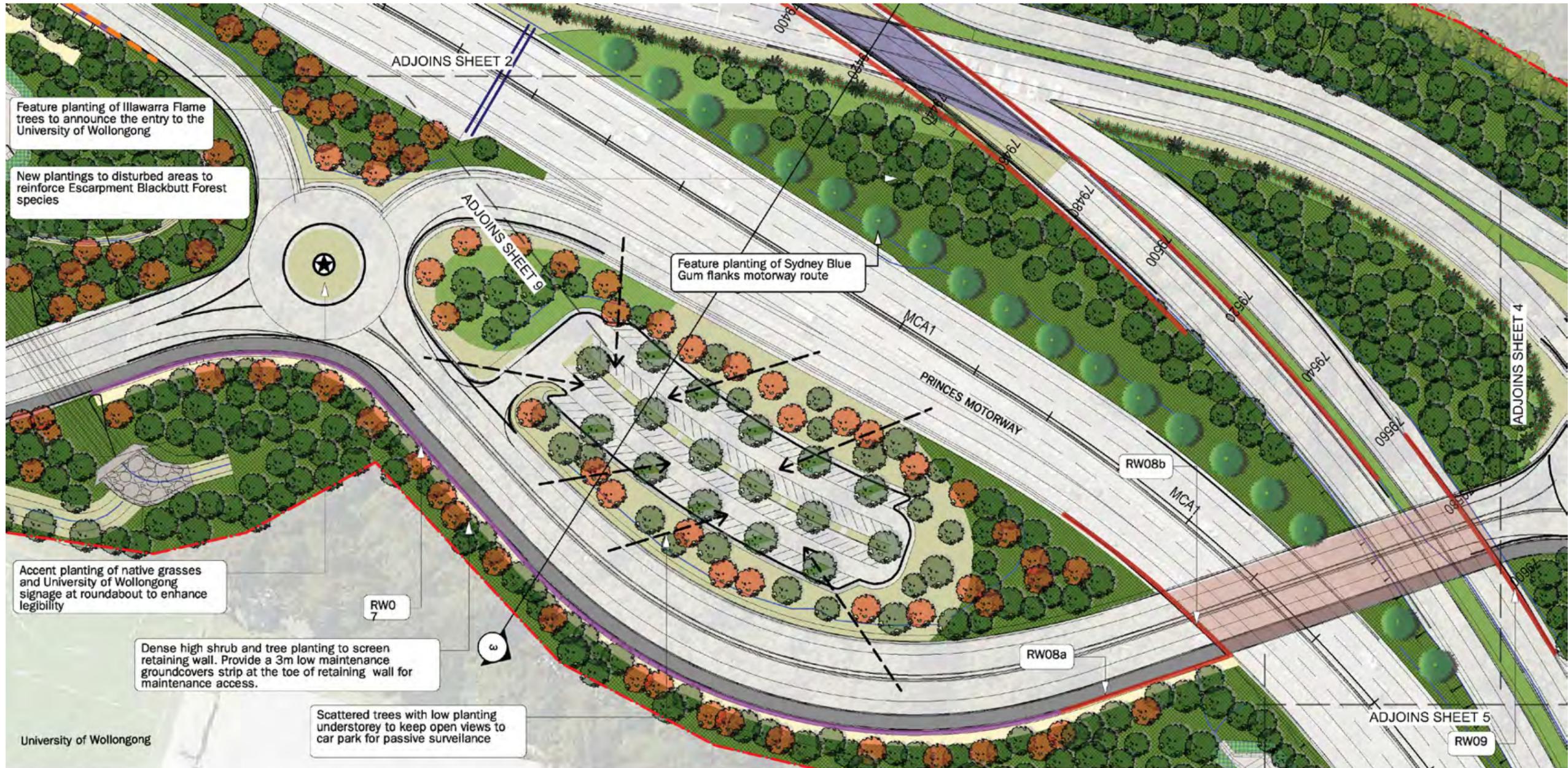
### 4.3 PLANS



**NOTE:**  
 Drawings are indicative and subject to further design development and consultation.

Figure 30. Urban and landscape concept design plan - Sheets 1 and 2 (Scale 1:1000)



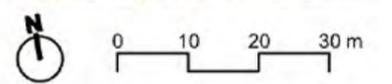


NOTE:  
 Drawings are indicative and subject to further design development and consultation.

Figure 31. Urban and landscape concept design plan - Sheets 3 and 4 (Scale 1:1000)



VEGETATION	SURFACES	STRUCTURES	OTHER
<ul style="list-style-type: none"> <li>Trees in clearing zone to be retained where possible</li> <li>Native trees</li> <li>Feature native trees: Sydney Blue Gum</li> <li>Feature planting: Cabbage Palm Tree</li> <li>Feature planting: Illawarra Flame tree</li> <li>Accent planting: Gynea Lillies</li> </ul>	<ul style="list-style-type: none"> <li>Low maintenance ground covers</li> <li>Ground covers and grasses</li> <li>Small-medium shrubs</li> <li>Medium-large shrubs</li> <li>Turf</li> </ul>	<ul style="list-style-type: none"> <li>Carriageway</li> <li>Shared path</li> <li>Concrete medians</li> <li>Heavy vehicle safety ramp</li> </ul>	<ul style="list-style-type: none"> <li>Retaining wall facing road corridor</li> <li>Retaining wall facing away from road corridor</li> <li>Noise wall with clear transparent panels</li> <li>Noise wall with coloured transparent panels</li> <li>Existing noise wall</li> <li>Gantry (indicative location)</li> <li>Overpass</li> <li>Underpass</li> <li>Embankment</li> <li>Spill basin</li> <li>RWXX Retaining wall ID Refer retaining wall strategy</li> <li>NWXX Noise wall ID Refer noise wall strategy</li> <li>Project boundary</li> <li>Passive surveillance</li> <li>Clearing boundary</li> <li>Signage / Artwork</li> <li>Drainage channels</li> </ul>



**NOTE:**  
Drawings are indicative and subject to further design development and consultation.

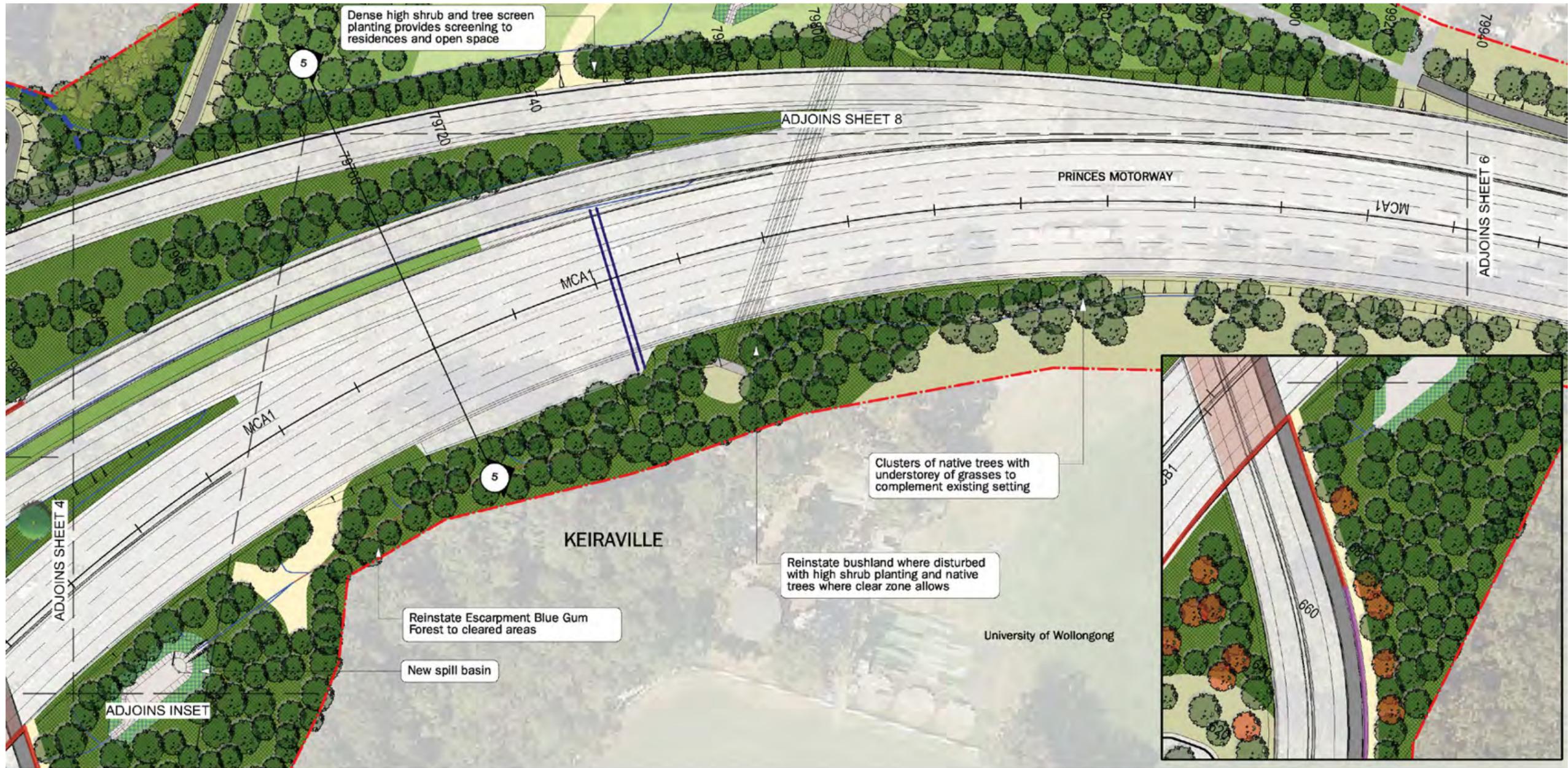
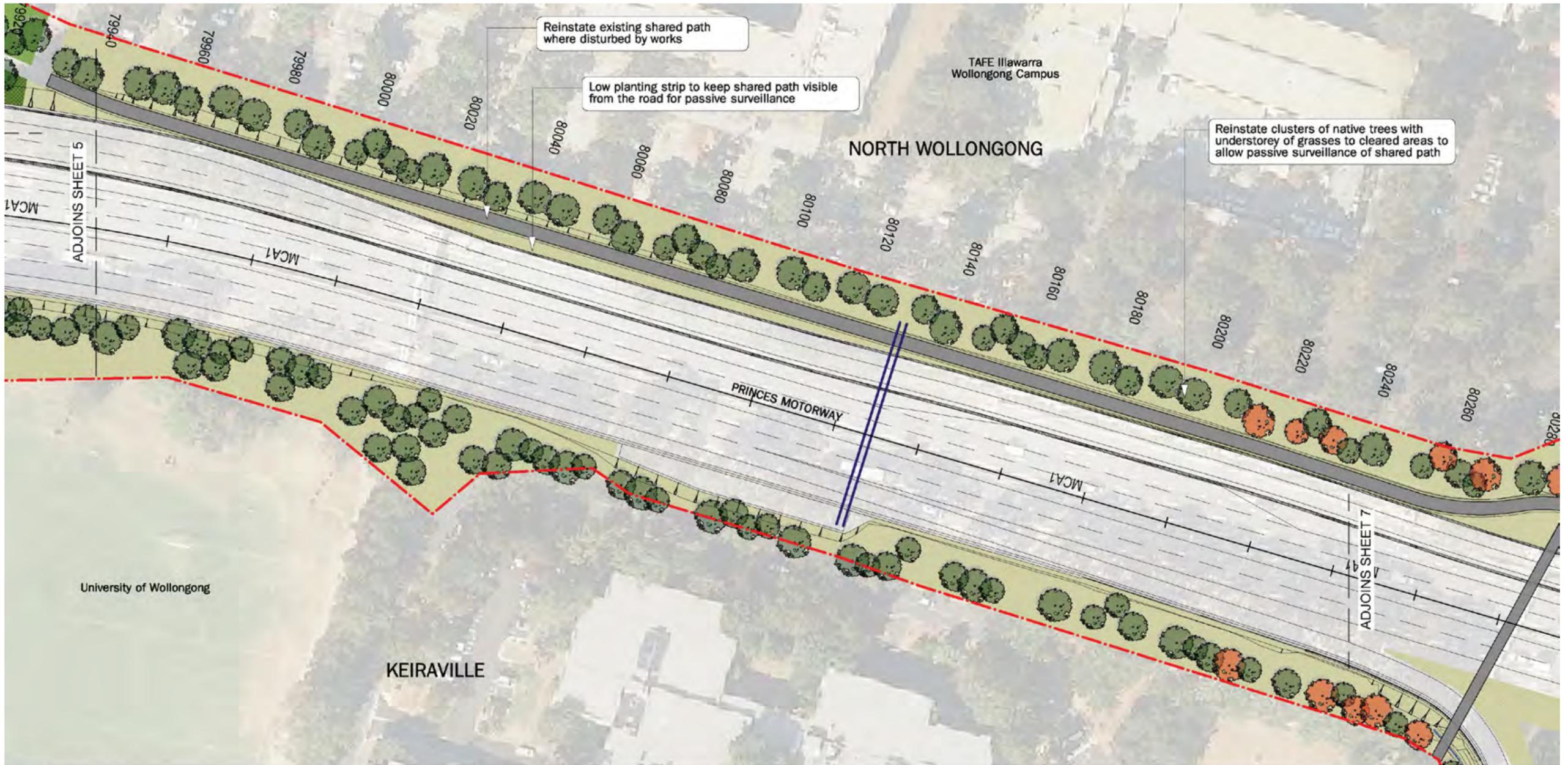


Figure 32. Urban and landscape concept design plan - Sheets 5 and 6 (Scale 1:1000)

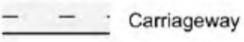
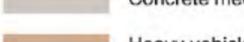


**VEGETATION**

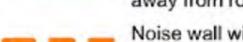
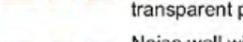
-  Trees in clearing zone to be retained where possible
-  Native trees
-  Feature native trees: Sydney Blue Gum
-  Feature planting: Cabbage Palm Tree
-  Feature planting: Illawarra Flame tree
-  Accent planting: Gynea Lillies

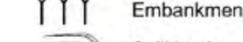
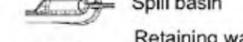
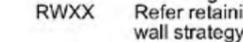
-  Low maintenance ground covers
-  Ground covers and grasses
-  Small-medium shrubs
-  Medium-large shrubs
-  Turf

**SURFACES**

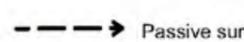
-  Carriageway
-  Shared path
-  Concrete medians
-  Heavy vehicle safety ramp

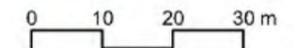
**STRUCTURES**

-  Retaining wall facing road corridor
-  Retaining wall facing away from road corridor
-  Noise wall with clear transparent panels
-  Noise wall with coloured transparent panels
-  Existing noise wall
-  Gantry (indicative location)

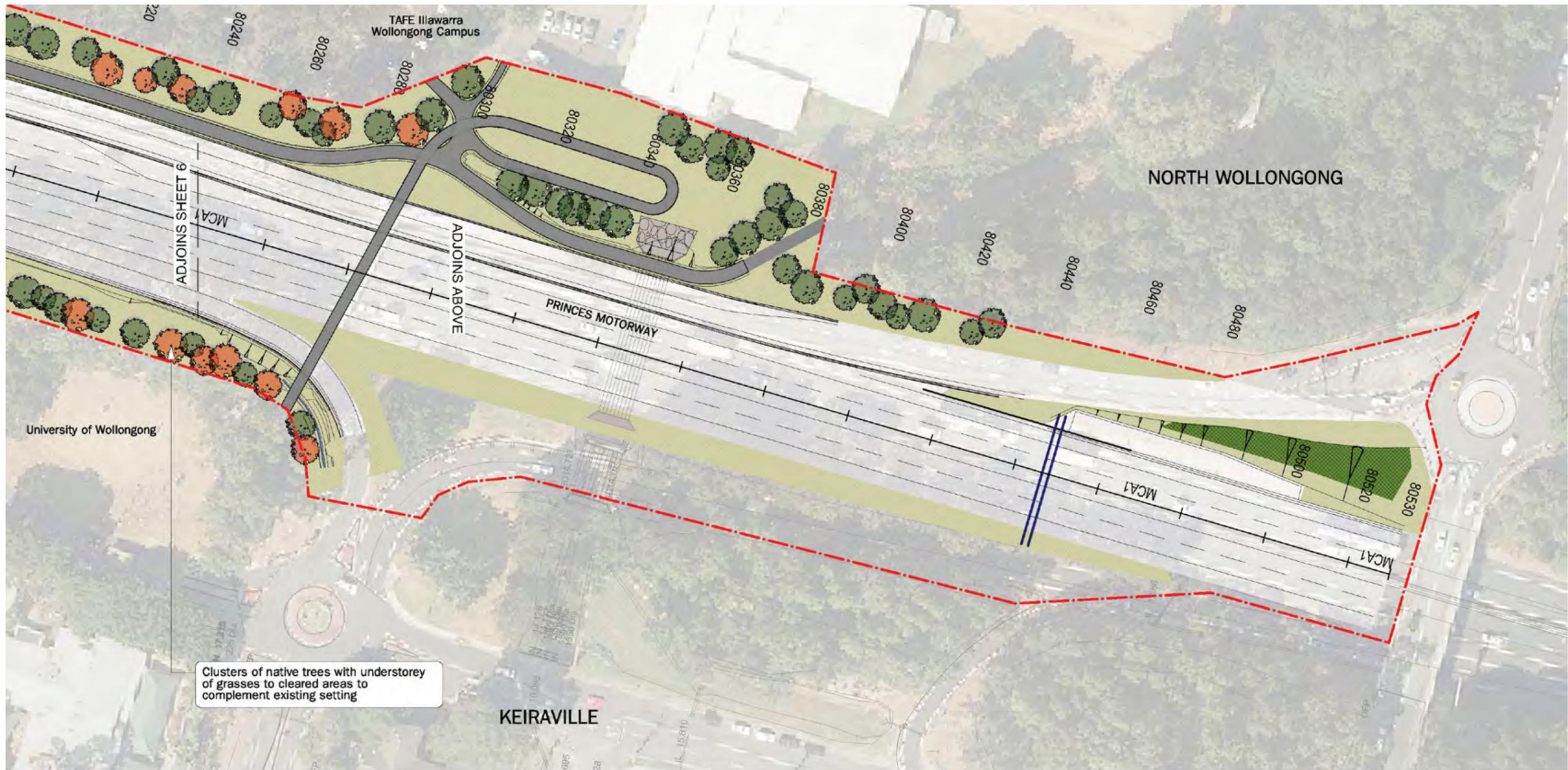
-  Overpass
-  Underpass
-  Embankment
-  Spill basin
-  Retaining wall ID Refer retaining wall strategy
-  Noise wall ID Refer noise wall strategy

**OTHER**

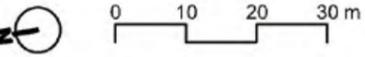
-  Project boundary
-  Passive surveillance
-  Clearing boundary
-  Signage / Artwork
-  Drainage channels



**NOTE:**  
Drawings are indicative and subject to further design development and consultation.



Clusters of native trees with understorey of grasses to cleared areas to complement existing setting



NOTE:  
Drawings are indicative and subject to further design development and consultation.

Figure 33. Urban and landscape concept design plan - Sheets 7 and 8 (Scale 1:1000)



**VEGETATION**

- Trees in clearing zone to be retained where possible
- Native trees
- Feature native trees: Sydney Blue Gum
- Feature planting: Cabbage Palm Tree
- Feature planting: Illawarra Flame tree
- Accent planting: Gynea Lillies

- Low maintenance ground covers
- Ground covers and grasses
- Small-medium shrubs
- Medium-large shrubs
- Turf

**SURFACES**

- Carriageway
- Shared path
- Concrete medians
- Heavy vehicle safety ramp

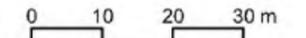
**STRUCTURES**

- Retaining wall facing road corridor
- Retaining wall facing away from road corridor
- Noise wall with clear transparent panels
- Noise wall with coloured transparent panels
- Existing noise wall
- Gantry (indicative location)

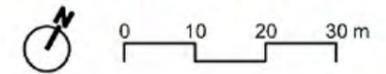
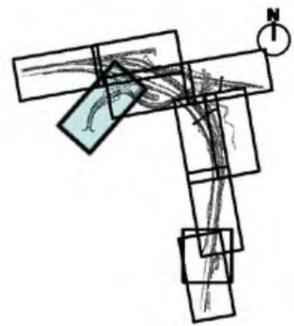
- Overpass
- Underpass
- Embankment
- Spill basin
- Retaining wall ID Refer retaining wall strategy
- Noise wall ID Refer noise wall strategy

**OTHER**

- Project boundary
- Passive surveillance
- Clearing boundary
- Signage / Artwork
- Drainage channels



**NOTE:**  
Drawings are indicative and subject to further design development and consultation.



**NOTE:**  
 Drawings are indicative and subject to further design development and consultation.

Figure 34. Urban and landscape concept design plan - Sheet 9 (Scale 1:1000)



Figure 35. Artists impression of view looking north east from University Access Road - Proposal showing mature planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

## 4.4 SECTIONS

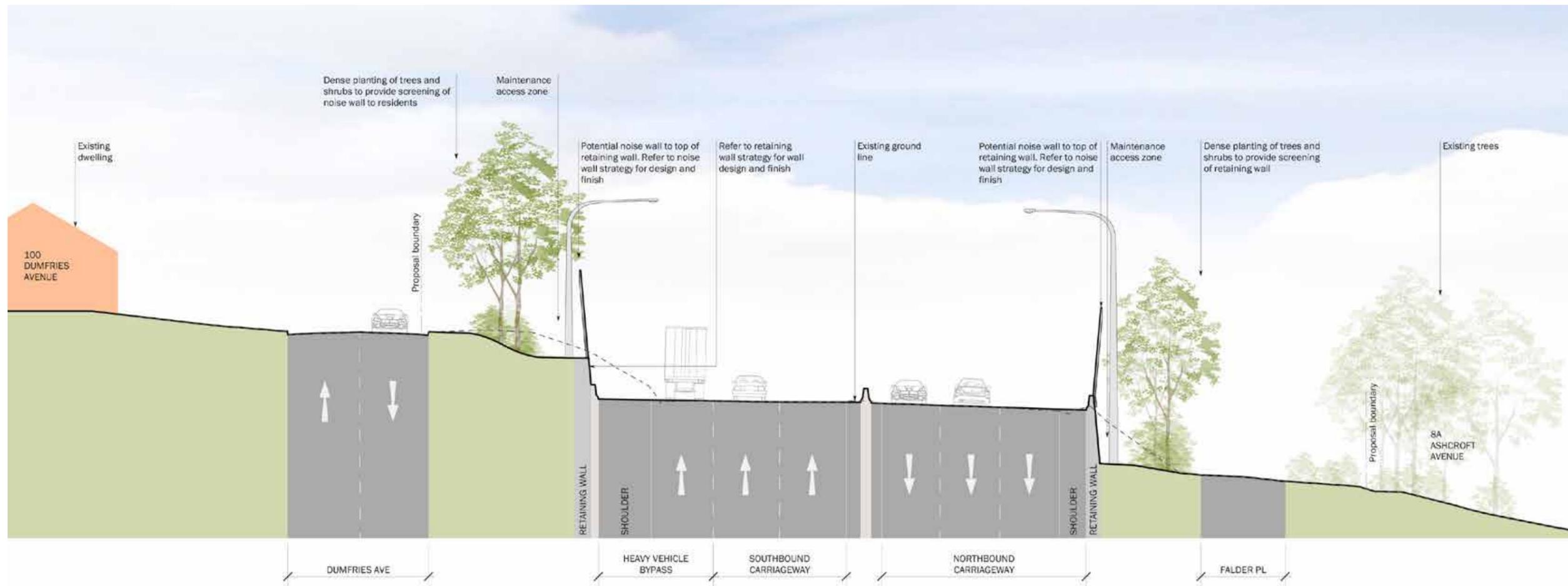


Figure 36. Section 1 through Princes Motorway west of Mount Ousley Road - Chainage 79000 (Scale 1:250)

Note: 1. Proposed planting shown at maturity  
 2. Subject to further design development and consultation.



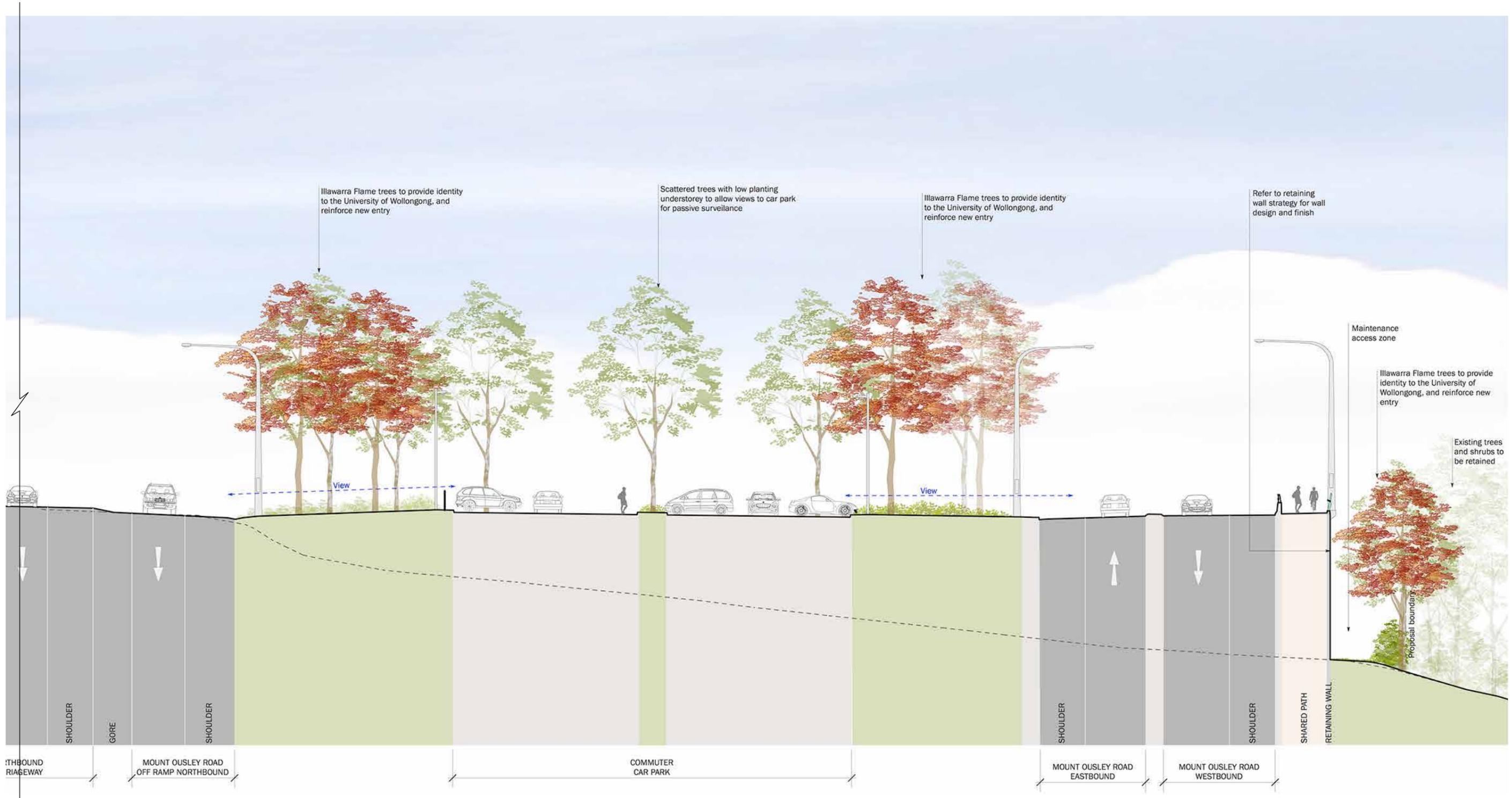
Figure 37. Section 2 through Princes Motorway west of Mount Ousley Road - Chainage 79200 (Scale 1:250)

- Note: 1. Proposed planting shown at maturity  
 2. Subject to further design development and consultation.



Figure 38. Section 3 through Princes Motorway - Chainage 79450 (Scale 1:250)

Note: 1. Proposed planting shown at maturity  
 2. Subject to further design development and consultation.



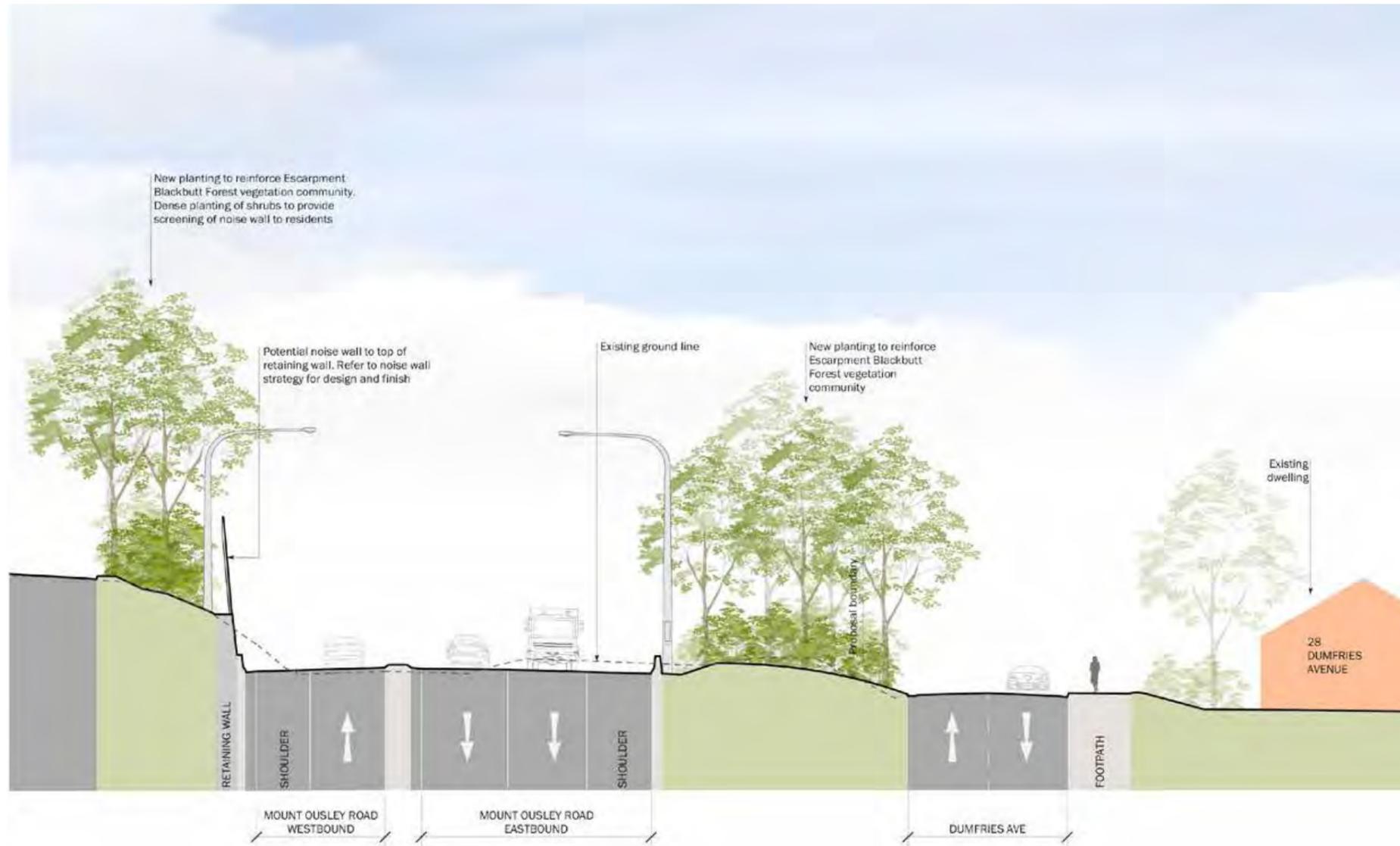


Figure 39. Section 4 through Mount Ousley Road - Chainage 1120 (Scale 1:250)

- Note: 1. Proposed planting shown at maturity  
 2. Subject to further design development and consultation.



Figure 40. Section 5 through M1 Princes Motorway - Chainage 79700 (Scale 1:250)

- Note: 1. Proposed planting shown at maturity  
 2. Subject to further design development and consultation.



Figure 41. Artists impression of view looking west from Mount Ousley Road - Proposal showing the potential range of noise wall heights and planting at road opening  
 Note: Artists impression is indicative only and subject to further design development and consultation



Figure 42. Artists impression of view looking west from Mount Ousley Road - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
 Note: Artists impression is indicative only and subject to further design development and consultation



Figure 43. Artists impression of view looking east from Princes Motorway - Proposal showing the potential range of noise wall heights and planting at road opening  
 Note: Artists impression is indicative only and subject to further design development and consultation



Figure 44. Artists impression of view looking east from Princes Motorway - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
 Note: Artists impression is indicative only and subject to further design development and consultation

## 4.5 DESIGN ELEMENTS

### 4.5.1. RETAINING WALLS

The proposal would require the introduction of a number of new retaining walls. Due to the steep topography and the nature of this large interchange with over and underpasses, the walls would be in both cut and fill conditions with varying structural wall types being required. The context of the walls varies greatly throughout the upgrade. They are described in detail in Table 1.

As mentioned in Section 4.2.1, the approach to the design of the retaining walls commenced with the identification of the visual hierarchy of elements, of which retaining walls were a primary focus due to the location, number and size of visible walls. This hierarchy established mainly three types of walls.



Figure 45. Example of weathering steel wall  
Source: <http://urbismagazine.com/articles/incredible-art-in-gibbs-trove/#img=1>

#### 1. WALLS FACING THE ROADWAY AND ARE KEY VISUAL ELEMENTS:

These comprise of, RW01 along the southbound lanes at the northwestern end of the interchange and its associated noise wall; and RW10 and RW11 on either side of Mount Ousley Road with their associated noise walls. The former has a feature pattern in potentially a weathering steel finish as described in section 4.2.1 with the latter also having a potentially similar feature pattern in keeping with the overall project theme combined with a sandstone finish.

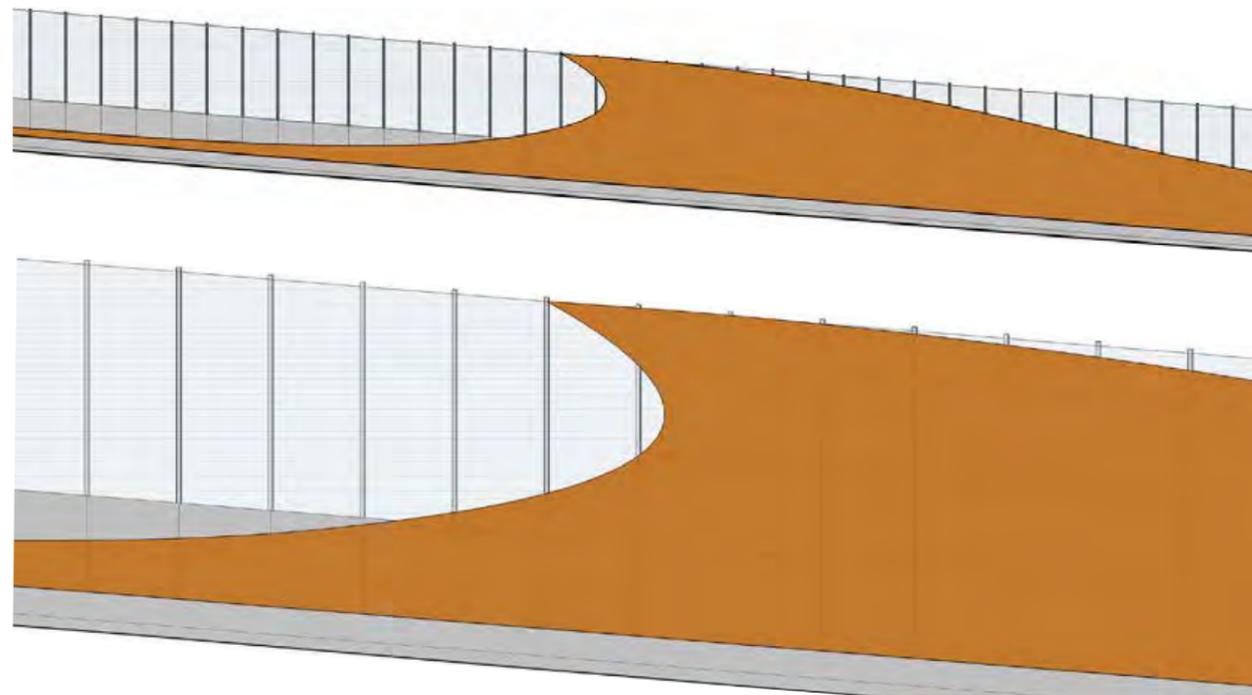


Figure 47. Elevation of highly visible retaining wall facing road corridor - Finish type RW-F1  
Note: Subject to further design development and consultation.

*Retaining wall (RW01) is proposed to be clad in weathered steel taking the form of a wave. The 'wave' (or billow) crests, troughs and peaks along the length of the wall, going up in height to the full height of the noise wall at one point for dramatic effect. The form is simple, large and dramatic to be in scale with the width of interchange and speed of travel through the interchange. The crest and peak of the wave is placed strategically in terms of travel direction and sightlines.*

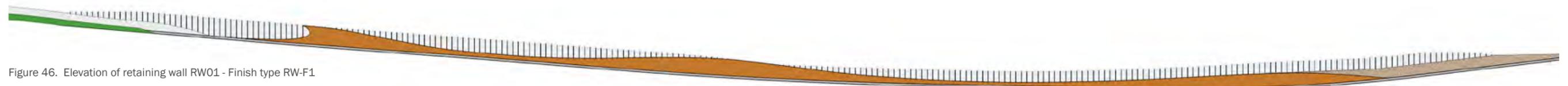


Figure 46. Elevation of retaining wall RW01 - Finish type RW-F1  
Note: Subject to further design development and consultation.

## 2. WALLS FACING THE ROADWAY AND ARE NOT KEY VISUAL ELEMENTS:

These walls would be largely short walls, primarily in locations that are further away from the roadway. The design detailing of these walls aim to 'soften' the appearance of the wall to reduce their visual presence. Walls facing local roads have also been selected to have a 'softer' finish to be more sympathetic to their local road environment.



Figure 48. Example of retaining wall facing the roadway

## 3. WALLS LARGELY SCREENED FROM VIEW:

These walls would be generally facing away from the road and at times screened by vegetation. Therefore they have a high exposure to the risk of graffiti in this urban setting. The design of the wall aims to discourage graffiti; allow for ease of maintenance and aim to recede their visual presence in terms of height and scale.



Figure 49. Example of retaining wall with planted vegetation  
Note: Planting shown at road opening

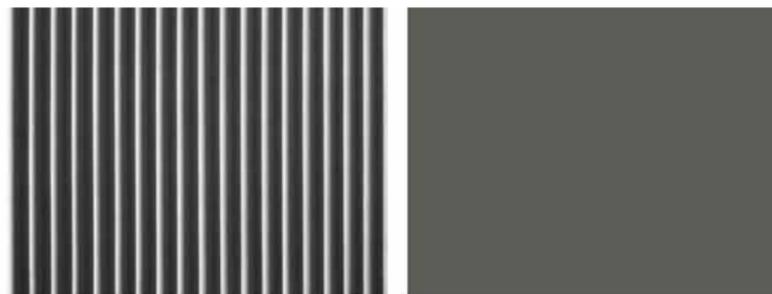
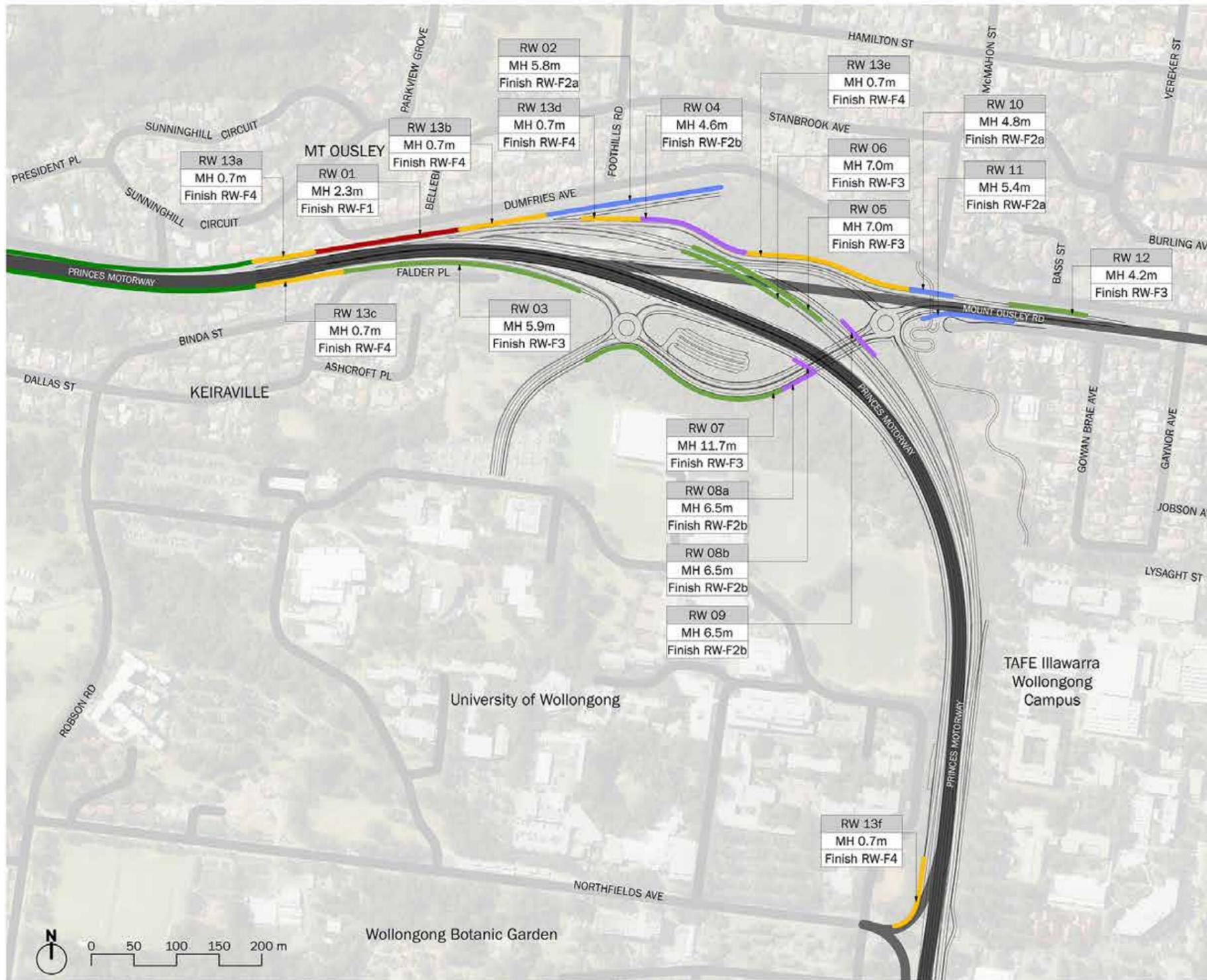
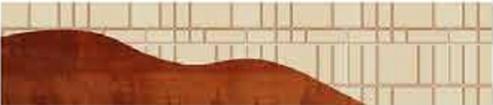
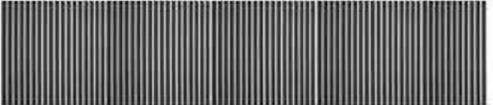


Figure 50. RSW precast concrete panels. Proposed texture and paint colour



**LEGEND**

- Retaining Wall Finish Type RW-F1
-  Weathering steel cladding
- Retaining Wall Finish Type RW-F2a
-  Sandstone and weathering steel cladding
- Retaining Wall Finish Type RW-F2b
-  Sandstone cladding
- Retaining Wall Finish Type RW-F3
-  Textured and painted concrete panels
- Retaining Wall Finish Type RW-F4
-  Type F road barrier

**KEY**

- RW 13 ← Retaining wall reference number
- MH 0.7m ← Maximum height of retaining wall
- Finish RW-F4 ← Surface finish to retaining wall

Figure 51. Retaining wall locations and recommended finishes  
 Note: Subject to further design development and consultation.

Table 1. Retaining walls description and finish type

RW ID	DESCRIPTION	RECOMMENDED WALL FINISH	RW FINISH TYPE
RW01, RW02	Feature walls facing the Motorway: Design aims - <ul style="list-style-type: none"> <li>▪ Provide visual interest, aid legibility</li> <li>▪ Reduce perceived scale</li> <li>▪ Integrate with noise wall</li> <li>▪ Reduce glare.</li> </ul>	See Figures 50 and 52 <ul style="list-style-type: none"> <li>▪ Weathering steel cladding over Class 2 concrete finish / sandstone</li> <li>▪ Wall angled at 5 degrees from roadway</li> <li>▪ Integrate with design of NW01.</li> </ul>	RW-F1
RW10, RW11	Feature walls facing local roads and safety ramp: Design aims - <ul style="list-style-type: none"> <li>▪ Provide visual interest / aid legibility</li> <li>▪ Reduce perceived scale</li> <li>▪ Integrate with Noise Wall</li> <li>▪ Integrate with landform</li> <li>▪ Reduce glare</li> </ul>	See Figures 53 – 54 <ul style="list-style-type: none"> <li>▪ Bottom section of wall - Weathering steel cladding over concrete finish</li> <li>▪ Top section of wall – Sandstone cladding to areas not covered by weathering steel (allow for overlap)</li> <li>▪ Integrated with noise wall</li> <li>▪ Wall angled at 5 degrees from roadway</li> <li>▪ RW11 to integrate with design of NW04a.</li> </ul>	RW-F2a
RW04	High visual priority walls facing the Motorway: Design aims - <ul style="list-style-type: none"> <li>▪ Provide visual interest, aid legibility</li> <li>▪ Reduce perceived scale</li> <li>▪ Integrate with Noise Wall</li> <li>▪ Integrate with landform</li> <li>▪ Reduce glare.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sandstone cladding</li> <li>▪ Wall facing in proximity to Motorway angled at 5 degrees, where possible</li> </ul>	RW-F2b
RW03, RW12	Walls facing residential roads: Design aims - <ul style="list-style-type: none"> <li>▪ Discourage graffiti</li> <li>▪ Allow for ease of maintenance through finishes</li> <li>▪ Recede from view</li> <li>▪ Integrate with barriers, noise walls and landform.</li> </ul>	See Figures 55 – 56 <ul style="list-style-type: none"> <li>▪ Vertical ribbed finish to concrete panels</li> <li>▪ Painted in a dark recessive colour</li> <li>▪ RW03 to integrate with design of NW02.</li> </ul>	RW-F3
RW8a, RW8b, RW09	Bridge abutment walls: Design aims - <ul style="list-style-type: none"> <li>▪ Soften the appearance of the abutment and return walls</li> <li>▪ Reduce perceived scale</li> <li>▪ Reduce glare.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sandstone cladding</li> <li>▪ Wall facing Motorway angled at 5 degrees from roadway.</li> </ul>	RW-F2b
RW05, RW06, RW07	Partially screened/ tall walls: Design aims - <ul style="list-style-type: none"> <li>▪ Discourage graffiti</li> <li>▪ Allow for ease of maintenance through finishes</li> <li>▪ Recede from view</li> <li>▪ Integrate with landform.</li> </ul>	See Figures 55 – 56 <ul style="list-style-type: none"> <li>▪ Vertical ribbed finish to concrete panels</li> <li>▪ Painted in a dark recessive colour.</li> </ul>	RW-F3
RW13	F-type barrier retaining walls	<ul style="list-style-type: none"> <li>▪ Precast concrete road safety barrier</li> </ul>	RW-F4

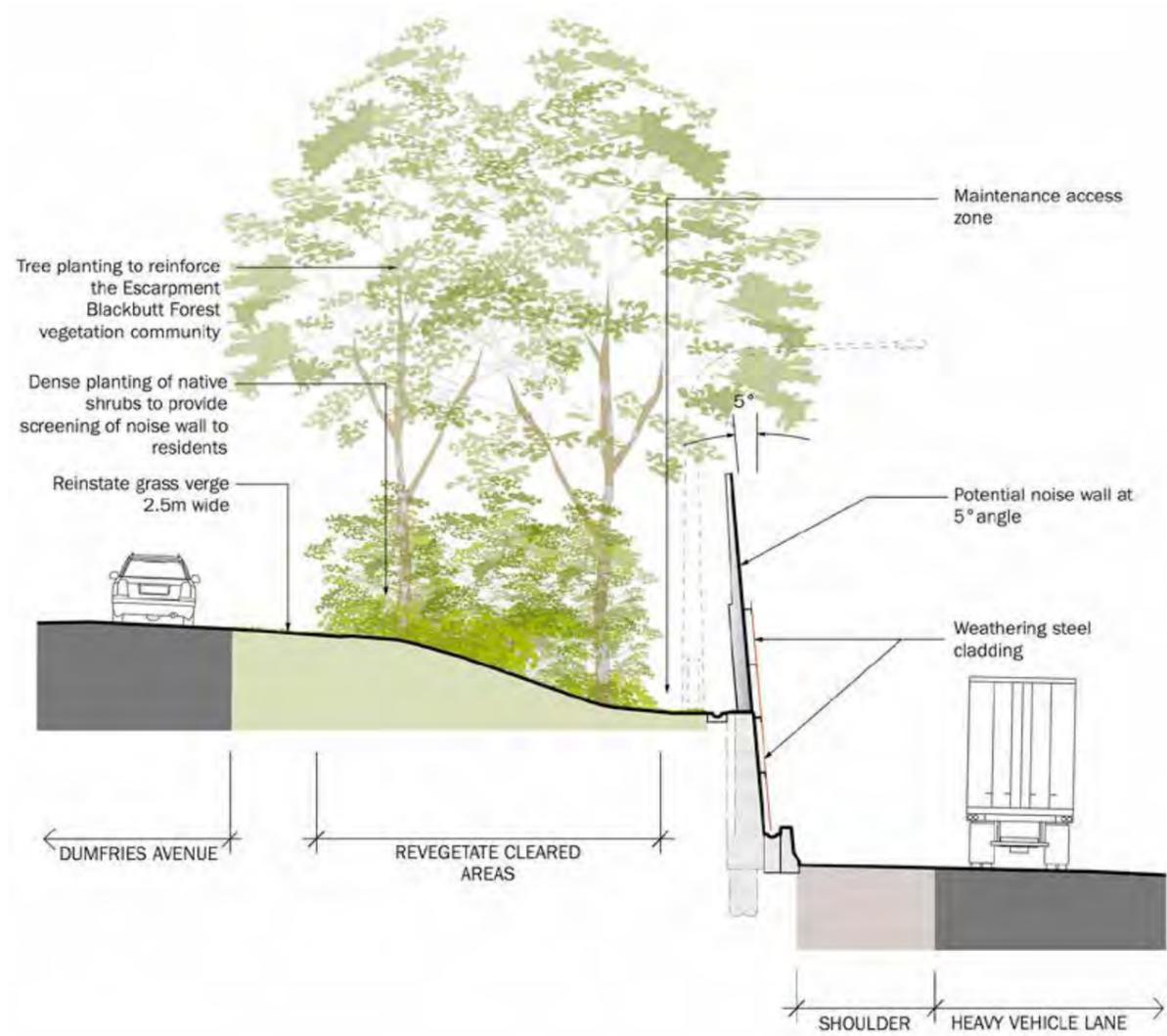


Figure 52. Typical section of highly visible retaining walls facing road corridor - Finish type RW-F1 (Scale 1:150)

Note: Subject to further design development and consultation.



Figure 53. Elevation of retaining wall facing Mount Ousley Road - Finish type RW-F2a (Scale 1:250)

Note: Subject to further design development and consultation.

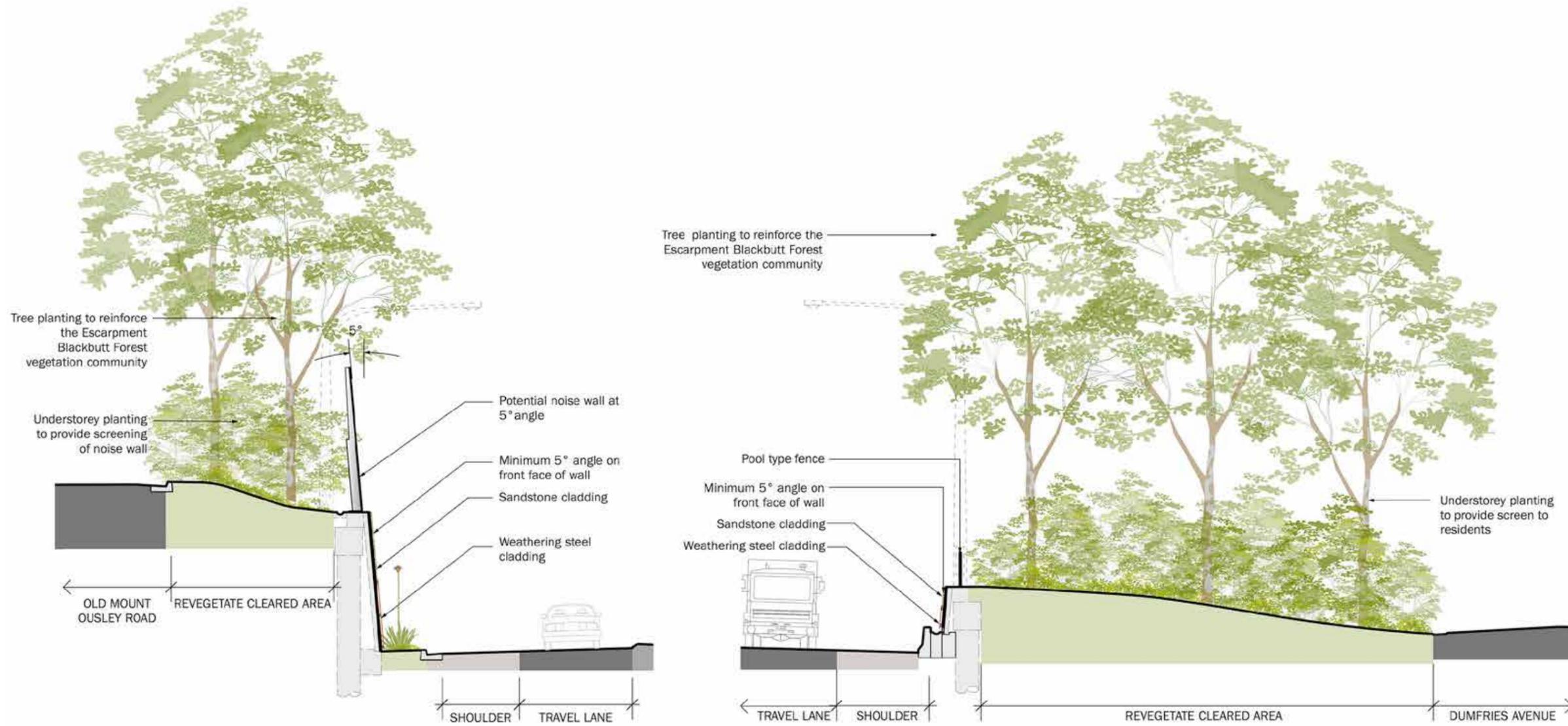


Figure 54. Section of retaining walls facing Mount Ousley Road - Finish type RW-F2a (Scale 1:150)

Note: Subject to further design development and consultation.

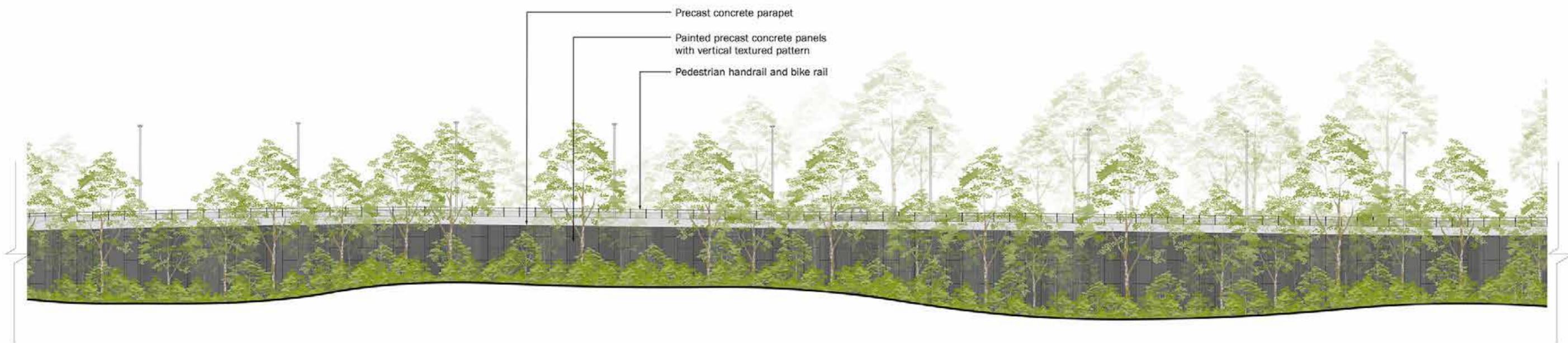
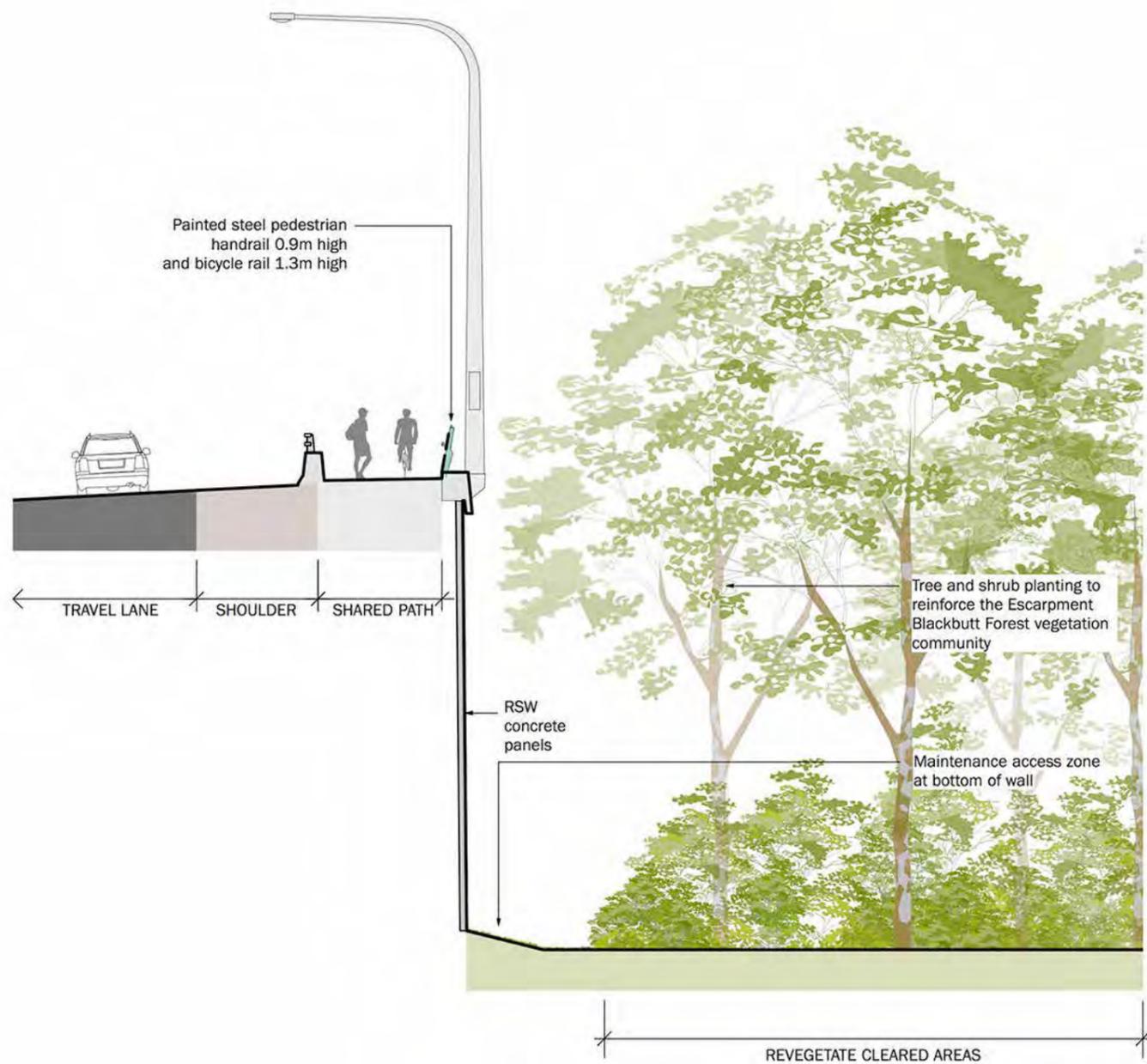


Figure 55. Typical elevation of retaining walls partially or fully screened from view - Finish type RW-F3 (Scale 1:150)

Note: Subject to further design development and consultation.



The design of retaining walls are guided by the following principles, consistent with Roads and Maritime best practice:

- The use of design strategies to reduce the perceived height and magnitude of wall
- Top of walls have a smooth flowing profile and avoids sharp angles
- Where walls would be likely to be exposed to graffiti, the design integrates measures to discourage graffiti
- Walls in proximity to the highway, and facing the highway, would be angled back at 5°, wherever possible
- The finish of walls and level of detailing, would be based on their location, level of visibility and visual impact
- Where there are noise walls on top of retaining walls, their design would be integrated
- Connections between existing and new sections of retaining and noise walls are considered in design
- Walls facing away from the Motorway towards local roads, residences, shared paths, and footpaths would be designed to be human in scale and finished with materials that are more sympathetic to the local environment.

The finishes proposed on retaining walls vary depending on their location and level of visibility. These are detailed in Table 2.

Figure 56. Typical section of retaining walls partially or fully screened from view - Finish type RW-F3 (Scale 1:150)

Note: Subject to further design development and consultation.

Table 2. Retaining wall design analysis and proposed finish type

WALL ID	LOCATION	CONDITION	APPROX. MAXIMUM HEIGHT	STRUCTURE TYPE	PROPOSED MITIGATION MEASURE/ FINISH	FINISH TYPE	ASSOCIATED NOISE WALL
RW01	Heavy vehicle bypass (Approx. 200m length)	<p><b>Facing:</b> Princes Motorway</p> <p><b>Construction:</b> In cut</p> <p><b>Exposure to graffiti:</b> Medium to Low – wall on road way with no pedestrian access</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> none</p> <p><b>Services:</b> Electrical, Water</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> Landscaped zone between Dumfries Avenue and Princes Motorway</p> <p><b>Planting zone available:</b> varies from none to 13m</p> <p><b>Services:</b> Electrical</p>	2.3m	<ul style="list-style-type: none"> <li>Combination bored pile and L Shaped in-situ wall</li> <li>5° angle</li> <li>Detailed design to consider integration with existing noise wall structure</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier at 820 mm above FSL.</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Weathered steel cladding fixed to concrete wall</li> <li>Surface coating of weathered steel to enable graffiti removal</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>5m noise wall above retaining wall</li> <li>Reinstate bushland on all cleared areas allowing for a 1.5m maintenance access path</li> </ul>	RW-F1	<p><b>Wall ID:</b> NW01</p> <p><b>Location:</b> M1 Princes Motorway (Heavy vehicle bypass lane) Ch. (78880-79320)</p> <p><b>Length:</b> Approx. 440m</p> <p><b>Wall material finish:</b></p> <ul style="list-style-type: none"> <li>Partially or wholly transparent panels with feature panel</li> <li>Transparent panels to have horizontal anti-bird strike line</li> <li>At 5 degree angle sloping away from roadway</li> </ul>
RW02	Heavy vehicle safety ramp 1 (Approx. 215m length)	<p><b>Facing:</b> Heavy vehicle safety ramp and seen only from M1 Princes Motorway, heavy vehicle safety ramp, heavy vehicle bypass,</p> <p><b>Construction:</b> In cut</p> <p><b>Exposure to graffiti:</b> Potentially high as minimal passive surveillance available</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> N/A</p> <p><b>Services:</b> Electrical</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> Bushland</p> <p><b>Planting zone available:</b> Plant all cleared areas</p> <p><b>Services:</b> None</p>	5.8m	<ul style="list-style-type: none"> <li>Bored piles with precast fascia panels</li> <li>5° angle</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier at 820 mm above FSL.</li> </ul> <p><b>WALL FINISH</b></p> <p><b>Sandstone and weathering steel cladding</b></p> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> <li>Weathered steel cladding fixed to fascia panel</li> <li>Surface coating of weathered steel to enable graffiti removal</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate bushland on all cleared areas</li> <li>1300mm high pool type fence painted in charcoal colour. Ensure integration of fence with noise wall</li> </ul>	RW-F2a	<p><b>Wall ID:</b> NW01</p> <p><b>Location:</b> Heavy vehicle safety ramp Ch. (78880-79320)</p> <p><b>Length:</b> Approx. 440m</p> <p><b>Wall material finish:</b></p> <ul style="list-style-type: none"> <li>Partially or wholly transparent panels with feature panel</li> <li>Transparent panels to have horizontal anti-bird strike line</li> <li>At 5 degree angle sloping away from roadway</li> </ul>

WALL ID	LOCATION	CONDITION	APPROXIMATE MAXIMUM HEIGHT	STRUCTURE TYPE	PROPOSED MITIGATION MEASURE/ FINISH	FINISH TYPE	ASSOCIATED NOISE WALL
RW03	Mount Ousley Road on ramp northbound (Approx. 294m length)	<p><b>WESTERN END OF WALL</b>  Facing: Falder Place  Construction: In cut and fill  Exposure to graffiti: High - adjacent to residential street  <b>BOTTOM OF WALL</b>  Planting zone available: Varies from 4 to 7m  Services: Water, Electrical  <b>TOP OF WALL</b>  Land use: Princes Motorway on-ramp  Planting zone available: N/A  Services: Electrical</p> <p><b>EASTERN END OF WALL</b>  Facing: Bushland area within University of Wollongong  Construction: In fill  Exposure to graffiti: Potentially low depending on availability of access to the area  <b>BOTTOM OF WALL</b>  Planting zone available: Varies from 11 to more than 20 m  Services: Electrical, Gas  <b>TOP OF WALL</b>  Land use: Princes Motorway on-ramp  Planting zone available: None  Services: None</p>	5.9m	<ul style="list-style-type: none"> <li>Bored pile footing with in-situ concrete retaining wall</li> <li>Vertical wall</li> <li>Needs to be integrated with existing retaining wall and noise wall</li> </ul>	<p><b>WESTERN END OF WALL</b>  <b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Screen planting of high shrubs and trees to visually soften the impact of the structure</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 650 mm above FSL</li> <li>Twin-rail medium performance barrier to 1300mm above FSL</li> <li>5m noise wall fixed to back of concrete barrier</li> </ul> <p><b>EASTERN END OF WALL</b>  <b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate bush land on all cleared areas</li> <li>Provide a 3m low maintenance groundcovers strip for maintenance access</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 650 mm above FSL</li> <li>Twin-rail medium performance barrier to 1300mm above FSL</li> <li>5m noise wall fixed to back of concrete barrier</li> </ul>	RW-F3	<p>Wall ID: NW02</p> <p>Location: M1 Princes Motorway and Mount Ousley Road on ramp northbound Ch. 565-1000</p> <p>Length: Approx. 478m</p> <p>Wall material finish:</p> <ul style="list-style-type: none"> <li>Partially or wholly transparent panels with horizontal anti-bird strike line.</li> <li>At 5 degree angle sloping away from roadway</li> </ul>
RW04	Heavy Vehicle off ramp (Approx. 139m length)	<p>Facing: Heavy vehicle off ramp , visible from heavy vehicle bypass lane, M1 Princes Motorway, eastern roundabout and University Access Road  Construction: In cut  Exposure to graffiti: Medium to Low – wall adjacent to roadway  <b>BOTTOM OF WALL</b>  Planting zone available: None  Services: None  <b>TOP OF WALL</b>  Land use: Bushland  Planting zone available: Cleared areas  Services: None</p>	4.6m	<ul style="list-style-type: none"> <li>Cast in-situ bored piles with precast fascia panels</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL. Wall to be set back to avoid barrier.</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate vegetation on cleared areas.</li> </ul>	RW-2b	N/A
RW05	Heavy vehicle bypass - Northern wall (including underpass) (Approx. 170m length)	<p>Facing: Heavy vehicle bypass and visible from Princes Motorway  Construction: In cut  Exposure to graffiti: Medium to Low – wall adjacent to roadway  <b>BOTTOM OF WALL</b>  Planting zone available: N/A  Services: None  <b>TOP OF WALL</b>  Land use: Road median/ new landscaped zones  Planting zone available: varies from 7 to 11m  Services: None</p>	7m	<ul style="list-style-type: none"> <li>Cast in-situ bored piles with precast fascia panels</li> <li>5° angle</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL.</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>1300mm high pool type fence painted in charcoal colour. Ensure integration with bridge structure and associated elements</li> <li>Planting of small to medium shrubs on new median where wider than 3m</li> </ul>	RW-F3	N/A

WALL ID	LOCATION	CONDITION	APPROX. MAXIMUM HEIGHT	STRUCTURE TYPE	PROPOSED MITIGATION MEASURE/ FINISH	FINISH TYPE	ASSOCIATED NOISE WALL
RW06	Heavy vehicle bypass - Southern wall (including underpass) (Approx. 140m length)	<b>Facing:</b> Heavy vehicle bypass <b>Construction:</b> In cut <b>Exposure to graffiti:</b> Medium to Low – wall on road way with no pedestrian access <b>BOTTOM OF WALL</b> <b>Planting zone available:</b> N/A <b>Services:</b> None <b>TOP OF WALL</b> <b>Land use:</b> Road median/ new landscaped zones <b>Planting zone available:</b> Cleared areas <b>Services:</b> None	7m	<ul style="list-style-type: none"> <li>Cast in-situ bored piles with precast fascia panels</li> <li>Vertical</li> </ul>	<b>BOTTOM OF WALL</b> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL.</li> </ul> <b>WALL FINISH</b> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <b>TOP OF WALL</b> <ul style="list-style-type: none"> <li>1300mm high pool type fence painted in charcoal colour. Ensure integration with bridge structure and associated elements</li> <li>Reinstate new landscape in landscape zone</li> </ul>	RW-F3	N/A
RW07	Mount Ousley Road near University of Wollongong Access (Approx. 297m length)	<b>Facing:</b> Bushland area within University of Wollongong. Visibility of the wall is likely to be low to partially screened <b>Construction:</b> In fill <b>Exposure to graffiti:</b> Potentially low depending on availability of access to the area <b>BOTTOM OF WALL</b> <b>Planting zone available:</b> Cleared areas <b>Services:</b> None <b>TOP OF WALL</b> <b>Land use:</b> Mount Ousley Road and shared path <b>Planting zone available:</b> None <b>Services:</b> None	11.7m	<ul style="list-style-type: none"> <li>Reinforced Soil Wall</li> <li>Vertical</li> </ul>	<b>BOTTOM OF WALL</b> <ul style="list-style-type: none"> <li>Reinstate bushland on all cleared areas</li> <li>Provide a 3m low maintenance groundcovers strip for maintenance access</li> </ul> <b>WALL FINISH</b> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <b>TOP OF WALL</b> <ul style="list-style-type: none"> <li>1300mm high bike/handrail</li> <li>Pedestrian lighting to be incorporated on shared path</li> </ul>	RW-F3	N/A
RW8a, RW8b	BR1 Southern Abutment (Approx. 50m length)	<b>Facing:</b> Princes Motorway (Bridge abutment) <b>Construction:</b> In fill <b>Exposure to graffiti:</b> Medium to Low – wall adjacent to roadway <b>BOTTOM OF WALL</b> <b>Planting zone available:</b> Cleared areas on abutment returns <b>Services:</b> None <b>TOP OF WALL</b> <b>Land use:</b> Mount Ousley Road and shared path <b>Planting zone available:</b> N/A <b>Services:</b> None	6.5m	<ul style="list-style-type: none"> <li>Reinforced Soil Wall</li> <li>5° angle on wall facing Motorway and vertical on returns</li> </ul>	<b>BOTTOM OF WALL</b> <ul style="list-style-type: none"> <li>Reinstate bushland on all cleared areas in front of abutment returns</li> <li>Provide a 3m low maintenance groundcovers strip for maintenance access</li> </ul> <b>WALL FINISH</b> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> </ul> <b>TOP OF WALL</b> <ul style="list-style-type: none"> <li>1300mm high bike/handrail</li> <li>Pedestrian lighting to be incorporated on shared path</li> </ul>	RW-F2b	N/A
RW09	BR1 Northern Abutment (Approx. 61m length)	<b>Facing:</b> Princes Motorway (Bridge abutment) <b>Construction:</b> In fill <b>Exposure to graffiti:</b> Medium to Low – wall adjacent to roadway <b>BOTTOM OF WALL</b> <b>Planting zone available:</b> Cleared areas on abutment returns <b>Services:</b> None <b>TOP OF WALL</b> <b>Land use:</b> Mount Ousley Road and shared path <b>Planting zone available:</b> N/A <b>Services:</b> None	6.5m	<ul style="list-style-type: none"> <li>Reinforced Soil Wall</li> <li>5° angle on wall facing Motorway and vertical on returns</li> </ul>	<b>BOTTOM OF WALL</b> <ul style="list-style-type: none"> <li>Reinstate bushland on all cleared areas in front of abutment returns</li> <li>Provide a 3m low maintenance groundcovers strip for maintenance access</li> </ul> <b>WALL FINISH</b> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> </ul> <b>TOP OF WALL</b> <ul style="list-style-type: none"> <li>1300mm high bike/handrail</li> <li>Pedestrian lighting to be incorporated on shared path</li> </ul>	RW-F2b	N/A

WALL ID	LOCATION	CONDITION	APPROX. MAXIMUM HEIGHT	STRUCTURE TYPE	PROPOSED MITIGATION MEASURE/ FINISH	FINISH TYPE	ASSOCIATED NOISE WALL
RW10	Heavy vehicle off ramp at BR2 northern abutment (Approx. 58m length)	<p><b>Facing:</b> Heavy vehicle off ramp / Mount Ousley Road, visible from new roundabout, pedestrian bridge and residential areas</p> <p><b>Construction:</b> In cut</p> <p><b>Exposure to graffiti:</b> Medium to Low – wall adjacent to roadway</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> None</p> <p><b>Services:</b> Electrical</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> Bushland</p> <p><b>Planting zone available:</b> Cleared areas</p> <p><b>Services:</b> None</p>	4.8m	<ul style="list-style-type: none"> <li>Bored pile wall with precast fascia panel</li> <li>5° angle</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL. Wall to be set back to avoid barrier.</li> </ul> <p><b>WALL FINISH</b></p> <p>Sandstone and weathering steel cladding to fascia panel</p> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> <li>Weathered steel cladding fixed to fascia panel</li> <li>Surface coating of weathered steel to enable graffiti removal</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Minimise clearing of vegetation</li> <li>Reinstate vegetation and screening shrubs on cleared areas.</li> </ul>	RW-F2a	N/A
RW11	Mount Ousley Road near eastern roundabout (Approx. 123m length)	<p><b>Facing:</b> Mount Ousley Road, visible from new roundabout and pedestrian bridge and residential areas</p> <p><b>Construction:</b> In cut</p> <p><b>Exposure to graffiti:</b> Medium to low – wall adjacent to roadway</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> Cleared zone in the vicinity of the roundabout</p> <p><b>Services:</b> Electrical</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> Service road and landscape zone</p> <p><b>Planting zone available:</b> cleared areas</p> <p><b>Services:</b> None</p>	5.4m	<ul style="list-style-type: none"> <li>Bored pile wall with precast fascia panel</li> <li>5° angle</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL. Wall to be set back to avoid barrier.</li> </ul> <p><b>WALL FINISH</b></p> <p>Sandstone and weathering steel cladding to fascia panel</p> <ul style="list-style-type: none"> <li>Sandstone cladding fixed to concrete fascia panel</li> <li>Sandstone to be 75mm thick, 300x600mm with rockface finish.</li> <li>Sealant on sandstone wall</li> <li>Weathered steel cladding fixed to fascia panel</li> <li>Surface coating of weathered steel to enable graffiti removal</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate vegetation and screening shrubs on cleared areas. Feature planting in the vicinity of the roundabout.</li> </ul>	RW-F2a	<p><b>Wall ID:</b> NW04a</p> <p><b>Location:</b> Mount Ousley Road near eastern roundabout</p> <p><b>Length:</b> Approx. 146m</p> <p><b>Wall material finish:</b></p> <ul style="list-style-type: none"> <li>Partially or wholly transparent panels with horizontal anti-bird strike line</li> <li>At 5 degree angle sloping away from roadway</li> </ul>
RW12	Dumfries Avenue opposite Bass street (Approx. 120m length)	<p><b>Facing:</b> Dumfries Avenue, visible from residential areas</p> <p><b>Construction:</b> In Fill</p> <p><b>Exposure to graffiti:</b> High - adjacent to residential street</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> Cleared zone</p> <p><b>Services:</b> Electrical</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> M1 Princes Motorway</p> <p><b>Planting zone available:</b> None</p> <p><b>Services:</b> None</p>	4.2m	<ul style="list-style-type: none"> <li>Bored pile footing with in-situ concrete retaining wall</li> <li>Vertical wall</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Precast concrete barrier to 820 mm above FSL. Wall to be set back to avoid barrier.</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Textured finish on concrete panels to discourage graffiti</li> <li>Painted (dark coloured to be recessive) to enable easy graffiti maintenance</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate vegetation and screening shrubs on cleared areas. Feature planting in the vicinity of the roundabout.</li> </ul>	RW-F3	N/A
RW13	Various locations	<p><b>Facing:</b> N/A</p> <p><b>Construction:</b> In cut</p> <p><b>Exposure to graffiti:</b> Medium to High</p> <p><b>BOTTOM OF WALL</b></p> <p><b>Planting zone available:</b> none</p> <p><b>Services:</b> None</p> <p><b>TOP OF WALL</b></p> <p><b>Land use:</b> Services and Landscape zone</p> <p><b>Planting zone available:</b> Cleared areas</p> <p><b>Services:</b> None</p>	0.7m	<ul style="list-style-type: none"> <li>Single sided F type barrier</li> <li>Vertical wall</li> </ul>	<p><b>BOTTOM OF WALL</b></p> <ul style="list-style-type: none"> <li>Road pavement</li> </ul> <p><b>WALL FINISH</b></p> <ul style="list-style-type: none"> <li>Smooth off form concrete</li> </ul> <p><b>TOP OF WALL</b></p> <ul style="list-style-type: none"> <li>Reinstate native planting to cleared areas</li> </ul>	RW-F4	<p>RW13a, RW13b are associated with noise wall NW01.</p> <p>RW13c is associated with NW02.</p>

## 4.5.2. NOISE WALLS

Noise walls may be required at several locations within the proposal (Figure 59) as identified in the Noise Assessment Report 2017. The heights and extents of noise walls would be developed further and finalised during Detailed Design in consultation with the community.

Design of noise walls would consider the following:

- Scale of the wall and potential visual impact
- Level of visibility of the wall (from both the road side and residents side) and availability of space for vegetation screening
- Existing medium and long distance views to the landscape context from nearby receptors
- Accessibility to the wall and risk of graffiti and vandalism
- Maintenance and durability.

Based on their locations and level of visibility and accessibility, the design of walls would aim to,

- Reduce their visual intrusion and impact, through the use of appropriate materials and landscape
- Reduce the perceived scale of the wall through design measures
- Complement and support the overall design approach including gateway strategies
- Discourage graffiti and enable ease of maintenance should graffiti occur

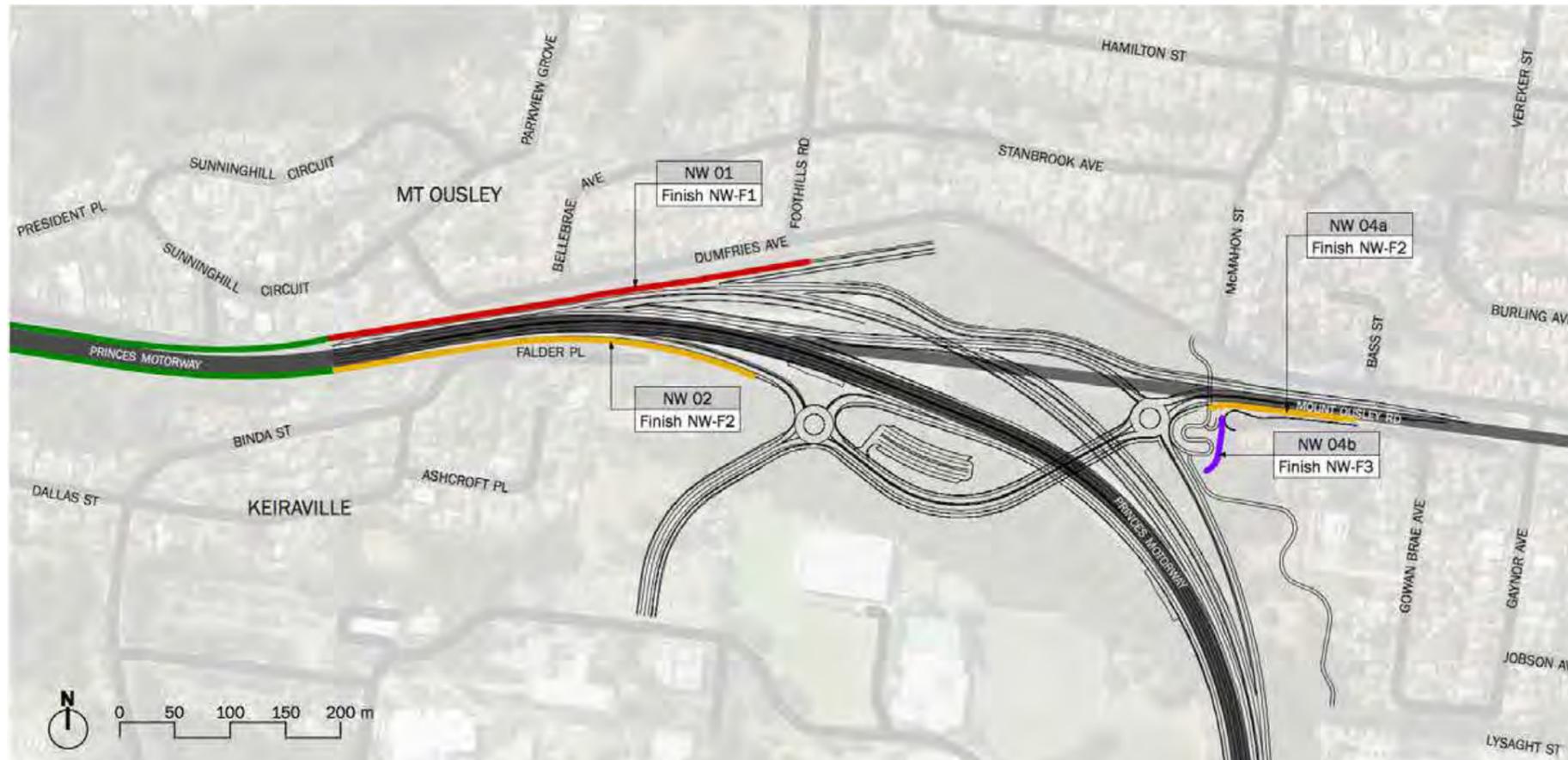
The design of walls along pedestrian paths would require a greater level of detailing and may include locational artwork.



Figure 57. Existing noise walls on the Motorway approaching the interchange travelling southbound



Figure 58. Residential street facing the Motorway currently buffered by screening vegetation



**LEGEND**

- Existing noise walls
- Noise wall Finish NW-F1
- Transparent clear panels with feature panel**  
Integrated with retaining walls. Plexiglas Soundstop (Clear) or equivalent with anti-bird strike lines.
- Noise wall Finish NW-F2
- Transparent clear panels**  
Integrated with retaining walls. Plexiglas Soundstop (Clear) or equivalent with anti-bird strike lines.
- Noise wall Finish NW-F3
- Transparent coloured panels**  
Combination of coloured panels in a range of subtle blue and green hues, and clear panels to open views at key locations.  
Plexiglas Soundstop (Steel Blue, Sea Green, Forest Green, Spring Green and Clear) or equivalent with anti-bird strike lines.

**KEY**

- NW 01 ← Noise wall reference number
- Finish NW-F1 ← Surface finish to noise wall

Figure 59. Noise wall location and finishes plan  
 Note: Subject to further design development and consultation.

**NW01 – M1 Motorway Southbound**

This noise wall would be located along the northern edge of M1 Motorway above the proposed retaining wall in cut and south of Dumfries Avenue. The noise wall would be required to provide noise protection for existing residential dwellings situated along Dumfries Avenue.

The land falls away from the ridge towards the south from properties along Dumfries Avenue. Their views of the interchange and the Motorway in general would be well screened by thick vegetation on the southern side of Dumfries Avenue.

This vegetation is proposed to be cleared for construction of the retaining wall. A noise wall with either partially or wholly transparent panels is recommended here to ensure that the visual impact and intrusion of the structure is minimised. New planting at the base of the noise wall along Dumfries Avenue is proposed to ensure as much screening is achieved as possible where space permits (with due consideration to maintenance access).

The planting would also reinforce the local planting communities and provide protection to the wall from vandalism. The proposed noise wall would slope at a 5 degree angle away from the road to compliment the angle of the retaining wall beneath on the M1 Motorway. The integration of the new noise wall with the existing smaller concrete noise wall to the west of the upgrade should be considered during the Detailed Design stage.

This noise wall would be a highly visible element for M1 Motorists and its integration with the retaining wall is proposed to create a memorable driving experience helping to establishing an identity for this interchange as a gateway to Wollongong. The wall design would be integrated with the design approach to RW01 and would potentially comprise sections of weathering steel cladding where the 'wave' crest and peak occur.

**NW02 - M1 Motorway Northbound**

This noise wall would be located above the proposed retaining wall along Falder Place below the northbound on ramp and along the southern side of the M1 Motorway. Adjacent properties to the south of the noise wall include the properties along Binda Street, the local road of Falder Place and currently vegetated areas with the University of Wollongong. The latter would be cleared for a spill basin.

Due to the scale of the wall in relation to the Motorway corridor, and visual intrusion and impact on both Motorists as well as residents, and potential overshadowing on Falder Place, either partially or wholly transparent panels are recommended for this wall. It would be fixed to a 1.3 metre high F-type barrier that would overhang the retaining wall facing Falder Place below it.

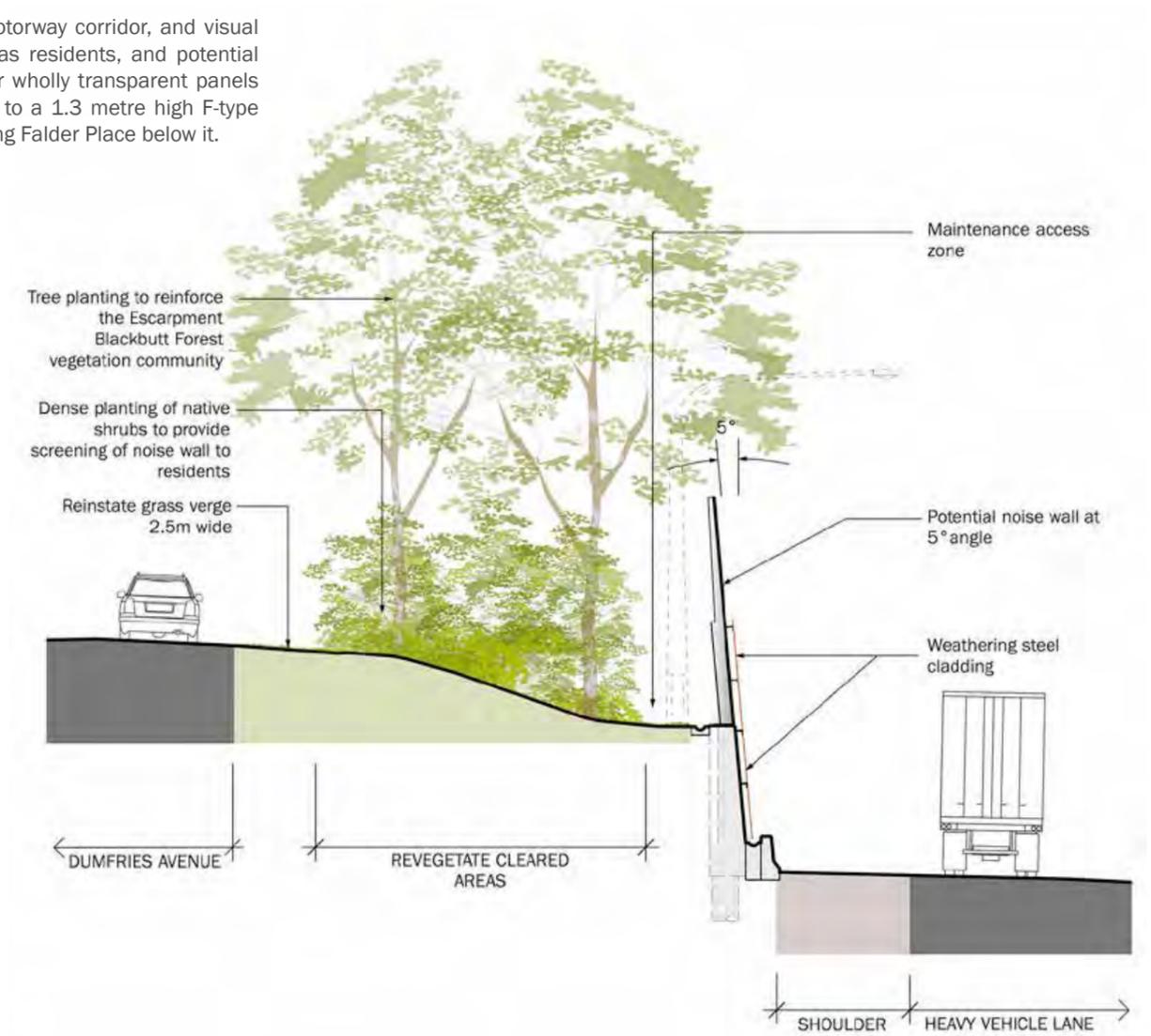


Figure 60. Typical section of feature noise wall facing Motorway - Finish type NW-F1 (Scale 1:150)

Note: Subject to further design development and consultation.

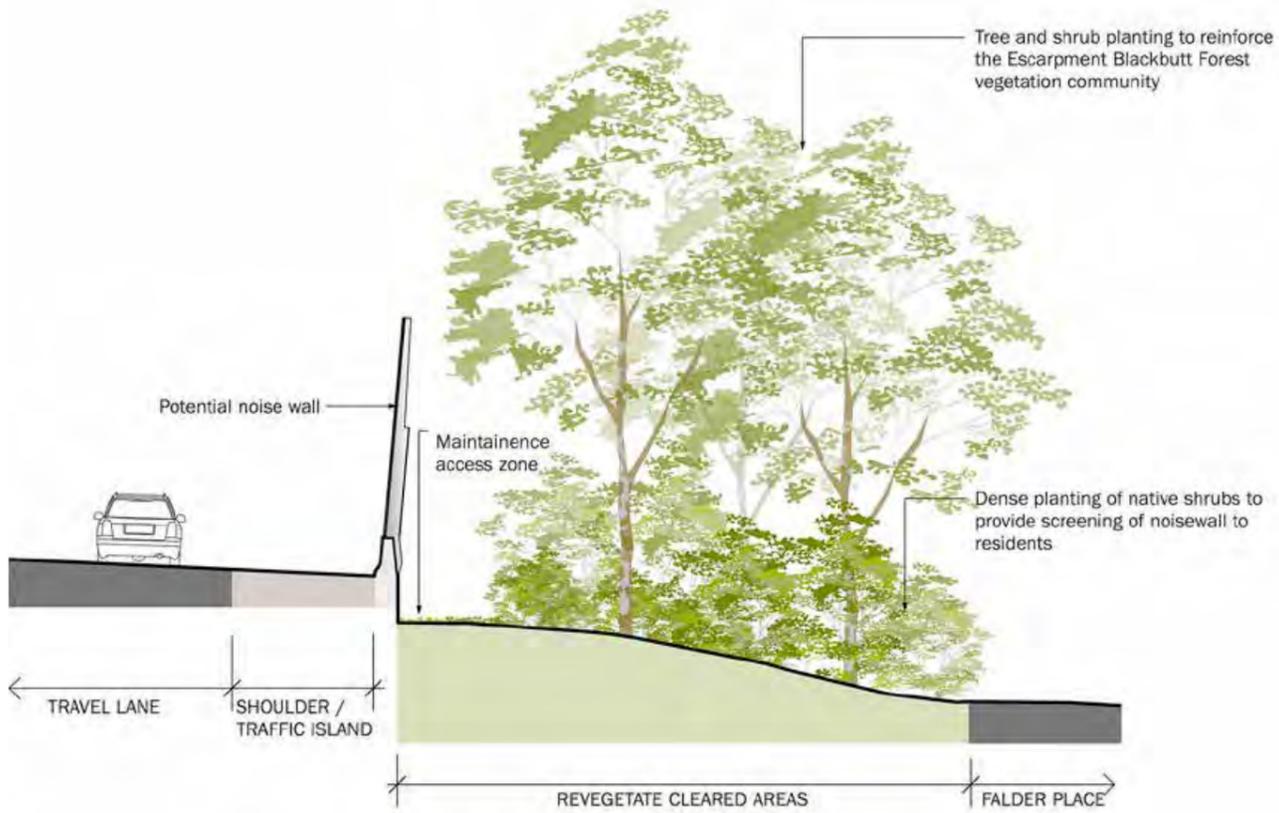


Figure 61. Typical section of noise wall facing Motorway - Finish type NW-F2 (Scale 1:150)

Note: Subject to further design development and consultation.



Figure 63. Example of transparent noise wall with clear acrylic panels

Source: <http://www.zakacoustics.com/acrylic-sheet-noise-barrier/>

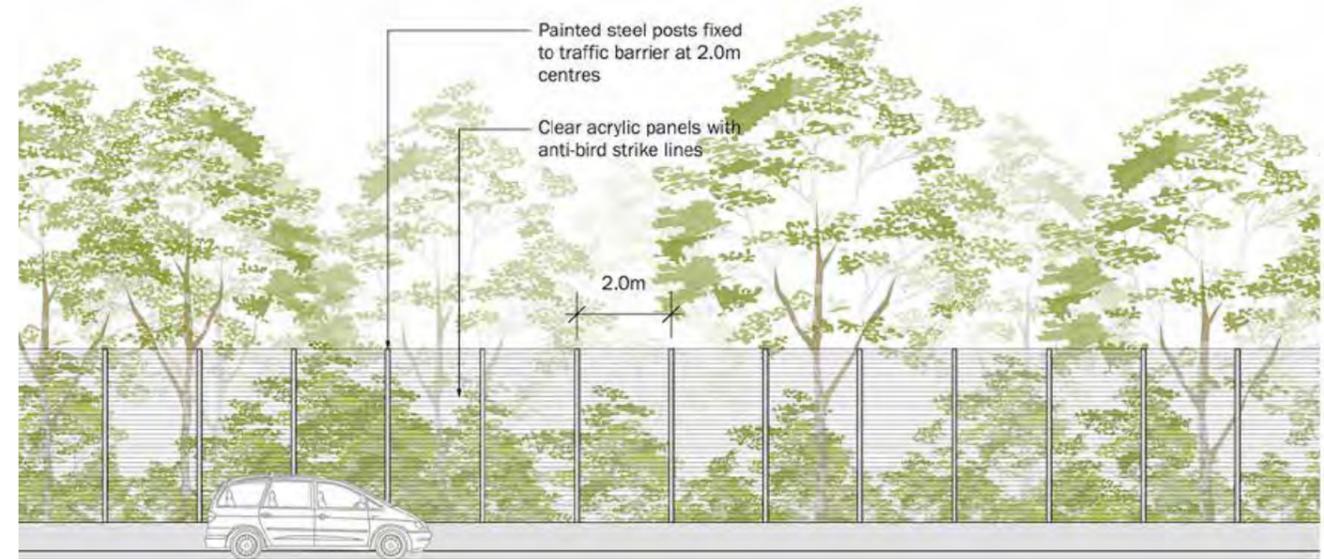


Figure 62. Elevation of noise wall with clear acrylic panels - Finish type NW-F2 (Scale 1:150)

Note: Subject to further design development and consultation.



Figure 64. Typical elevation of noise wall - Finish type NW-F2 (Scale 1:500)

Note: Subject to further design development and consultation.

#### NW04a – On Mount Ousley Road

Noise wall NW04a located above the proposed retaining wall along the southern side of Mount Ousley Road. The wall would be seen from the Motorway as well as residents on Old Mount Ousley Road and adjoins the pedestrian bridge. With an aim to reduce the visual and overshadowing impact of the wall, either partially or wholly transparent panels are recommended. Added features may be considered for this wall to differentiate the identity of Mount Ousley Road as a local road, and heighten its function as an entry to Wollongong.

#### NW04b – Alongside northern shared path

This noise wall would provide noise attenuation to the residential properties on the eastern side of the interchange south of Mount Ousley Road. The wall would run adjacent to the shared path to the south of the pedestrian and cyclist bridge and could potentially be presented as an 'artwork screen' rather than a barrier structure, through appropriate design measures. Partially or wholly transparent coloured panels with an inlay of local poetry or art is recommended as a possible option.

The area around shared path would have a garden-like landscape setting with low vegetation to allow passive surveillance. Screen planting would be provided between the wall and the residential properties to provide privacy and minimise visual intrusion to the properties.

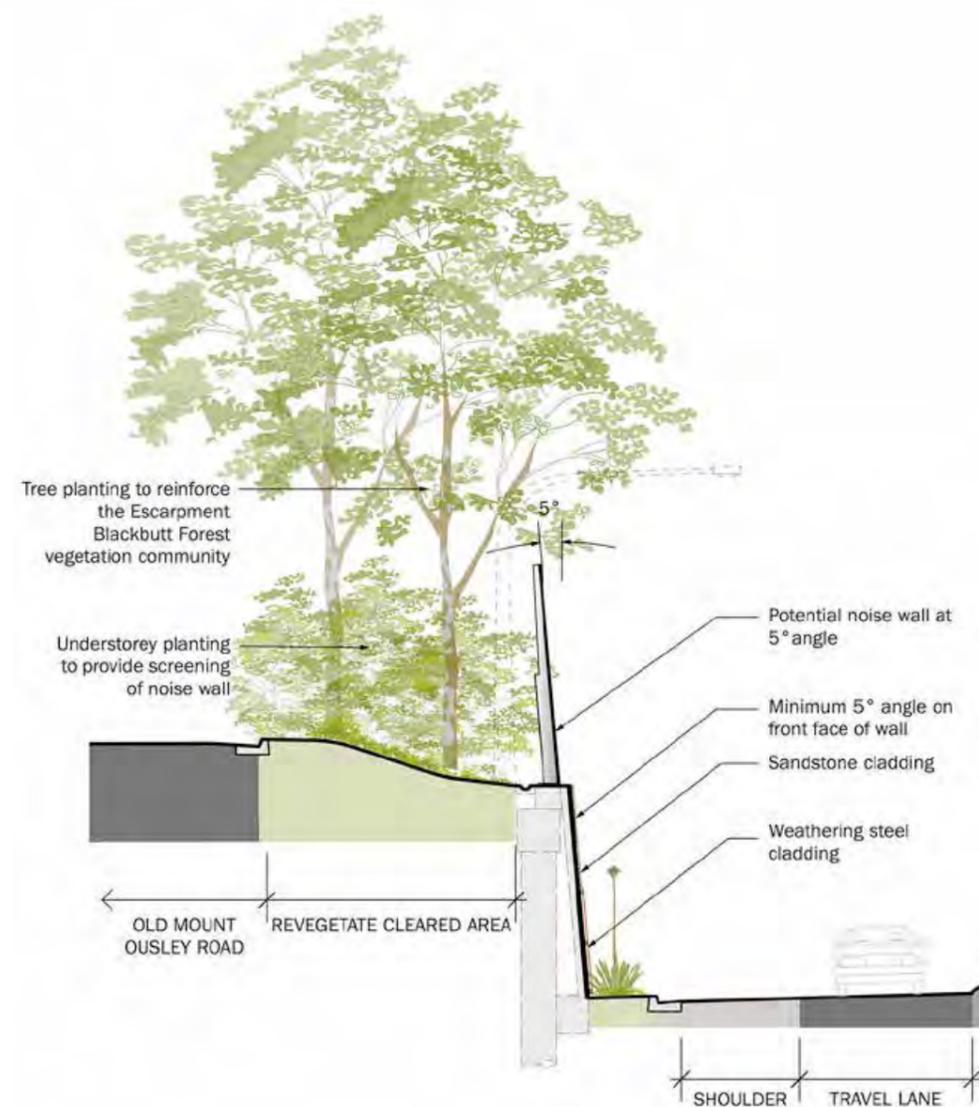


Figure 65. Typical section of noise wall - Finish type NW-F1 (Scale 1:150)

Note: Subject to further design development and consultation.



Figure 67. Relate artwork on noise wall to cultural attributes of Wollongong  
Source: South Coast Writers Centre



Figure 68. Example artwork - 'Veil of Trees' by Janet Lawrence (1999) at the Domain, City of Sydney  
Source: Jamie Williams for City of Sydney

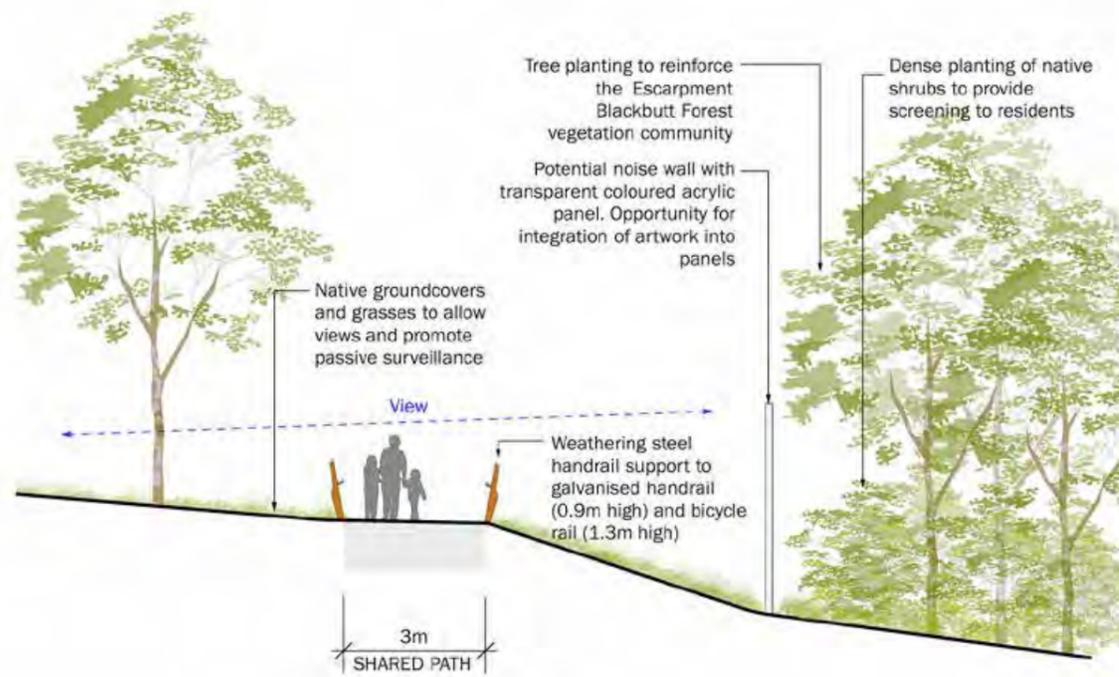


Figure 66. Section through proposed shared path to the south of the pedestrian bridge over Mount Ousley Road (Scale 1:150)

Note: Subject to further design development and consultation.

*The noise wall along the shared path could be designed to appear more like artwork - landscape art that is joyful to look at - rather than a tall barrier. The coloured transparent panels could potentially have inlays of local poetry or artwork within a well landscaped setting*

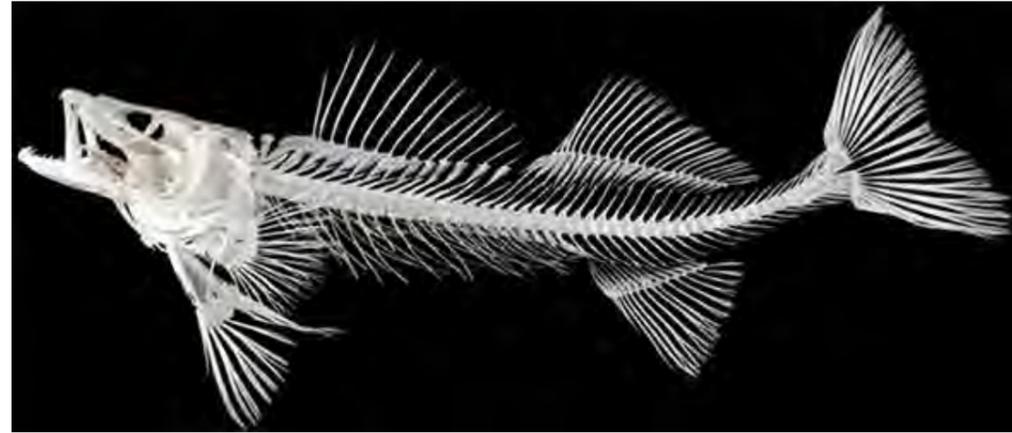
### 4.5.3. BRIDGES

There would be four bridge structures forming part of the proposal (Figure 69). They are:

- 1) Bridge over M1 Motorway (BR01)
- 2) Pedestrian Bridge over Mount Ousley (BR02)
- 3) Heavy Vehicle Underpass (BR03)
- 4) Pedestrian Bridge over M1 Motorway (BR04)



Figure 69. Bridge location plan



*The reference to the sea, waves and a great feast of fish is carried through to the design of the pedestrian and cyclist bridges in the detailing of their safety screen posts*

Figure 70. Fish skeletons - inspiration for the design of the safety screens on the shared path overbridges relating to the overall proposal approach  
Source: <https://us.123rf.com/450wm/bluehand/bluehand1309/bluehand130900161/22975092-scheletro-di-pesce-osso-isolato-su-sfondo-nero.jpg?ver=6>

*The design of the bridge structure is simple and straight forward, whilst the detailing of the bridge elements, such as the safety screen posts and handrails, creates and promotes its role as a visual marker and an entry statement to the city of Wollongong. It could also become a piece of land art for the local community to use and enjoy.*

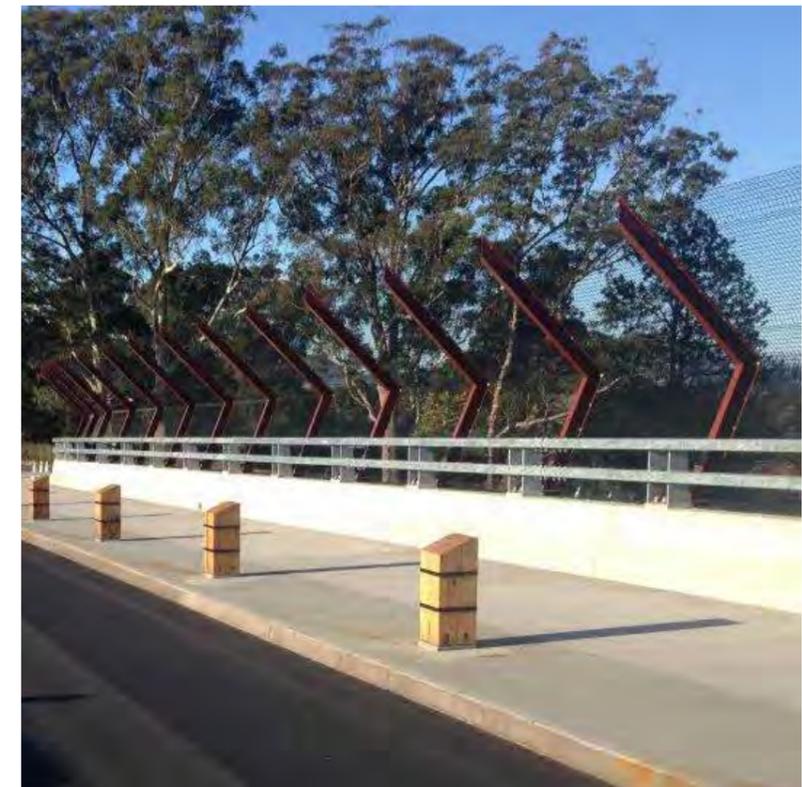
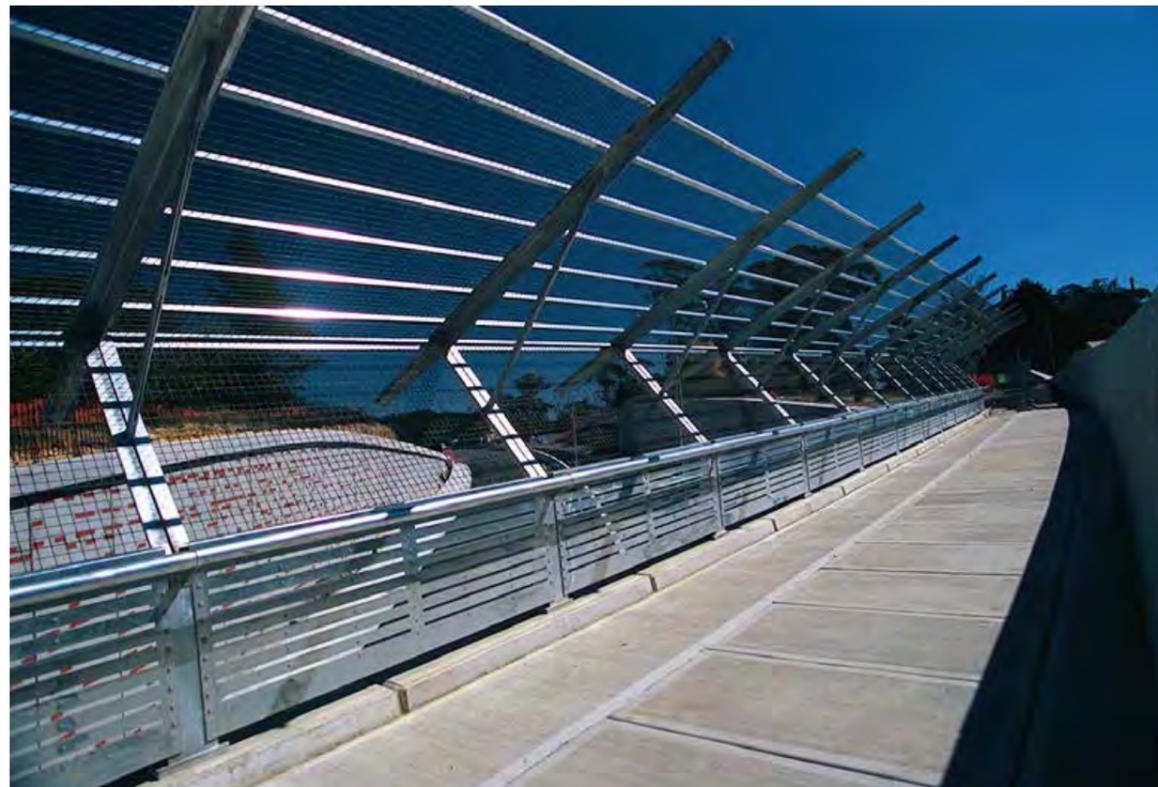


Figure 71. Examples of bridge design where safety screens have been used to create visual interest and a gateway statement. Image 1 - Shell Corner bridge over Great Western Highway; Image 2 - Kangaroo Valley Bridge over the Princes Highway at Berry  
Source: Nadira Yapa

## 1. BRIDGE OVER M1 MOTORWAY (BR01)

The Bridge over the M1 Motorway extends 74 metres connecting the new roundabout at Mount Ousley Road to the new roundabout at the entry to the University of Wollongong, the commuter car park and the northbound on-ramp to the M1 Motorway. The bridge spans over the Motorway and is a highly visible structure within the interchange for both north and southbound motorists.

The design of the bridge considers the guidelines outlined in the Bridge Aesthetics (Roads and Maritime, 2013). The bridge has been designed to include the following features:

- Unsymmetrical two span bridge with Super-T girders
- Central portal pier with tapering sides with a smooth off form concrete finish
- Bridge parapets would be angled outward to ensure self-cleaning
- Lighting would be provided along the elevation of the Super-T at either end, as a night-time feature
- Twin steel rail and medium performance traffic barriers would be provided to ensure through views to the surrounding landscape is maintained for the motorists
- Bridge parapets would be precast units and incorporate a small skirt to provide a drip edge and conceal any drainage and services pipes
- Steel mesh throw screen on both sides of the bridge supported on coloured steel supports
- Throw screen posts would be simple sculptural elements contributing to the identity of the interchange. The 'fishbone' shape of the supports references the coastal setting of Wollongong supporting the overall identity of the interchange. The supports have a thinner profile at pedestrian eye level to frame views to the surrounding environment
- The bridge abutment wall facing the Motorway would be at a 5 degree angle
- Both abutments would be finished in sandstone cladding.

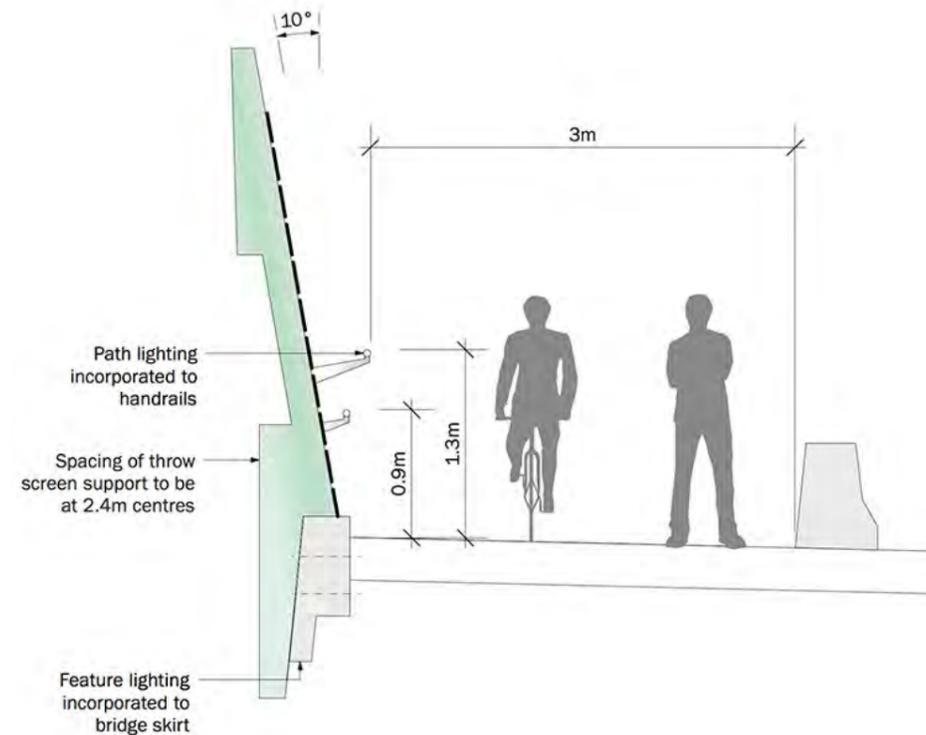


Figure 72. Bridge over M1 Princes Motorway - BR01 - Section (Scale 1:200)

Note: Subject to further design development and consultation.

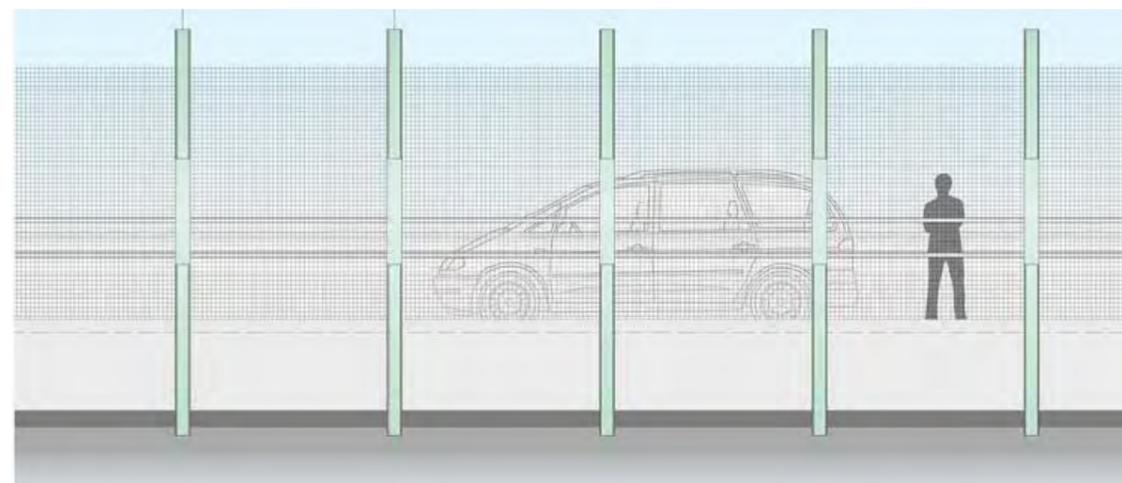


Figure 73. Bridge over M1 Princes Motorway - BR01 - Elevation (Scale 1:150)

Note: Subject to further design development and consultation.

*The detailing of the bridge elements, the safety screen posts and railings, are consistent with the shared path over bridges. The colour is differentiated to signify the different role played by the bridge at the interchange.*



Figure 74. Example of bridge deck lighting

Source: [http://www.cancer.org.il/dover\\_news/news.asp?ID=1256](http://www.cancer.org.il/dover_news/news.asp?ID=1256)

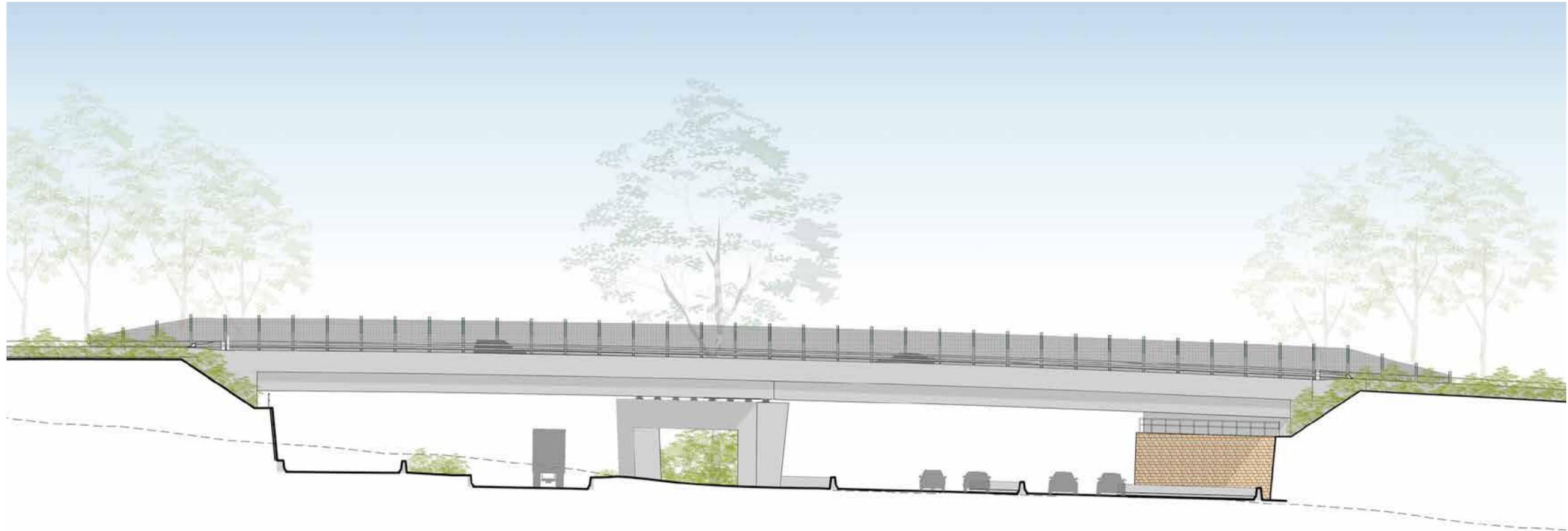


Figure 75. Elevation of bridge over M1 Princes Motorway - BR01 (Scale 1:300)

Note: Subject to further design development and consultation.



Figure 76. Section through bridge over M1 Princes Motorway - BR01 (Scale 1:100)  
Note: Subject to further design development and consultation.

## 2. PEDESTRIAN BRIDGE OVER MOUNT OUSLEY (BR02)

The new pedestrian bridge extending 27 metres over Mount Ousley Road is highly visible to southbound motorists on the M1 Motorway; Motorists travelling towards North Wollongong; and pedestrians, cyclists and residents along Mount Ousley Road. The bridge provides pedestrian and cyclist connection between the residential suburbs of Mount Ousley and North Wollongong and the University of Wollongong.

The design of the bridge considers the guidelines outlined in the *Bridge Aesthetics* (Roads and Maritime, 2013). The bridge has been designed to include the following features:

- A single span steel trough girder structure with circular column piers at either end and on approach structures
- Steel mesh throw screens supported on weathering steel supports
- Throw screen posts would be sculptural elements contributing to the identity of the interchange. The shape of the 'fishbone' supports reference the coastal setting of Wollongong. The supports have a thinner profile at pedestrian eye level to frame views to the surrounding environment
- Lighting would be provided at the soffit of the bridge beam, seen in elevation, as a night-time feature
- DDA compliant and provides handrail and bicycle rail. The handrail would have a linear strip of light underneath to shed light on the shared path for pedestrians and cyclists
- The bridge abutments would be finished in a sandstone cladding contiguous with the retaining walls on both sides of the road.

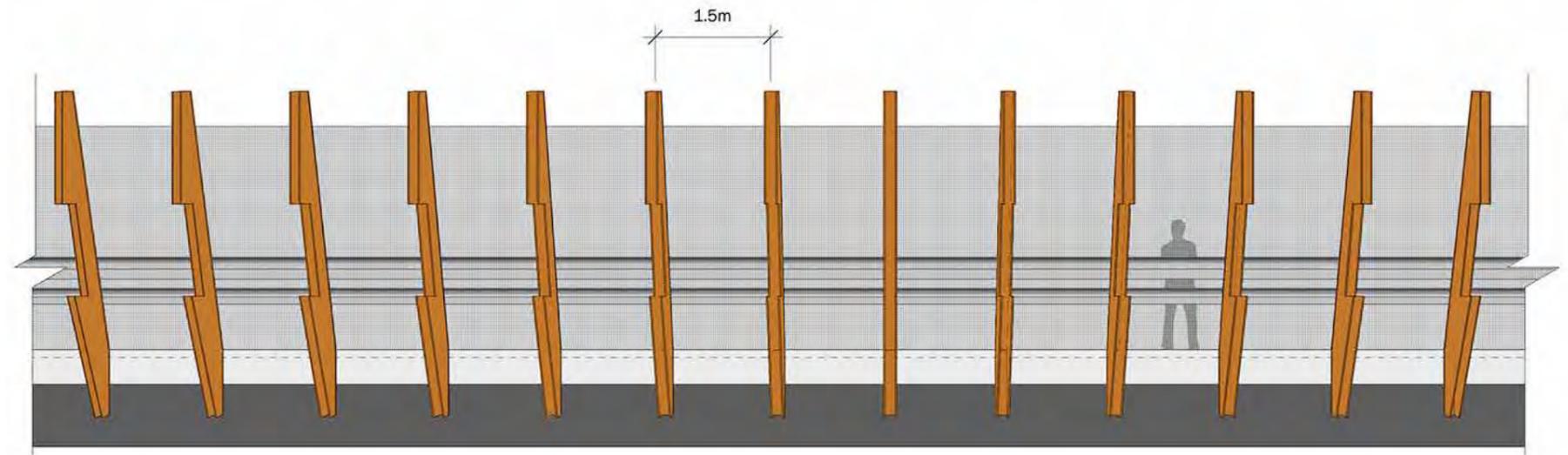


Figure 77. Pedestrian Bridge over Mount Ousley Road - BR02 - Elevation (Scale 1:80)

Note: Subject to further design development and consultation.



*The skeletal design of the pedestrian and cyclists bridge is carried through in the design of the access ramps to the bridge and potentially could become a piece of land art to be enjoyed by the local community, and provide identity to the interchange*



Figure 78. Example of a bridge access ramp that is sculptural and joyful to experience

Source: <http://www.sandermeisner.nl/>

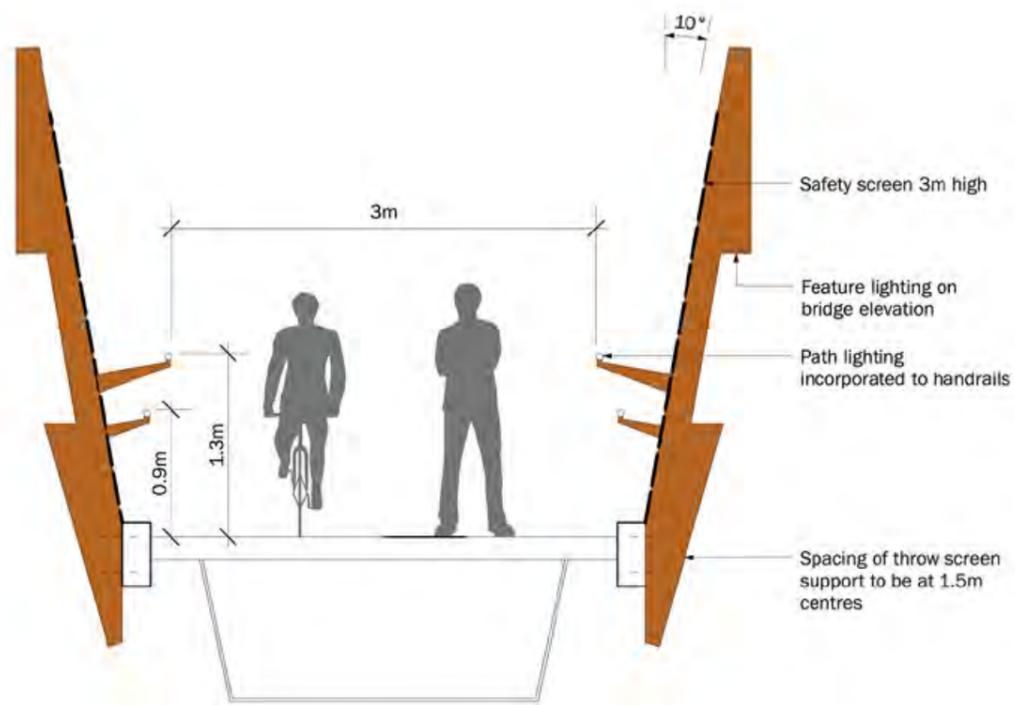


Figure 79. Bridge over Mount Ousley Road- Section (Scale 1:50)  
 Note: Subject to further design development and consultation.

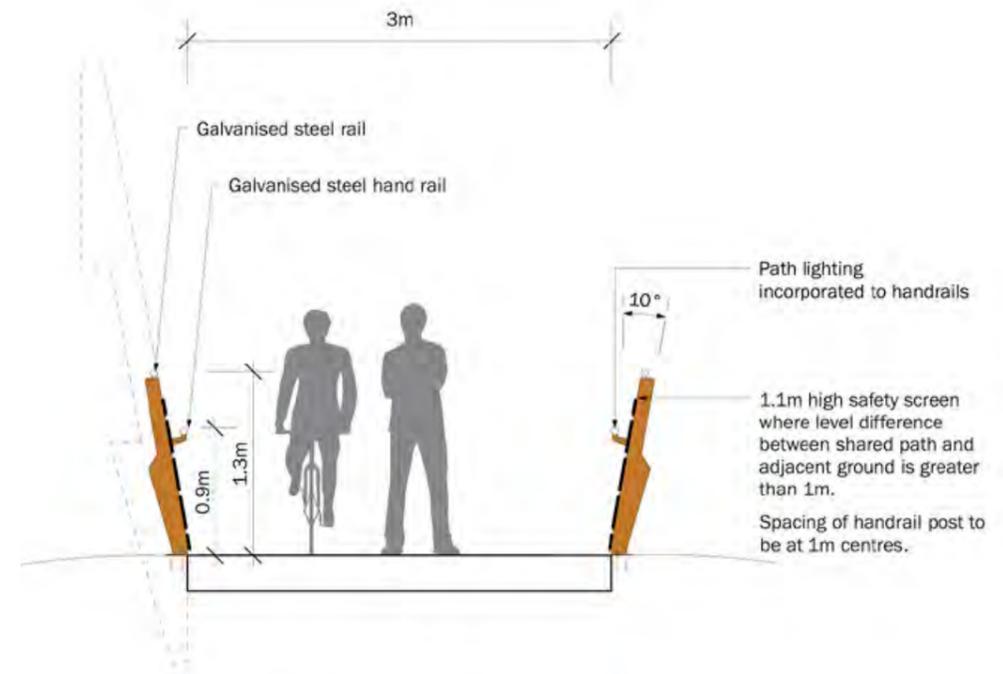


Figure 80. Shared path near Bridge over Mount Ousley Road - Section (Scale 1:50)  
 Note: Subject to further design development and consultation.

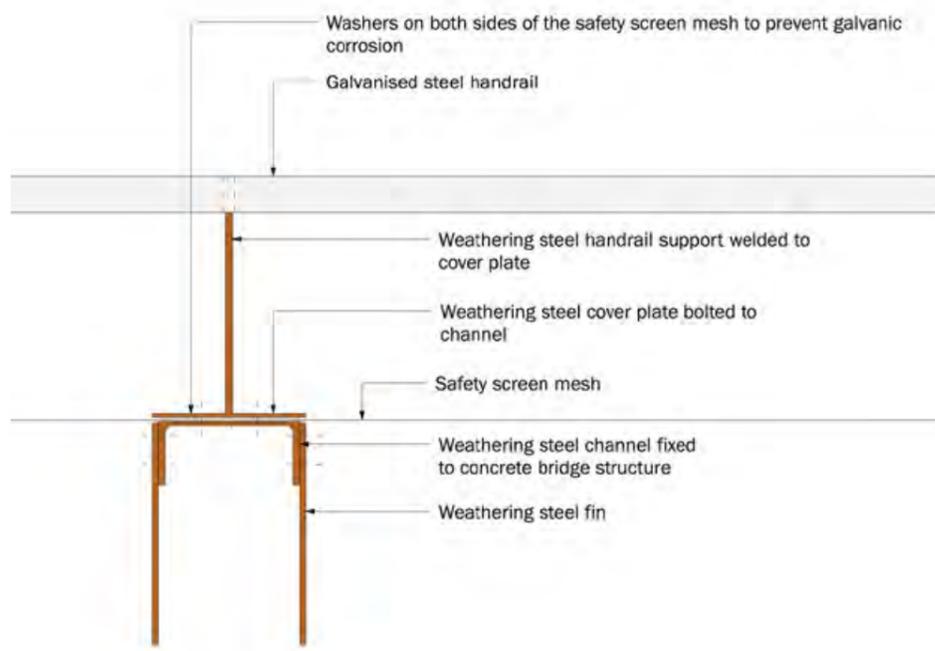


Figure 81. Bridge over Mount Ousley Road - Detail Section of throw screen and handrail support (Scale 1:50)  
 Note: Subject to further design development and consultation.

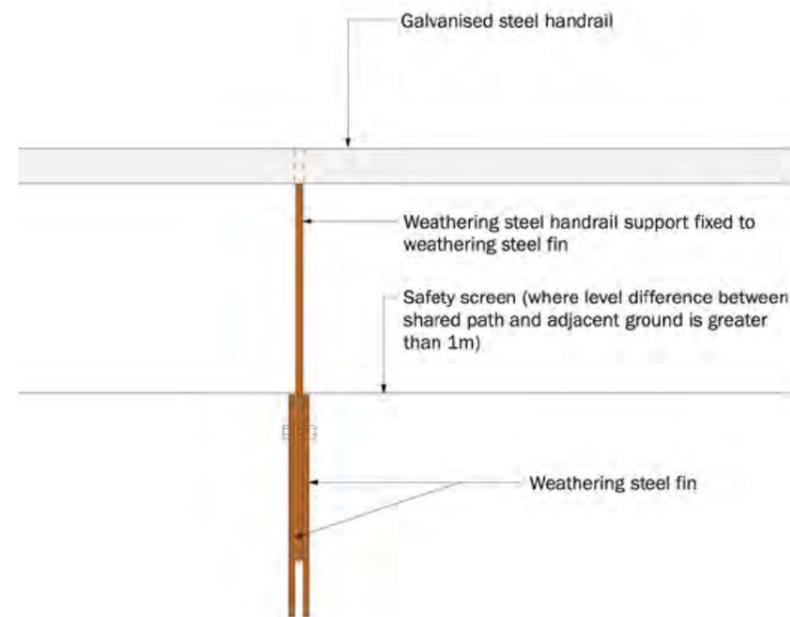


Figure 82. Bridge over Mount Ousley Road - Detail Section of throw screen and handrail support (Scale 1:50)  
 Note: Subject to further design development and consultation.

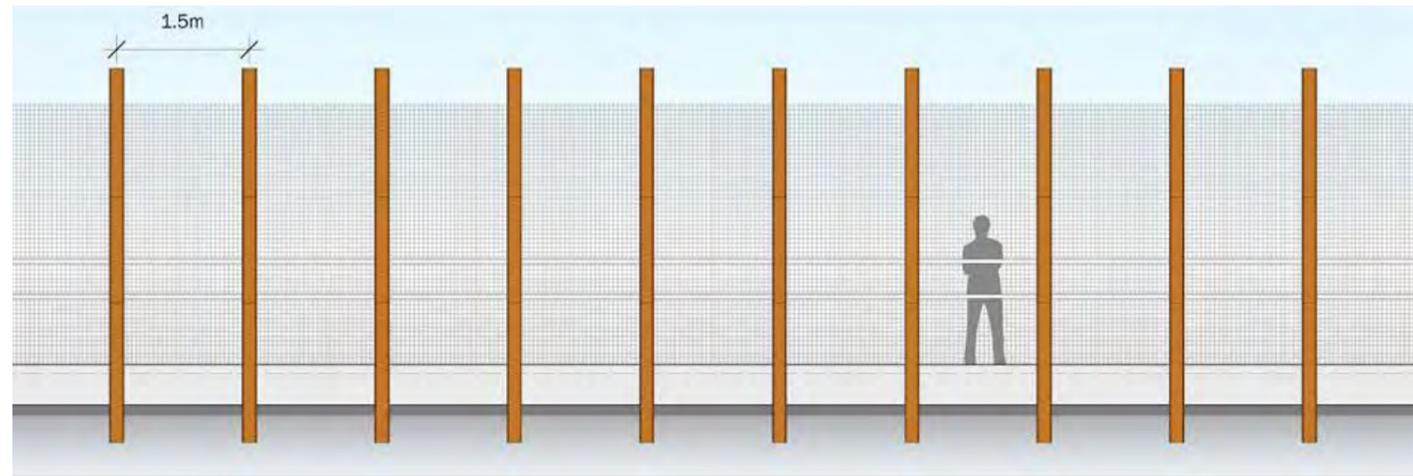


Figure 83. Pedestrian bridge over Mount Ousley Road BR02 - Elevation (Scale 1:80)

Note: Subject to further design development and consultation.

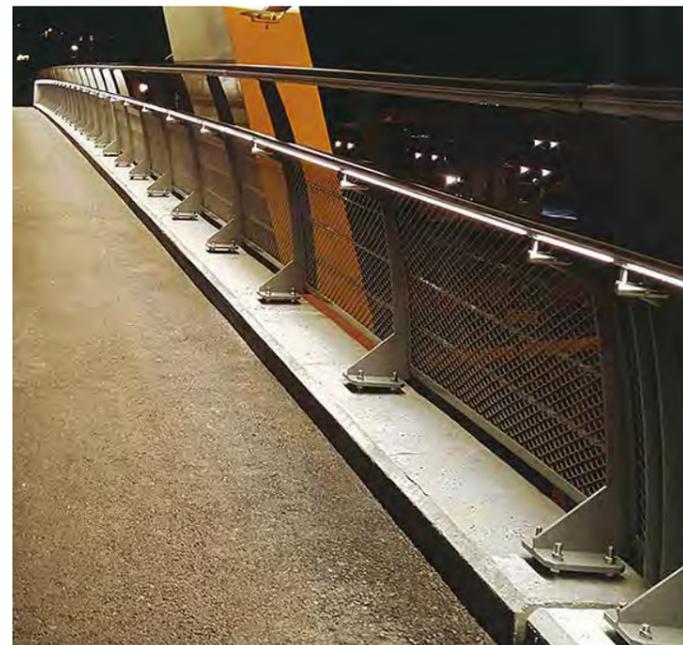


Figure 84. Example of lighting incorporated to handrail  
Source: Artlight



Figure 85. Example of lighting incorporated into bridge design  
Source: <http://kuntatekniikka.fi/2017/05/08/oulun-pikisaarensilta-palkittiin-lontoossa/>

### 3. HEAVY VEHICLE UNDERPASS (BR03)

The Heavy vehicle underpass extends for 80 metres and providing for the heavy vehicle bypass to extend beneath the Mount Ousley Road exit ramp, heavy vehicle exit ramp and the Southbound Service Road.

The design of the bridge considers the guidelines outlined in the Bridge Aesthetics (Roads and Maritime, 2013). The bridge has been designed to include the following features:

- Contiguous piled wall clad with precast concrete fascia panels
- Concrete panels to have a ribbed finish (to discourage graffiti) and painted in a dark recessive colour (to visually recede and allow ease of maintenance)
- Concrete deck planks, where not roadway, is to allow for a minimum of 0.1 metres for drainage, 0.6 metres for top soil and 0.075 metres for mulch to allow for low planting.

### 4. PEDESTRIAN BRIDGE OVER M1. MOTORWAY (BR04)

The existing pedestrian bridge over the M1 Motorway between the University of Wollongong and the TAFE (Figure 86) is proposed to be extended and refurbished, and a new DDA compliant ramp provided. Shared path connections to the ramp would be provided from the north, south and east.

The refurbished bridge would include the following features:

- A single span steel trough girder structure with circular column piers at either end
- Steel mesh throw screens supported on weathering steel supports
- Throw screen posts would be sculptural elements contributing to the identity of the interchange. The shape of the 'fishbone' posts reference the coastal setting of Wollongong. The supports have a thinner profile at pedestrian eye level to frame views to the surrounding environment
- DDA compliant and provides handrail and bicycle rail. The handrail would have a linear strip of light underneath to shed light on the shared path for pedestrians and cyclists.



Figure 86. Existing pedestrian overpass and ramp over M1 Princes Motorway to University of Wollongong  
Source: [www.google.com.au/maps](http://www.google.com.au/maps)



Figure 87. View of shared path and existing ramp at Northfields pedestrian overpass

*This bridge plays an important role in connecting pedestrian and cyclists traffic across the Motorway between two major institutional land uses. Further, it is along a major pedestrian and cyclist link connecting north west Wollongong to the southern areas of Wollongong and the CBD.*



Figure 88. Shared path connecting to TAFE Illawarra and eastern suburbs (Tech Tahs Rugby Club to the left)



Figure 89. View of the existing ramp and shared path leading to Mount Ousley Road to the north



Figure 90. Shared path leading to the overpass from the south - connecting to Wollongong CBD

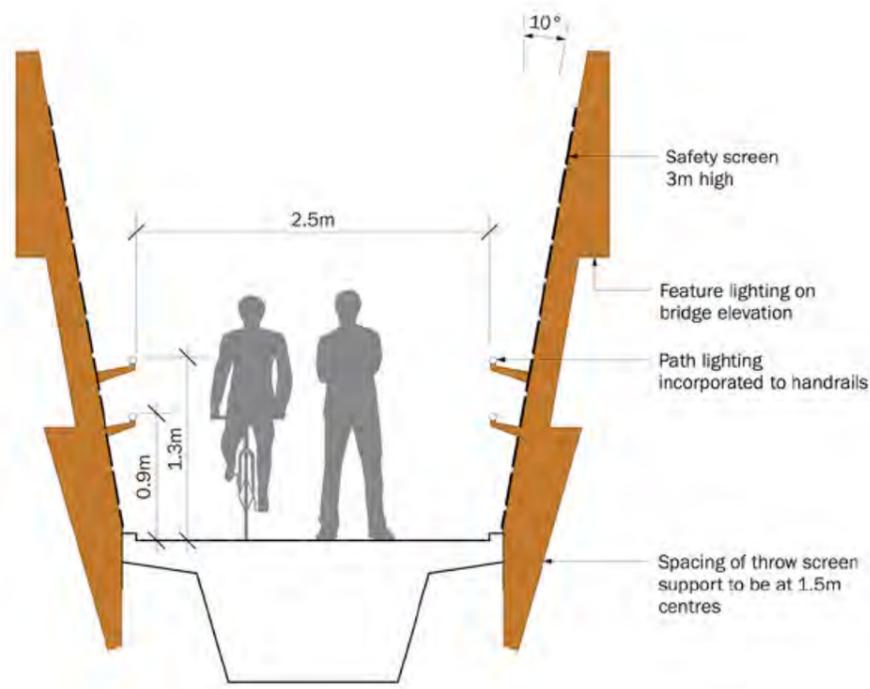


Figure 91. Section through proposed Northfields pedestrian overpass extension - BR04 (Scale 1:200)

Note: Subject to further design development and consultation.

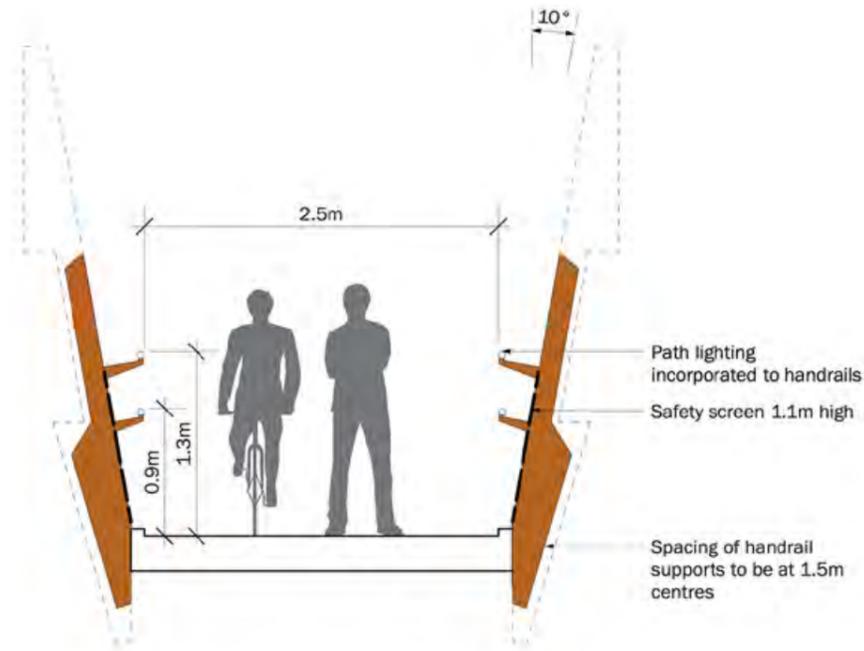


Figure 92. Section through proposed Northfields pedestrian overpass extension - Transitional section between bridge and ramp - BR04 (Scale 1:200)

Note: Subject to further design development and consultation.

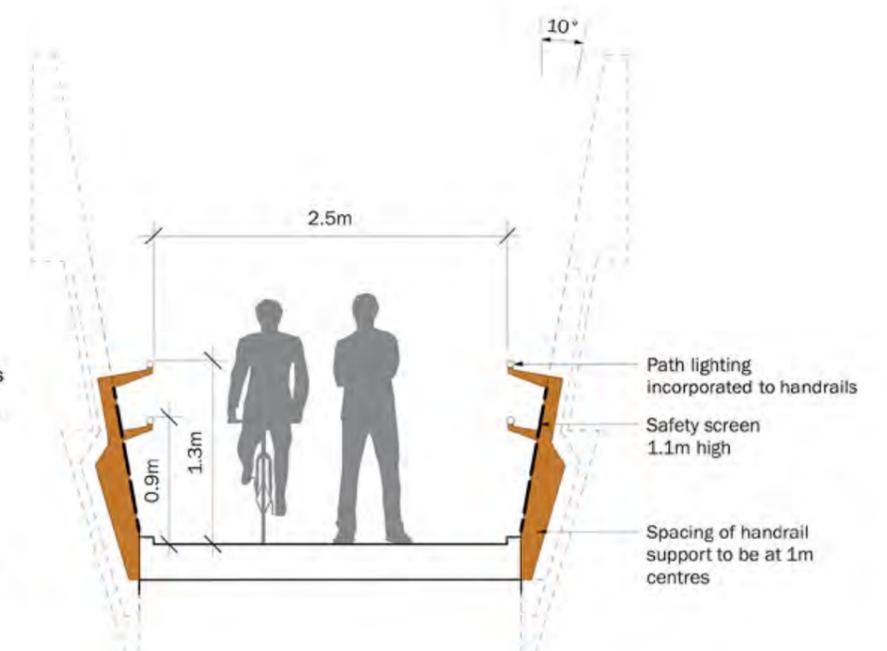


Figure 93. Section through the new ramp of the proposed Northfields pedestrian bridge extension - BR04 (Scale 1:200)

Note: Subject to further design development and consultation.

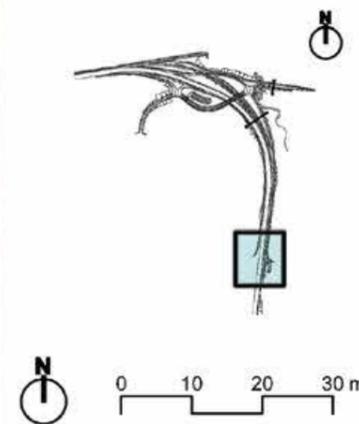


Figure 94. Plan of the proposed shared path connections to the Northfields pedestrian overpass extension - BR04 (Scale 1:1000)



Figure 95. Example of pedestrian ramp showing sculptural design  
Source: <http://nakanimamasakhlisi.ge/>

*The urban design treatments of the two pedestrian and cyclists bridges at either end of the shared path are consistent and aim to reinforce the importance of the link visually from the Motorway and the surrounding community*



#### 4.5.1. PLANTING DESIGN

As outlined in the overall urban design strategy, the primary aim is to increase directional legibility at the interchange, ensure the upgrade integrates with the existing context. Another key strategy for the planting design is the provision for suitable screen planting to mitigate the visual impact of views towards the proposal from dwellings, local roads, and public spaces including the University of Wollongong. The proposed planting design plays an important role in delivering the urban design objectives. These key aims are further discussed below:

##### 1. Improving legibility

With a relatively complex arrangement of new roads proposed as part of the proposal, road legibility and wayfinding would be clarified through the considered use of strategically placed feature tree planting. Road legibility would be strengthened through the considered use of select tree species structured to reinforce the key motorist routes and sightlines. This planting would also contribute to the identity of the interchange through strong visual statements (Figure 96).

##### 2. Integration with existing context

Integration of the upgrade with the existing context would be achieved through maximising appropriate vegetation in the road corridor, within proposal constraints, as well as by reinstating vegetation in areas adjoining and affected by the proposed upgrade. This would be important as the proposal introduces considerable changes in the study area. Maintaining the character of the existing forested foothills of Mount Keira and Mount Ousley (Figure 97), and the surrounding residential and institutional areas, is important in maximising the proposal's fit and respecting the lifestyle and values of both residents in surrounding areas, as well as the people attending the nearby educational institutions.

##### 3. Screening of structures

The relationship between retaining walls, noise walls, bridges and planting is critical in terms of maximising proposal integration with the setting as well as strategic screening of structures. As discussed in previous sections, there would be a large number of retaining walls and noise walls, ranging in height and visibility. They would represent a notable change to the existing vegetated road corridor. New vegetation would play a vital role in visually softening the impact of these walls from the roadway, help to fully or partially screen structures from existing residential areas, local roads and public spaces including the University of Wollongong, and mitigate the scale of the walls to better relate to the human scale and the residential and institutional environment.

#### PLANTING DESIGN PRINCIPLES

The planting design has been guided by the following principles:

- Ensure the visual and ecological integrity of the journey by introducing a planting palette based on four landscape treatment zones (outlined below)
  - Provide structured feature planting to improve and strengthen road legibility and to provide visual cues along important road alignments to aid in way finding and enhance identity of the interchange including:
    - Mount Ousley Road as the entry to Wollongong
    - The main alignment of the M1 Motorway
    - The entry to University of Wollongong
  - Minimise the visibility of the proposal from adjoining properties where appropriate
  - Ensure distant views from properties are maintained
  - Mitigate the visual impact of noise walls and retaining walls where they occur through planting strategies, siting responses, material selection, as well as texture and colour
  - Ensure that required sight lines for motorists are not obscured by planting and revegetation areas
  - Consider CPTED (Crime Prevention Through Environmental Design) principles in the planting design adjacent to pedestrian paths (Figure 98), cycle ways and the commuter carpark
  - Provide setbacks for structures and pathways to enable clear access for maintenance and visual inspections when the vegetation matures
  - Vegetate all areas affected by the work
  - Vegetate fill embankments and cut batters to stabilise the earthwork, minimise their visual impact and integrate them with the character of the surrounding landscape.
- At the Detailed Design stage, which would include further refinement of the plant species selection, particular consideration should be made for ongoing maintenance requirements. Principles include:
- Selection of plant species are to be robust, non-invasive and not fire promoting
  - Use of local provenance plant material for native revegetation plantings
  - Exclusion of all species identified as noxious or local weeds
  - Placement and species selection for planting within the road corridor, including in medians and verges, to be in accordance with clear zone and sight stopping distance requirements
  - Minimise ongoing maintenance requirements.



Figure 96. Example of the use of planting to improve legibility  
Source: <http://www.panoramio.com/user/2029429>



Figure 97. Existing planting along Mount Ousley Road



Figure 98. Example of CPTED principles utilised in planting adjacent to pedestrian paths  
Source: <http://outwalking.com.au/western-sydney-parklands/>



Figure 99. Landscape treatment strategy

- Key**  
**Landscape strategies**
-  Creating a gateway to Wollongong for the southbound motorists
  -  Provision of well vegetated road corridor along the M1 Motorway
  -  Providing a presence to the University of Wollongong and creating an entryway
  -  Screen planting for visual mitigation



Figure 100. Example of locally occurring native palm trees



Figure 101. Example of Sydney Blue Gum trees

## LANDSCAPE STRATEGIES

Based on the site analysis and existing landscape character zones, and consideration of the design objectives, four key landscape strategies are proposed. These strategies, depicted in Figure 99, are described below.

### 1. Creation of a gateway to Wollongong for the southbound motorists

Southbound motorists travelling on the M1 Princess Motorway approaching the interchange are presented with a strong sight line along Mount Ousley Road looking east. This view would be enhanced to help in establishing a 'gateway' to Wollongong and include new planting works as well as the treatment to the pedestrian bridge over Mount Ousley Road and retaining walls below.

Formalised planting along both sides of the traffic lanes leading to Mount Ousley Road with locally occurring native palm trees - Cabbage Tree Palms, arranged in a single line on either side of the road to guide the driver towards Mount Ousley Road. The formal planting arrangement would extend through to the eastern roundabout, accentuating the role of Mount Ousley Road as the gateway into North Wollongong and the city centre. This structured planting would be underplanted with ornamental native species including the Gynea Lily.

The proposed Palm tree - the Cabbage Tree Palm (*Livistona australis*), is a palm species naturally occurring within the Escarpment Blackbutt Forest vegetation community. The selection of this species would reflect the local vegetation character of the area and also complement the existing street tree plantings of Cabbage Tree Palms located within the central median of Mount Ousley Road between Gaynor Avenue and the Princes Highway.

## 2. Provision of a well vegetated road corridor along the M1 Motorway

The existing landscape character adjoining the M1 Princes Motorway is typically defined by the existing plant communities of the Escarpment Blackbutt Forest and the Escarpment Moist Blue Gum Forest and provides suitable amenity and ecological value. These plant communities are characteristic of the foothills of Mount Keira and Mount Ousley and are found in Character Zones 2, 3 and 4 and described in further detail in chapter 5.

The proposal would reinstate these vegetation communities and revegetate disturbed roadside areas to re-establish a well-planted road corridor with suitable landscape treatments along the M1 Princes Motorway. Furthermore structured planting of endemic species would enhance road legibility.

Three sub-precincts of the escarpment landscape would respond to the immediate design requirements of the site and are to be further developed in the Detailed Design phase. These include,

### Open Character

To be applied in areas where CPTED principals are important, and clear lines of sight are recommended for visual connection and passive surveillance. These areas would be characterised by low growing ground covers and grasses, and canopy trees with no low growing branches. These areas include, planting adjacent to shared paths as well as surrounding the commuter car park.

### Revegetation

To be applied to broader areas of disturbed land where ecological integrity is important and where re-establishing the natural forested setting is valued. Proposed planting would include species associated with existing mapped plant community including Escarpment Blackbutt Forest to the areas north of the heavy vehicle off ramp and within large medians including - between the main motorway alignment and heavy vehicle bypass, and south of Mount Ousley Road on ramp southbound.



Figure 102. Example of Illawarra Flame Trees

### Legibility

The proposal for the formal planting of tall trees arranged in a single line along the outside of the sweeping bend on the main alignment is proposed to accentuate the bend of the road, act as a visual cue to guide the motorist along the M1 Princes Motorway.

The proposed tree species, the Sydney Blue Gum (*Eucalyptus saligna*), is a dominant canopy tree species within the existing Escarpment Blue Gum Forest vegetation community and with its characteristic tall clear trunk with smooth light coloured bark would create a strong contrast to the proposed planting behind the trees when viewed by motorists travelling on the main alignment of the M1 Princes Motorway. The regular and structured arrangement of the tree planting, together with the Sydney Blue Gums' characteristic trunk colour and form would provide a strong visual cue for approaching motorists and help in road legibility of the Motorway alignment as well as aid in establishing the identity of the interchange.

The proposed tree planting would establish an appropriate scale for vegetation along the side of the road that would help to mitigate the scale of the bridge over the M1. This planting would also complement the sandstone and weathering steel finishes of the bridge.

## 3. Acknowledge the University of Wollongong from the Motorway and create a new entryway

The two entries associated with the University of Wollongong, one existing at Northfields Avenue, and the proposed new entry associated with the University Access Road would incorporate the planting of the ornamental tree species Illawarra Flame Tree (*Brachychiton acerifolius*). The proposed tree species would be common to both areas and is proposed to identify the presence of the University from the Motorway and highlight its entry points.

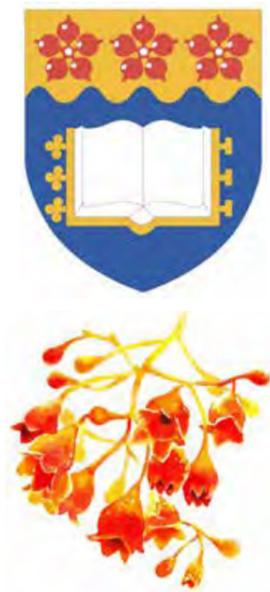


Figure 103. Example of noise wall screen planting for visual mitigation  
Source: 'Noise Wall Design Guideline' (Roads and Maritime)

The area associated with the new University Access Road extends south from the M1 Princes Motorway alignment, west of the bridge over the M1 along Mount Ousley Road and also along Mount Ousley Road on ramp southbound. It includes the areas surrounding the western roundabout and the commuter car park and continues along the University Access Road. This precinct would be highly visible to motorists both travelling on the M1 Princes Motorway and also for motorists and pedestrians approaching from the Bridge over the M1 Motorway.

The proposed planting strategy would reinforce and integrate the locally occurring forest vegetation community with the informal feature planting of the Illawarra Flame Tree to present the university to motorists on the Motorway and highlight the new entry of the University of Wollongong. This approach responds to the University of Wollongong Master Plan in providing a suitable landscape treatment for this entry along the University access road. The university of Wollongong Master Plan identifies this new road as the potential 'second key gateway to the campus' with the upgrade connections for vehicles, pedestrians and cyclists. To further enhance the presence of the University at the existing eastern entrance to the University at Northfields Avenue, the planting of Illawarra Flame Trees is proposed on both sides of the M1 Princes Motorway, north of the upgrade to the Pedestrian Bridge extension over the M1. The Planting of the Illawarra Flame Tree is proposed to be arranged informally amongst the planting of the proposed locally occurring tree species.

The proposed feature tree, the Illawarra Flame Tree (*Brachychiton acerifolius*) has a strong association with the identity of the University of Wollongong, and is one of the principal elements on the Universities' Coat of Arms. The Illawarra Flame Tree is a deciduous tree, occurring naturally throughout the region and offers striking seasonal colour, flowering in spring. It is an iconic tree species that would add a strong identity to the University.

## 4. Screen planting for visual mitigation

Screen planting is proposed in a number of locations throughout the proposal as a means to mitigate the magnitude and the visibility of the road and structures from residential areas. The proposed screen planting would be native in character and proposed species would be mostly derived from the locally occurring vegetation communities of the Escarpment Blackbutt Forest and the Escarpment Moist Blue Gum Forest.

The locations proposed for screen planting include.

- Along Dumfries avenue; adjacent to the heavy vehicle bypass lane and the heavy vehicle safety ramp 1 as screening to Noise wall (NW01), and also west from McMahan Street
- Along the southern side of Mount Ousley Road on ramp southbound and behind properties on Falder Place to screen retaining wall (RW03) and noise wall (NW02)
- Along the backs of the properties at Old Mount Ousley Road , on the northern side of the shared path as screening northern views towards the properties and also towards noise wall (NW04b)
- Between Mount Ousley Road and Old Mount Ousley Road to screen noise wall (NW04a)
- Along the eastern side of Mount Ousley Road on ramp southbound to screen views from users of the open space located behind properties on Gowan Brae Avenue.

## PROPOSED PLANT PALETTE

To achieve consistency with the existing character of the study area, an indicative selection of plant species are provided. The proposed plant species are summarised below, based on the respective landscape treatment precincts. A recommended list of street tree and plant species for the Wollongong Local Government Area as recorded in the Wollongong Development Control Plan 2009 has been reviewed in the preparation of these indicative plant lists.

### PROVISION OF A WELL VEGETATED ROAD CORRIDOR ALONG THE M1 MOTORWAY

	Botanical name	Common name	Mature height
<b>STRUCTURED/FORMALISED TREE PLANTING</b>			
1	<i>Eucalyptus saligna</i> <sup>x</sup>	Sydney Blue Gum	20-45m
<b>TREES</b>			
	<i>Allocasuarina torulosa</i> *	Forest Oak	15-20m
2	<i>Eucalyptus botryoides</i> *	Southern Mahogany	40m
	<i>Eucalyptus pilularis</i> * <sup>x</sup>	Blackbutt	20-45m
	<i>Pittosporum undulatum</i> * <sup>x</sup>	Sweet Pittosporum	12m
3	<i>Syncarpia glomulifera</i> *	Turpentine	25m
<b>SHRUBS</b>			
4	<i>Breynia oblongifolia</i> *	Coffee Bush	3 m
	<i>Clerodendrum tomentosum</i> * <sup>x</sup>	Hairy Clerodendrum	5m
	<i>Eupomatia laurina</i> *	Bolwarra	5m
5	<i>Notelaea venosa</i> <sup>x</sup>	Veined Mock-Olive	6m
6	<i>Pittosporum revolutum</i> *	Yellow Pittosporum	3m
7	<i>Synoum glandulosum</i> subsp. <i>Glandulosum</i> <sup>x</sup>	Scentless Rosewood	7m
<b>GRASSES AND GROUNDCOVERS</b>			
8	<i>Calochlaena dubia</i> * <sup>x</sup>	Soft Bracken	0.4-1.5m
9	<i>Dianella caerulea</i> *	Blue Flax-lily	0.7m
	<i>Dichondra repens</i> * <sup>x</sup>	Kidney Weed	0.2m
	<i>Lomandra longifolia</i> *	Mat Rush	1m
10	<i>Oplismenus imbecillis</i> * <sup>x</sup>	Basket Grass	1m
	<i>Poa labillardieri</i> var. <i>labillardieri</i> *	Tussock	0.8m

#### Key:

\* Indicates species derived from the Escarpment Blackbutt Forest.

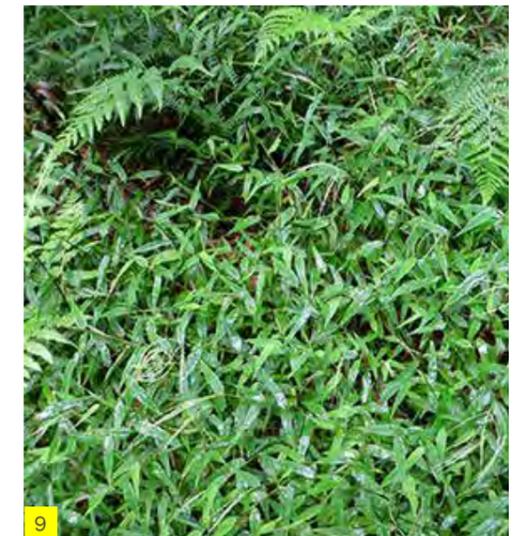
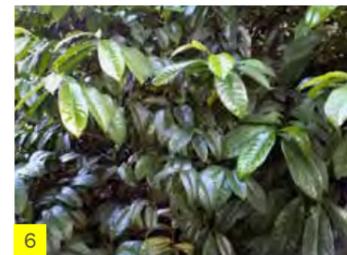
x Indicated species derived from the Escarpment Moist Blue Gum Forest

Source: Native Vegetation of the Illawarra Escarpment and Coastal Plain. NSW National Parks and Wildlife Service.



**WOLLONGONG GATEWAY**

	Botanical name	Common name	Mature height
<b>STRUCTURED/FORMALISED TREE PLANTING</b>			
1	<i>Livistona australis</i> * X	Cabbage palm	25m
<b>TREES</b>			
	<i>Eucalyptus botryoides</i> *	Southern Mahogany	40m
2	<i>Eucalyptus pilularis</i> * X	Blackbutt	20-45m
	<i>Pittosporum undulatum</i> *	Sweet Pittosporum	12m
3	<i>Tristaniopsis laurina</i>	Water Gum	9m
<b>SHRUBS</b>			
	<i>Breynia oblongifolia</i> *	Coffee Bush	8m
4	<i>Callistemon salignus</i>	White bottlebrush	7m
	<i>Correa alba</i>	White correa	1.5m
5	<i>Doryanthes excelsa</i>	Gymea lily	1-2m
6	<i>Eupomatia laurina</i> *	Bolwarra	4m
7	<i>Pittosporum revolutum</i> *	Yellow Pittosporum	3m
<b>GRASSES AND GROUNDCOVERS</b>			
	<i>Dianella caerulea</i> *	Blue Flax-lily	0.7m
8	<i>Lomandra longifolia</i> *	Mat Rush	1m
9	<i>Oplismenus imbecillis</i> * X	Basket Grass	1m
	<i>Poa labillardieri</i> var. <i>labillardieri</i> *	Tussock	0.8m
	<i>Themeda australis</i>	Kangaroo Grass	0.8m



**Key:**

\* Indicates species derived from the Escarpment Blackbutt Forest.

x Indicated species derived from the Escarpment Moist Blue Gum Forest

Source: Native Vegetation of the Illawarra Escarpment and Coastal Plain. NSW National Parks and Wildlife Service.

**PROVIDING A PRESENCE TO THE UNIVERSITY OF WOLLONGONG AND CREATING A NEW ENTRYWAY**

	Botanical name	Common name	Mature height
<b>GATEWAY TREE PLANTING</b>			
1	<i>Brachychiton acerifolius</i>	Illawarra flame tree	30m
<b>TREES</b>			
	<i>Eucalyptus botryoides</i> *	Southern Mahogany	40m
2	<i>Eucalyptus pilularis</i> *	Blackbutt	20-45m
3	<i>Eucalyptus saligna</i> X	Sydney blue gum	40m
4	<i>Glochidion ferdinandi</i>	Cheese tree	10m
	<i>Pittosporum undulatum</i> * X	Sweet Pittosporum	12m
<b>SHRUBS</b>			
5	<i>Breynia oblongifolia</i> *	Coffee Bush	8m
6	<i>Clerodendrum tomentosum</i> *	Hairy Clerodendrum	5m
	<i>Correa alba</i>	White correa	1.5m
7	<i>Eupomatia laurina</i> *	Bolwarra	4m
8	<i>Hakea dactyloides</i>	Finger hakea	2m
	<i>Notelaea venosa</i> X	Veined Mock-Olive	6m
9	<i>Synoum glandulosum</i> X subsp. <i>Glandulosum</i>	Scentless Rosewood	7m
<b>GRASSES AND GROUNDCOVERS</b>			
10	<i>Blechnum cartilagineum</i> X	Gristle Fern	1.5m
11	<i>Dianella caerulea</i> *	Blue Flax-lily	0.7m
	<i>Dichondra repens</i> * X	Kidney Weed	0.2m
12	<i>Imperata cylindrica</i>	Blady grass	1.5m
	<i>Lomandra longifolia</i> *	Mat Rush	1m
	<i>Microlaena stipoides</i>	Weeping grass	0.7m
	<i>Oplismenus imbecillis</i> *	Basket Grass	1m
	<i>Poa labillardieri</i> var. <i>labillardieri</i> *	Tussock	0.8m



**Key:**

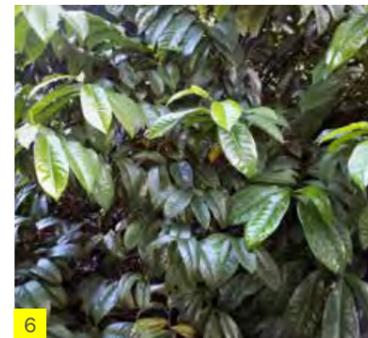
\* Indicates species derived from the Escarpment Blackbutt Forest.

x Indicated species derived from the Escarpment Moist Blue Gum Forest

Source: Native Vegetation of the Illawarra Escarpment and Coastal Plain. NSW National Parks and Wildlife Service.

**SCREEN PLANTING FOR VISUAL MITIGATION AND REVEGETATION**

	Botanical name	Common name	Mature height
<b>TREES</b>			
1	<i>Eucalyptus botryoides</i> *	Southern Mahogany	40m
2	<i>Eucalyptus pilularis</i> *	Blackbutt	20-45m
3	<i>Pittosporum undulatum</i> * x	Sweet Pittosporum	12m
<b>SHRUBS</b>			
4	<i>Breynia oblongifolia</i> *	Coffee Bush	8m
5	<i>Clerodendrum tomentosum</i> *	Hairy Clerodendrum	5m
	<i>Correa alba</i>	White correa	1.5m
6	<i>Eupomatia laurina</i> *	Bolwarra	4m
7	<i>Hakea dactyloides</i>	Finger hakea	2m
	<i>Notelaea venosa</i> x	Veined Mock-Olive	6m
8	<i>Synoum glandulosum</i> x subsp. <i>Glandulosum</i>	Scentless Rosewood	7m
9	<i>Pittosporum revolutum</i> *	Yellow Pittosporum	3m
<b>GRASSES AND GROUNDCOVERS</b>			
10	<i>Blechnum cartilagineum</i> x	Gristle Fern	1.5m
11	<i>Dianella caerulea</i> *	Blue Flax-lily	0.7m
	<i>Dichondra repens</i> * x	Kidney Weed	0.2m
	<i>Imperata cylindrica</i>	Blady grass	1.5m
12	<i>Lomandra longifolia</i> *	Mat Rush	1m
	<i>Microlaena stipoides</i>	Weeping grass	0.7m
	<i>Oplismenus imbecillis</i> *	Basket Grass	1m
	<i>Poa labillardieri</i> var. <i>labillardieri</i> *	Tussock	0.8m



**Key:**

\* Indicates species derived from the Escarpment Blackbutt Forest.

x Indicated species derived from the Escarpment Moist Blue Gum Forest

Source: Native Vegetation of the Illawarra Escarpment and Coastal Plain. NSW National Parks and Wildlife Service.

#### 4.5.2. BALUSTRADES AND FENCES

The proposal would be comprised of a number of fence and barrier types. They consist of:

- Fences or road safety barriers on top of retaining walls
- Pedestrian and cyclist handrails
- Proposal boundary fencing
- Residential fences - where existing fences are impacted, if any.

##### FENCES OR ROAD SAFETY BARRIERS ON TOP OF RETAINING WALLS

There are two types of fences/ barriers required on top of retaining walls:

1. Pool type fences. These would be required to be 1100mm in height or 1300mm where adjacent to shared paths.
2. Twin-rail medium performance barriers to a height of 1200 in general and 1300mm where adjacent to shared paths or cycle paths.

The placement of fencing should be rationalised, and design further developed and documented, in Detailed Design.

##### PEDESTRIAN AND CYCLIST HANDRAILS

The design of these should conform to the relevant Australian Standards and best practice design standards in general. The design of these should be developed and documented in Detailed Design.

The design should consider and rationalise the type of handrail based on their location, and fall, in the determination of the required level of safety i.e. if a pool type fence is required or if a single or double rail fence would be adequate. Where adjacent to footpaths the total height of the railing should be 1100mm with a grab rail at 900mm. Adjacent to shared paths, the total height of the railing should be 1300mm with a grab rail at 900mm. Pool type fences on top of retaining walls should be painted a dark grey colour, or similar recessive shade that would assist it to recede from view (Figure 104).

##### PROPOSAL BOUNDARY FENCING

Proposal boundary fencing should be avoided where possible or rationalised and minimised. Where required, they should be screened with planting on both sides and be as recessive as possible.

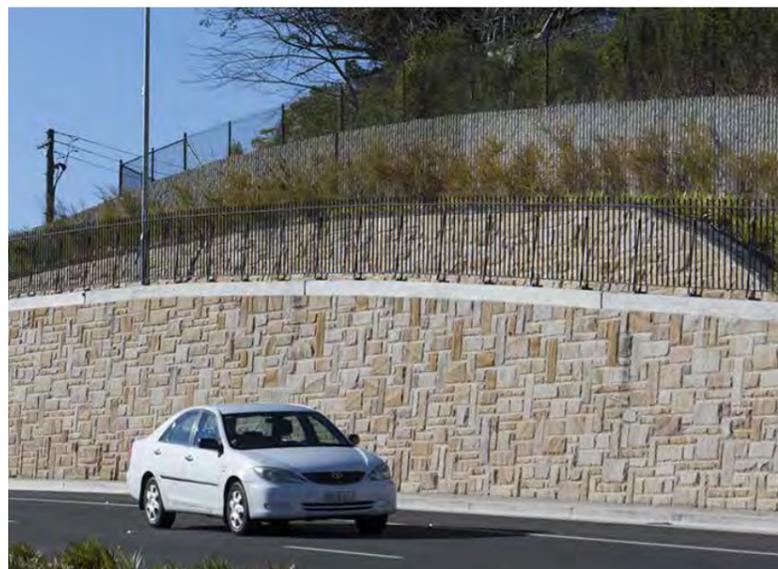


Figure 104. Example of pool type fence on top of retaining walls

### 4.5.3. CYCLIST AND PEDESTRIAN PROVISIONS

Pedestrian and cycle paths would be provided as follows and depicted in Figure 105:

- A 3.0 metre wide off road shared path connecting Dumfries Avenue across the new pedestrian bridge over Mount Ousley Road providing access to the west, east and south
- A 3.0 metre wide off road shared path connecting North Wollongong to the new entrance to University of Wollongong as well as the commuter car park
- A 3.0 metre wide off road shared path from Mount Ousley Road to the south connecting with the existing shared path to the pedestrian and cyclist bridge between the University of Wollongong and TAFE Illawarra. This path (existing) continues south providing access to Wollongong CBD
- The existing pedestrian and cyclist bridge across the Motorway at Northfields Avenue is to be extended and refurbished. As part of this work, the existing non DDA compliant ramp to the bridge would be demolished and a DDA compliant ramp provided.

The design of the pedestrian and cycle paths have included the provision of landscaped zones adjacent to the paths in consideration of CPTED principles and lighting. Opportunities for passive surveillance has been maximised as far as possible.

Shared paths and footpaths, if concrete, should be a brushed finish concrete with integral oxide colour (CCS ONYX 21 @4% minimum as per supplier specification in grey cement).

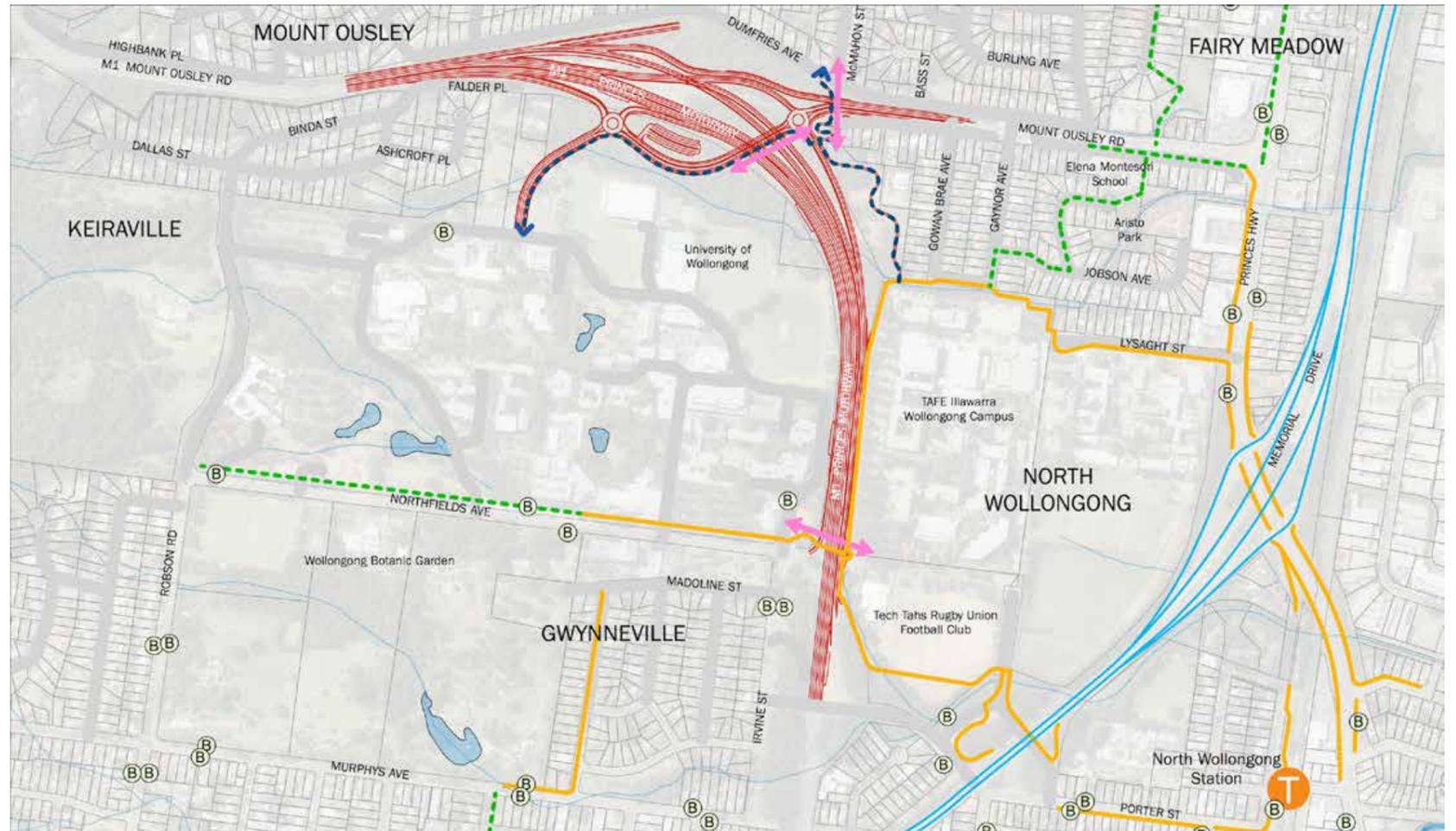
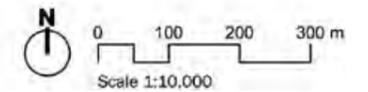


Figure 105. Proposed pedestrian and cyclist strategy

#### KEY

- |  |                           |  |   |  |               |
|--|---------------------------|--|---|--|---------------|
|  | Proposal                  |  | Proposed shared path within proposal                                    |  | Train station |
|  | Existing shared path      |  | Proposed cycleway link (Source: City of Wollongong Bike Plan 2014-2018) |  | Bus stop      |
|  | Existing on road cycleway |  | Pedestrian overpass   |  |               |



#### 4.5.4. EARTHWORKS

Extensive earthworks would be required for this proposal, which requires a large volume of cut and fill. Due to the constrained nature of the corridor a large number of retaining walls would be required to accommodate the level change. Where space permits, embankments have been incorporated particularly on the eastern side of the alignment (Figure 106). The slopes are generally 1:3.

Embankments should be sensitively designed to maximise integration with the surrounding landscape. This includes appropriate vegetation to minimise visual contrast with the surrounding landscape character.

#### 4.5.5. DRAINAGE

Drainage is largely a formalised piped drainage system for the road corridor. A number of drainage channels would also be included at the bottom of embankments or on top of retaining walls. Where visible from the roadway, all concrete drains should have an integral colour to avoid them becoming highly intrusive elements in the road corridor, as well as residential areas (Figure 107). An assessment of their visibility should be conducted during Detailed Design.

Three spill basins would be required. Basin design is to be of a natural shape and form where possible within clearance requirements, consistent with Roads and Maritime Landscape Design Guidelines.



Figure 106. Example of rounding batters to achieve a more natural outcome



Figure 107. Example of a coloured concrete lined drain

#### 4.5.6. LIGHTING

Lighting is to be provided in accordance with Roads and Maritime specifications and the Australian Standards. Pedestrian lighting is proposed along the length of the shared pathways (Figure 108). Lighting would be provided along the Pedestrian Bridge within the handrails and pedestrian scale light posts along shared paths and the commuter car park. The lighting design would be developed at the Detailed Design stage and strategies would be adopted to reduce excessive light spill to adjacent residences. Feature lighting would be provided along the bridge deck in all elevations, landscaped areas near shared paths and ramps.



Figure 108. Example of path lighting - indicative  
Source: [http://www.thehansindia.com/assets/7535\\_lighting.jpg](http://www.thehansindia.com/assets/7535_lighting.jpg)

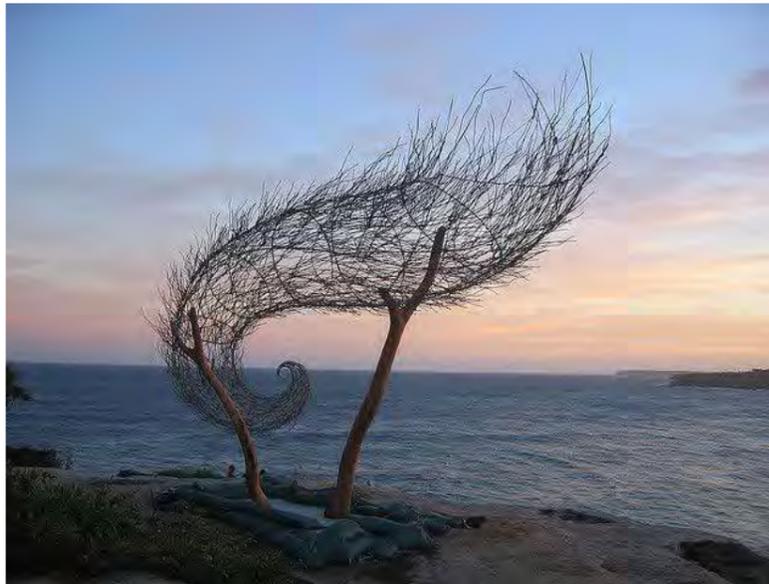


Figure 109. Example of a symbolic artwork that may be part of the 'Welcome to Wollongong' signage; image shows 'Wind Spiral II'  
Source: <https://emorfes.com/2016/04/08/windspiral-environmental-art-berman-bronwyn/>



Figure 110. Existing metal sculpture adjacent to M1 Princes Motorway at Mount Ousley Interchange  
Source: [www.google.com.au/maps](http://www.google.com.au/maps)

#### 4.5.7. SIGNAGE AND ARTWORK

##### Road Signs

There would be a large number of signs of varying sizes at the interchange. The integration, and placement of these signs is an important issue to be considered in the Detailed Design stage of the project.

##### Identity Signs

As part of the Detailed Design, entry signage / artwork may be integrated into the landscape blister on the northern side of the eastern roundabout to announce this as the southern entry point to Wollongong (Figure 109). The existing metal sculpture may be relocated at the gore area leading into Mount Ousley Road (Figure 110). In addition, the south western roundabout may comprise signage for the University of Wollongong announcing its new entrance way (Figure 111). These should be developed in consultation with Council and key stakeholders.



Figure 111. New university signage by Frost Design (2016-2020)

#### 4.5.8. SMART MOTORWAY GANTRIES

There would be a number of Smart Motorway gantries that span across the carriageways approximately 40 metres in length. These gantries would be constructed of steel girders and are proposed to be clad in a steel mesh. Design development and integration with adjacent structures, such as noise walls and retaining walls, are to be considered at Detailed Design stage.

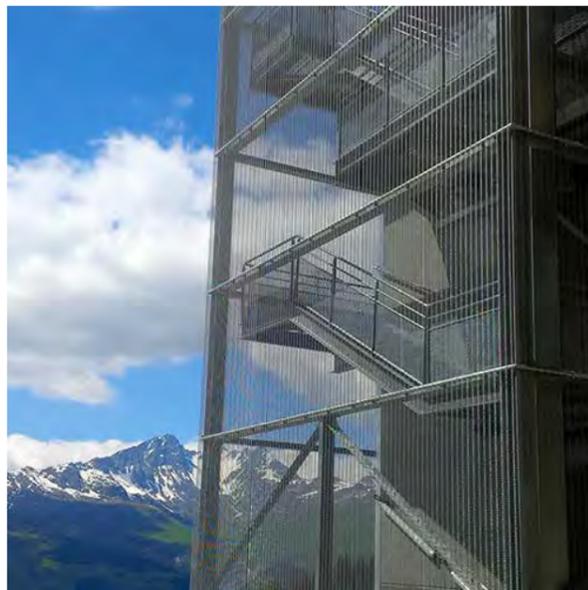


Figure 112. Example of mesh screening to structure  
Source: <http://www.weavingarchitecture.com/en/project-gallery/details/stair-tower-les-arcs-1800/>

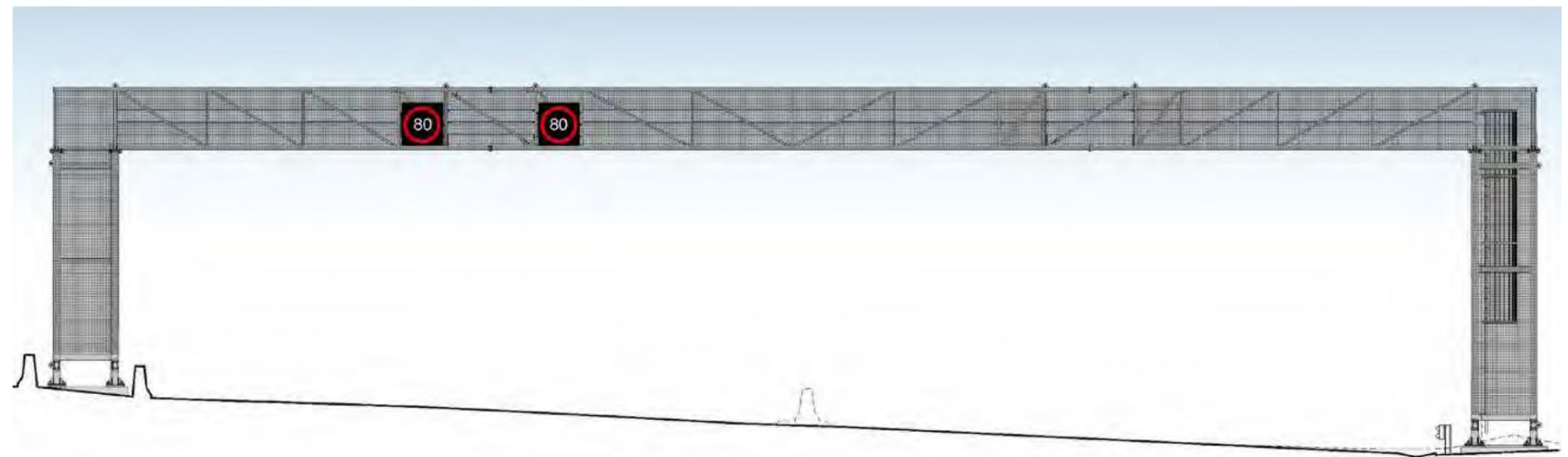


Figure 113. Typical gantry structure across Motorway  
Source: Jacobs

# CHAPTER 5

## LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT

### 5.1 INTRODUCTION

This section of the report aims to assess the impact of the proposal on the identified Landscape Character Zones and viewpoints within the study area. These are discussed in sections 5.2 and 5.3 respectively.

The *Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment* (Hereafter referred to as the 'Practice Note', March 2013, RMS) sets out two main purposes of landscape character and visual impact assessment:

*"To inform the development of the preferred route and concept design so that the proposal can avoid and minimise impacts up front..."*

*"To inform RMS, other agencies and the community about the landscape character and visual impact of the proposal and what avoidance, management and mitigation strategies would be implemented."*

The Practice Note describe the landscape character assessment and visual impact assessment as follows:

*"Landscape character and visual assessment are equally important. Landscape character assessment helps determine the overall impact of a project on an area's character and sense of place. Visual impact assessment helps define the day to day visual effects of a project on people's views."*

*This dual assessment helps differentiate options, improve route alignment decisions and improve design outcomes."*

*Landscape character assessment sums up an area's sense of place including all built, natural and cultural aspects, covering towns, countryside and all shades between. Visual assessment addresses people's views of an area from their homes or other places of value in the community."*

### 5.2 IMPACT ASSESSMENT METHODOLOGY

The methodology adopted in the assessment of the proposal is defined in the Practice Note (RMS, 2013).

The assessment of landscape character involves the identification of the different landscape character zones within the proposal area, a description of their defining attributes and an assessment of the sensitivity and impact of the proposal on each zone (discussed in section 5.2.1). The assessment of visual impact includes a description of the selected viewpoint and an assessment of the sensitivity and impact of the proposal, in terms of magnitude. The ratings for sensitivity and magnitude and the overall impact rating is based on the rating matrix provided in the Practice Note (See Table 3).

When assessing the magnitude of this proposal a conservative clearing boundary has been assumed as provided by Jacobs, consistent with other Working Papers contributing to this Review of Environmental Factors (REF). The assessment of impact is carried out generally based on the first five years from the opening of the road. It should be noted that impacts would reduce in rating as the vegetation matures over time. Signage structures have not been considered in this visual impact as the signage design had not been developed sufficiently at the time of writing this report.

Table 3. Landscape character and visual impact grading matrix

		MAGNITUDE				
		high	moderate	low	negligible	
SENSITIVITY	high	high	high-moderate	moderate	negligible	
	moderate	high-moderate	moderate	moderate-low	negligible	
	low	moderate	moderate-low	low	negligible	
	negligible	negligible	negligible	negligible	negligible	negligible

(Source: EIA No. 4 Guidelines, 2013)

### 5.3 LANDSCAPE CHARACTER ASSESSMENT

Based on the contextual analysis, the study area has been divided into seven Landscape Character Zones (LCZ) (refer to Figure 114). This section provides a discussion for each LCZ, including the existing character, the proposed works, the likely landscape character changes and an assessment of the likely impact of the proposal on the existing landscape character. The landscape character is the combination of the area's built, natural and cultural features that make the area unique. The Landscape Character Assessment therefore provides a measure of the proposal's overall impact on the area's existing sense of place.

The proposal covers seven character zones:

- Character Zone 1 (LCZ 1): Mount Ousley – North Residential
- Character Zone 2 (LCZ 2): Vegetation – North of M1 Princes Motorway
- Character Zone 3 (LCZ 3): Keiraville Residential
- Character Zone 4 (LCZ 4): Vegetation – South of M1 Princes Motorway
- Character Zone 5 (LCZ 5): Mount Ousley – South Residential
- Character Zone 6 (LCZ 6): Institutional – University of Wollongong
- Character Zone 7 (LCZ 7): Institutional – TAFE Illawarra.

These are depicted in the Figure 114.

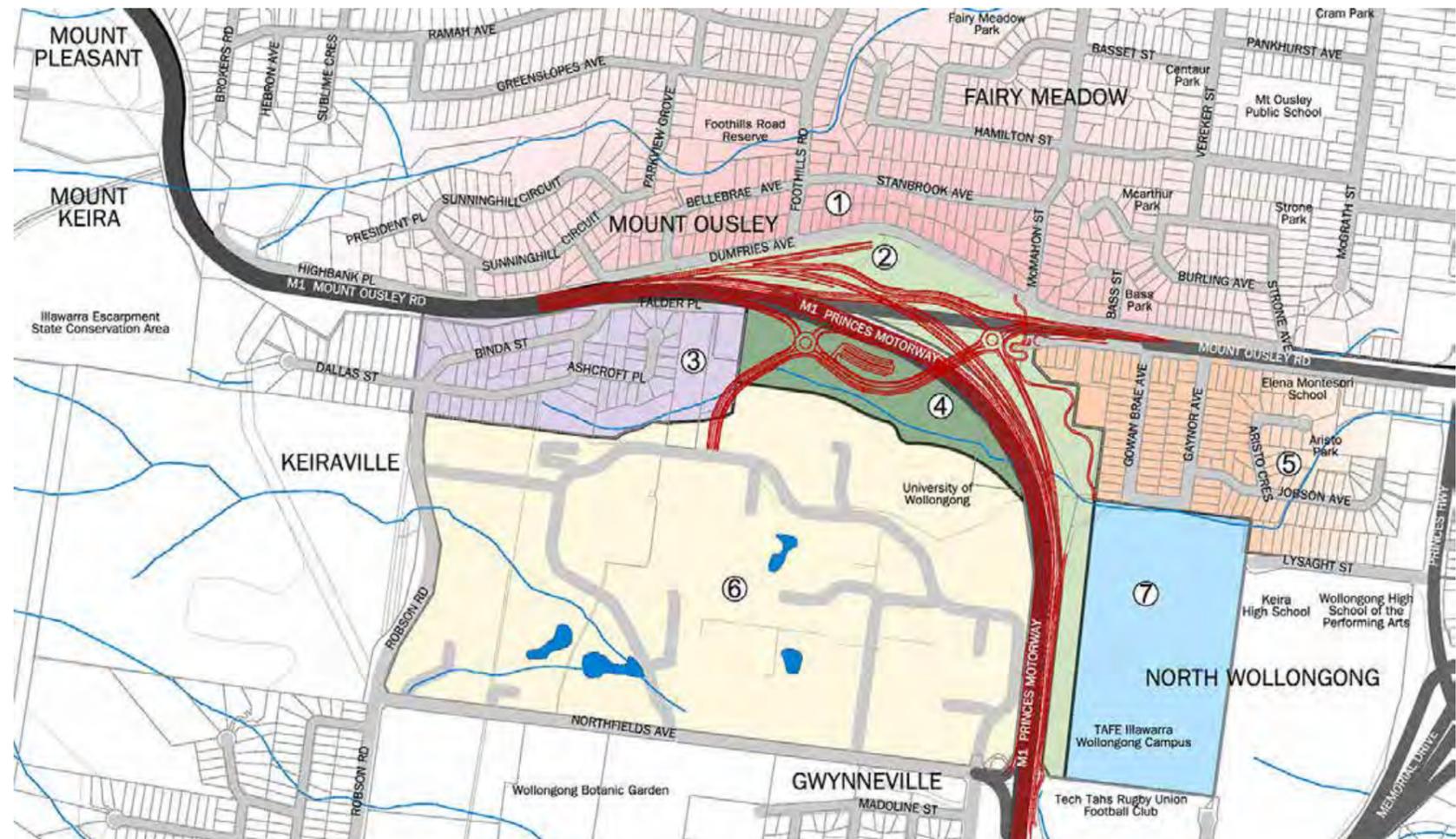
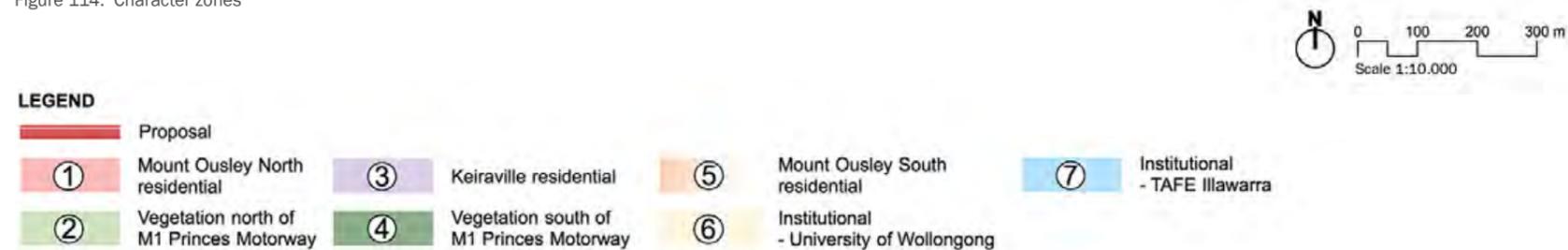


Figure 114. Character zones



### LANDSCAPE CHARACTER ZONE 1: MOUNT OUSLEY - NORTH RESIDENTIAL

Located north of the interchange, Mount Ousley is a residential suburb positioned at the foothills of Mount Keira comprising of single and double storey dwellings on suburban blocks. Residential roads generally have grassed verges and no footpaths and have a highly vegetated character with mature trees contributing to the scenic quality of the suburb. Views west to Mount Keira are common from the east-west aligned streets.

Vegetation in the residential areas is typically a mix of native and exotic species, including informal street tree planting, and mixed tree and shrub plantings within established gardens in private properties. Swathes of remnant vegetation, typically Escarpment Blackbutt Forest provide a distinctive identity and reference the pre-existing vegetation of the area. Such areas include - along creek lines flowing east through the suburb, at the rear of the properties between Hamilton Street and Stanbrook Avenue and also at Foothills Road Reserve. Individual large established native species including Eucalyptus species, and tall landmark plantings of Araucaria species scattered throughout the suburb further help to establish the identity of this residential neighbourhood.



Figure 115. Typical residential properties on Dumfries Avenue within Mount Ousley - Character Zone 1  
Source: www.google.com.au/maps

A commercial and retail strip is concentrated at the corner of Mount Ousley Road and Princes Highway to the east of the residential area.

**Sensitivity:** This area is typically suburban in nature, including the built form and vegetation within properties. The neighbourhoods are highly scenic due to the mature planting and views to Mount Ousley. The sensitivity of the zone is considered to be **high**.

**Magnitude:** Mount Ousley Interchange would widen the Motorway and impact on nearby vegetation along the southern side of the character zone. The proposal would include the following changes within close proximity to the character zone:

- Road widening for the M1 main alignment / heavy vehicle bypass lane and associated retaining wall (RW01) to be approximately 200 metres long with an approximate maximum height of 2.3 metres located south of Dumfries Avenue
- Heavy vehicle safety ramp including the following along the northern side of the ramp;

- A retaining wall (RW02) extending for approximately 215 metres with an approximate maximum height of 5.8 metres
- 1:3 landscaped cut batters extending for approximately 300m and 3.5metres wide
- The potential noise wall (NW01) along the northern side of the heavy vehicle bypass lane / M1 main alignment and continues along the northern side of the heavy vehicle safety ramp. This noise wall would be fixed above the retaining wall (RW01) as well as above a portion of retaining wall (RW02) and be partially or wholly transparent. The height of the wall is undetermined at present and is to be confirmed in consultation with the community. The assessment is based on a possible height range of 3.0 – 8.0 metres.
- Gantry structure over M1 Motorway.

The proposal would introduce an increased area of pavement, add retaining walls and noise walls, as well as impact upon the screening vegetation to the south of Dumfries Avenue. However, due to the elevation of the properties in relation to the road, and the retaining walls facing away from properties, LCZ 1 is not visually impacted by the road and retaining wall elements. The noise walls on either side of the Motorway, together with the removal of the existing screening vegetation introduces a potentially tall structure to the character zone and view, particularly impacting dwellings facing Dumfries Avenue. Both noise walls have been designed to comprise partially or wholly transparent panels to minimise the visual impact. Vegetation screening in front of the walls would be provided, however would take time to establish and achieve adequate height to screen the noise wall.

The removal of the mature vegetation in LCZ 2 would also impact upon the visual amenity of residents along Dumfries Avenue. It is assumed that the removal of this vegetation may open up views to the Pacific Ocean and Wollongong CBD. These areas would undergo revegetation however larger trees and screen planting would take time to mature and re-establish the existing forested character of the area. The magnitude of the proposed changes is considered to be **moderate** in the first five years, reducing substantially over time as the revegetation and screen planting mature for noise wall heights in the range of 3.0 - 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of

- **high-moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high** (retained impact over long term) for noise wall heights of over 5.0 metres.

## LANDSCAPE CHARACTER ZONE 2: VEGETATION – NORTH OF M1 PRINCES MOTORWAY

This zone is the area situated central to the study area and north of the interchange where the M1 Motorway and Mount Ousley Road converge. This zone is characterised by a range in vegetation types that are typically densely structured and contributes to the forested character of the area and landscape setting.

A commuter car park lies on the northern verge of the Mount Ousley Road providing a highly used facility for people car-pooling and commuting to Sydney and surrounds. An unpaved safety ramp off the M1 Motorway bisects the dense vegetation north of the motorway.

Remnant forest vegetation includes the Escarpment Blackbutt forest, which typically remains intact north of the commuter car park and east of the Princes Motorway and offers a high quality and valued setting. A less established forest of native vegetation, weeds and exotics, planted as part of previous intersection works, define the character to the west of this zone between Dumfries Avenue and Mount Ousley Road. Overall, the dense vegetation provides a strong visual screening element to areas beyond the motorway, while the forest character contributes to the identity and amenity of the surrounding character zones.

The landform in this character zone typically has a southern aspect sloping down from the residential areas around Mount Ousley and Fairy Meadow towards the Princes Motorway. Mount Keira can be seen as a landmark to the west and provides a high scenic value and sense of place.



Figure 116. Dense vegetation along Dumfries Avenue at the edge of Character Zone 2

**Sensitivity:** The forested character of this area with densely planted understorey and open canopy establishes an enclosed spatial quality resulting in a **high** sensitivity rating.

**Magnitude:** The proposal would introduce considerable changes to this character zone, notably, vegetation clearing required to facilitate the new works for the road widening, heavy vehicle safety ramp, heavy vehicle bypass lane, heavy vehicle off ramp. Other changes within and around the character zone include:

- Heavy vehicle safety ramp including a retaining wall (RW02) extending approximately 215 metres with an approximate maximum height of 5.8 metres.
- Removal of large areas of vegetation for new road widening and new road alignment including in the areas surrounding the zones of new pavement. These surrounding areas include the following - between Dumfries Avenue and the main alignment / heavy vehicle safety ramp, between the heavy vehicle safety ramp and the heavy vehicle off ramp, along the length of the heavy vehicle off ramp associated with the cut embankment between the motorway alignment and the back of properties along Gowan Brae Avenue.

- The heavy vehicle off ramp would include the following along the northern side of the road,
- An approximately 140 metre long retaining wall (RW04) up to approximately 4.6 metres in height would be located south of the heavy vehicle safety ramp
- Two concrete road barriers (RW13d and RW13e) performing as low retaining walls are located on either side of the retaining wall (RW04). RW13d is approximately 70 metres long and located to the west, and RW13e is approximately 200 metres long and located to the east.
- Approximately 60 metre long retaining wall (RW10) up to approximately 4.8 metres in height would be located east of the pedestrian bridge over Mount Ousley Road
- A 1:3 cut batter extending from where the ramp would divert from the main alignment through to past the pedestrian bridge over Mount Ousley Road.
- Road widening for the M1 main alignment / heavy vehicle bypass lane and associated retaining wall (RW01) to be approximately 200 metres long with an approximate maximum height of 2.3 metres located south of Dumfries Avenue
- Heavy vehicle safety ramp including the following along the northern side of the ramp,
- A retaining wall (RW02) extending for approximately 215 metres with an approximate maximum height of 5.8 metres
- 1:3 landscaped cut batters extending for approximately 300 metres and 3.5 metres wide
- The proposed noise wall (NW01) along the northern side of the heavy vehicle bypass lane / M1 main alignment and continuing along the northern side of the heavy vehicle safety ramp. This noise wall would continue above retaining wall (RW01) and above a portion of retaining wall (RW02)
- Concrete road barriers (RW13a) performing as low retaining wall extending approximately 70 metres between the RW01 and the existing retaining wall proposed to be retained on the northern side of the M1 Princes Motorway
- Concrete road barriers (RW13b) performing as low retaining wall extending approximately 95 metres between the retaining walls (RW01 and RW02)
- Heavy vehicle safety ramp 2
- Heavy vehicle bypass lane including 1:3 cut batters and retaining walls associated with the heavy vehicle underpass.
- Pedestrian Bridge over Mount Ousley Road and new shared path connections from Dumfries Avenue connecting to the pedestrian bridge over Mount Ousley Road
- Noise wall (NW04a), with partially or wholly transparent panels to the south of Mount Ousley Road

- Two gantries, one over M1 Motorway and one over Mount Ousley Road off ramp would be seen in the distance
- Revegetation with native trees and understory planting where existing bushland has been impacted
- Screen planting between Dumfries avenue and noise wall (NW01)
- Revegetation of the Escarpment Blackbutt Forest including the following areas - north of the Heavy Vehicle off ramp, between south bound service road and the M1 Princess Motorway, between Mount Ousley Road on ramp southbound, north of Mount Ousley Road on ramp southbound.
- A 120 metre long retaining wall (RW12) up to approximately 4.2 metres in height is proposed along the southern side of Dumfries Avenue, opposite Bass Street.

The proposal would transform the landscape character by the removal of large areas of vegetation and modification of the landform. It would change the spatial quality of the area and impact on views for both motorists on the M1 upgrade and also local roads including Dumfries Avenue as well as residents along Dumfries Avenue. The changes to this landscape character therefore result in the magnitude being assessed as **high**. It should be noted that the rating would reduce over time when the proposed trees and shrubs mature for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of,

- **high** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high** (retained impact over long term) for noise wall heights of over 5.0 metres

### LANDSCAPE CHARACTER ZONE 3: KEIRAVILLE RESIDENTIAL

This zone is the small residential suburb of Keiraville at the foot of Mount Ousley, situated in a steeply undulating gully between the M1 Princes Motorway and the University of Wollongong. Mount Keira provides the backdrop to this well-established residential area characterised by single and double storey detached dwellings typically with low or no front fences. Streets have grass verges and no footpaths.

Vegetation comprises a variety of established native and exotic species primarily located within verges in front of private properties as well as some street tree planting. A dense band of vegetation to the rear of the houses along Dallas Street and Binda Street provides a physical and visual barrier between the properties and the Motorway. An area of remnant Escarpment Moist Blue Gum Forest remains along the southern boundary of this character zone separating it from the northern car park and ring road at the University of Wollongong.

**Sensitivity:** Due to the existing suburban nature of this area including areas of revegetation within properties and adjacency to the M1 Motorway, the sensitivity of this character zone is considered to be **moderate**.

**Magnitude:** The proposal introduces a number of changes associated with this character zone including road widening for the northbound on ramp, and the proposed University Access Road. Other changes within the character zone would include.

- Approximately 300 metre long retaining wall (RW03) ranging in height from approximately 1.2 to 5.9 metres extending along the southern side of the northbound on ramp

- Noise wall (NW02) positioned on top of retaining wall (RW03) which would be partially or wholly constructed of transparent panels

The proposal would introduce an increased area of pavement, removal of roadside vegetation adjacent to the M1 Motorway along Falder Place. The noise wall along Falder Place would be constructed partially or wholly of transparent panels to reduce visual intrusion and overshadowing of properties along Falder Place. New planting of screening shrubs and trees are proposed to mitigate the impact of new retaining and noise walls. The magnitude of the proposed changes is therefore considered to be **moderate** in the first five years reducing over time as the tree planting matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of,

- **moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high-moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.



Figure 117. Residential properties of Keiraville on the foothills of Mount Ousley overlooking the University of Wollongong - Character Zone 3  
Source: www.google.com.au/maps

#### Landscape Character Zone 4: Vegetation – South of M1 Princes Motorway

This zone is the area lying central to the proposal area and south of the interchange where the M1 Princess Motorway and Mount Ousley Road converge. This zone sits east of LCZ 3 and incorporates heavily forested areas along the northern boundary of the University of Wollongong and generally slopes away from the Motorway alignment with a south-westerly aspect.

This zone is densely vegetated and includes a creek line flowing from west to east crossing the motorway. Adjacent to the motorway, vegetation is typically a mix of weeds and exotics. Closer to the creek line significant remnant stands of Escarpment Blackbutt Forest and Escarpment Moist Blue Gum Forest remain. The vegetation provides a visual screen to the University of Wollongong between the motorway and areas beyond, establishes a forested natural setting to the northern boundary of the University grounds, and contributes to the character and amenity of the surrounding character zones.

**Sensitivity:** This zone is characterised by its forested nature, including remnant vegetation communities. The sensitivity of this landscape character zone is therefore considered to be **high**.

**Magnitude:** The proposed upgrade to the M1 Motorway would involve clearing of vegetation in this landscape character zone for the proposed works including,

- Western roundabout near the University Access Road
- Approximately 300 metre long retaining wall (RW03) ranging in height from approximately 1.2 to 5.9 metres extending along the southern side of the northbound on ramp
- Approximately 480 metre long noise wall (NW02) with partially or wholly transparent panels extending above retaining wall (RW03)
- Retaining walls (RW07) and (RW08a) on the southern side of Mound Ousley Road would have a combined length of approximately 300 metres and ranging in height up to approximately 11.7 metres. This wall would continue and return as retaining wall (RW08b) as the western abutment wall beneath the bridge over M1 Princes Motorway.
- Two spill basins, one located west of University Access Road, and one located south of Mount Ousley Road and retaining wall (RW08a)
- New landscaped fill embankments along the western and eastern sides of the University Access Road
- New shared path proposed adjacent to Mount Ousley Road and the University Access Road
- New commuter car park

The removal of vegetation within this character zone would change the spatial qualities of this area and would reduce this natural visual barrier between the motorway and areas beyond and change the character of this vegetated roadside environment substantially. The magnitude of the proposed changes is considered to be **high** in the first five to 10 years reducing over time as the trees mature for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of,

- **high** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high** (retained impact over long term) for noise wall heights of over 5.0 metres.



Figure 118. Verge vegetation fronting the southern side of the M1 Princes Motorway within Character Zone 4

### Landscape Character Zone 5: Mount Ousley - South Residential

This character zone encompasses the south-eastern portion of the residential suburb of Mount Ousley, located south of Mount Ousley Road and west of the Princes Highway. A mix of single and double storey detached dwellings typically establishes the identity of this residential area. Houses are setback from the street frontage with grass street verges and some footpaths.

Vegetation in this character zone comprises a mix of both exotic and native. Street planting is generally unstructured and informal, with vegetation within this character zone predominantly occurring within private property. A number of larger Eucalyptus species appear to be remnant plantings and occur throughout the suburb and more notably along the creek line between Jobson Avenue and Princes Highway and also along the southern boundary of the character zone where the trees provide a strong visual screen to the adjacent TAFE.

The topography falls from west to east following the natural fall of land from the Illawarra escarpment towards the coast. A natural creek line continuing from LCZ3 and LCZ4 flows along the south of the residential area, before heading in a north east direction towards and under the Princes Highway and the south coast rail line before joining Cabbage Tree Creek.

A small commercial strip is located to the eastern edge of the suburb along the Princes Highway. Glimpses of Mount Keira can be viewed to the west from more elevated streets contributing to a sense of place.



Figure 119. Single storey properties along Gaynor Avenue within Character Zone 5  
Source: [www.google.com.au/maps](http://www.google.com.au/maps)

**Sensitivity:** Due to the suburban nature of this residential area the sensitivity of this character zone is considered to be **moderate**.

**Magnitude:** The proposal would introduce a number of changes associated with this character zone including road widening of Mount Ousley Road and removal of vegetation in the following locations - between Mount Ousley Road and the southbound on ramp and between the southbound on ramp and the backs of properties along Gowan Brae Avenue. Other changes within close proximity to the character zone include.

- A retaining wall (RW11) with an approximate maximum height of 5.4 metres extends for approximately 125 metres along the southern side and facing Mount Ousley Road, beginning at Gowan Brae Avenue and continuing to just past the pedestrian bridge over Mount Ousley Road
- A noise wall (NW04a) would extend along the top of the retaining wall between Gowan Brae Avenue and the pedestrian bridge over Mount Ousley Road. This noise wall would be partially or wholly transparent
- A noise wall (NW04b) is proposed to the west of the new shared path connecting to the existing shared path along TAFE Illawarra, would comprise of partially or wholly transparent coloured panels
- Pedestrian bridge over Mount Ousley Road.

- Vegetation removal for the regrading of the proposed shared path connecting the pedestrian bridge over Mount Ousley Road; east towards Old Mount Ousley Road; west towards the pedestrian crossing at the southbound on ramp and the University of Wollongong; and south to TAFE Illawarra
- Screen planting along the back of noise walls (NW04a and NW04b)
- Revegetation of cleared areas between Mount Ousley Road and the southbound on ramp and between the southbound on ramp and the backs of properties along Gowan Brae Avenue.

The removal of vegetation along Mount Ousley Road, near the eastern roundabout and along Old Mount Ousley Road would impact on the character of this area. The magnitude is considered to be **moderate** in the first five to ten years reducing over time as the tree plantings in LCZ 2 matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of,

- **moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high-moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.

### Landscape Character Zone 6: Institutional - University of Wollongong

This zone is the campus of the University of Wollongong, lying east of the Illawarra Escarpment State Conservation Area and is bounded by the M1 Motorway to the north and east, limiting its integration to the north and east. This zone does not include the forested area along the northern boundary of the University identified as part of LCZ4.

The campus dates back to the early 1950s and was previously used as farming land. The campus design of today was established by landscape architect Bruce Mackenzie's Master Plan in the early 1970s, with a vision to reflect the original forested landscape character of the region.

The campus consists of a variety of multi-storey buildings set in a rainforest and tall Eucalyptus forest landscape setting within a simple, ring road street design built in the 1980s. Sport fields, open grassed areas, generous landscaped building setbacks and established streetscapes contribute to the visual quality of the campus. Vegetation is predominantly native tree plantings that provide established screening to surface and multi-storey car parks and campus buildings. Brick paving on paths connects the buildings, providing a pedestrian scale and sense of cohesion.



Figure 120. A multi-storey building adjacent to the ring road and tall Eucalyptus trees within the University of Wollongong - Character Zone 6

The topography is generally flat with a gentle east-west slope. A densely vegetated creek line draining from Mount Keira crosses the south-west corner of the campus at its low point and feeds into the chain of ponds throughout the central campus. This pocket of vegetation provides a buffer between the main campus buildings and the University accommodation. The University is a major employer in the region and has over 30,000 students.

**Sensitivity:** Due to established open informal vegetated character of this institutional setting and the forested edge planting offered by LCZ4 to the north, this character zone has a sensitivity rating of **moderate**.

**Magnitude:** The proposed upgrade includes the following changes:

- University Access Road, provides a new road and shared path connection to the University with fill embankments on either side of the road
- Widening of M1 Motorway and clearing of roadside vegetation along the eastern boundary of the University
- Revegetation of native species along the eastern boundary of the character zone adjacent to the M1 Princes Motorway

The following elements occur within close proximity to this character zone;

- Retaining walls (RW07) and (RW08a) on the southern side of Mound Ousley Road would have a combined length of approximately 300 metres and with an approximate maximum height of 11.7 metres
- A concrete road barrier (RW13f) performing as low retaining wall extending approximately 50 metres along the western side of the Northfields Avenue on ramp northbound.
- Two Spill basins, one located west of University Access Road, and one located south of Mound Ousley Road and retaining wall (RW08a)
- Realignment of Mound Ousley Road and new roundabout at junction with University Assess Road and northbound on ramp
- Widening of M1 Motorway and clearing of roadside vegetation along the eastern boundary of the University
- Widening of the M1 Princes Motorway east of the University and removal of roadside vegetation
- Revegetation of Escarpment Moist Blue Gum Forest and the Escarpment Blackbutt Forest associated with LCZ4, north of this character zone
- Gantry spanning across the motorway to the east.

The proposal would impact upon existing vegetation along the eastern boundary of the University and remove considerable roadside vegetation within the adjacent LCZ4 and to the western boundary of this character zone. Removal of vegetation would significantly reduce the visual buffer between the M1 Motorway and associated road infrastructure in the short to medium term until the new vegetation matures. The changes to this landscape character results in a magnitude being assessed as **moderate**.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of **moderate** in the first five to ten years reducing over time as the trees and understory planting matures.

**Landscape Character Zone 7: Institutional - TAFE Illawarra**

This character zone is the Wollongong campus of TAFE Illawarra. The campus is positioned east of the M1 Motorway corridor alongside the University of Wollongong to the west. The campus is generally flat and consists of numerous multi-storey buildings arranged in a grid like pattern with central courtyards, green spaces and paved pedestrian zones between buildings.

Established vegetation consists predominantly of native tree species such as Eucalypts and Casuarinas planted in the courtyards and car parks. These mature tree species contribute largely to the character of the campus.

The campus is predominantly pedestrianised in the core, with access roads and on-grade car parks located on the outer edges and having a dominating presence. This is particularly the case on the western and southern edges of the campus where large car parking areas sit along the entire length of the boundaries, allowing filtered views between the TAFE and surrounding context.

**Sensitivity:** Due to the built up character of the campus with a centralised, less open core, and established tree plantings scattered through the grounds, the sensitivity is considered to be **low**.

**Magnitude:** The proposal includes the following changes closely associated with the character zone.

- Widening of the M1 Motorway providing for the southbound off ramp including fill embankments.
- Adjustment to the existing shared path adjacent to the eastern side of the M1 Princes Motorway
- Removal of roadside vegetation adjacent to motorway associated with the road widening
- Pedestrian bridge extension over M1 Princes Motorway near Northfields Avenue and new shared path access ramp on the eastern side of the bridge
- Revegetation of native trees and understory planting between TAFE Illawarra and the M1 Princes Motorway.

Proposed changes would remove some roadside vegetation between the M1 Motorway and TAFE Illawarra impacting on the visual relationship between the TAFE and the M1 Motorway. The changes to this landscape character results in a magnitude being assessed as **low**.

**Assessment of impact:** The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of **low**.



Figure 122. TAFE Illawarra car park on the western side of Character Zone 7



Figure 121. Shared path next to TAFE Illawarra within Character Zone 7

Table 4. Landscape character summary

Character Zone	Sensitivity	Magnitude	Impact Rating
LCZ 1 - Mount Ousley - North Residential	high	moderate	high-moderate
LCZ 2 - Vegetation - North of M1 Princes Motorway	high	high	high
LCZ 3 - Keiraville Residential	moderate	moderate	moderate
LCZ 4 - Vegetation - South of M1 Princes Motorway	high	high	high
LCZ 5 - Mount Ousley - South Residential	moderate	moderate	moderate
LCZ 6 - Institutional - University of Wollongong	moderate	moderate	moderate
LCZ 7 - Institutional - TAFE Illawarra	low	low	low

## 5.4 VISUAL IMPACT ASSESSMENT

The visibility of the proposal is illustrated in the Visual Envelope Map (VEM) (Figure 123). The visibility of the proposal from outside the corridor is limited due to the existing vegetation and topography. The large areas of vegetation loss as a result of the proposal throughout the interchange would expose the road upgrade and structures to nearby residences, local road network educational institutions and public spaces, particularly in the short term until the new vegetation reaches maturity. The following elements would be visible from surrounding residents and motorists and discussed in greater detail in the visual assessment of viewpoints in section 5.4.2. These elements include, noise walls, retaining walls, Bridge over the M1, pedestrian bridge over Mount Ousley Road, pedestrian bridge extension over the M1 Motorway at North fields, heavy vehicle safety ramps, large gantry and signage structures as well as the widened road area. The resultant loss of road corridor vegetation would heighten the impact of these new structures..

The VEM indicates that the views are largely contained within the corridor with a few exceptions including.

- Dumfries Avenue with views towards the noise wall (NW01)
- Falder place and Binda Street with views towards the noise wall (NW02)
- Old Mount Ousley Road with views towards the noise wall (NW04a) and the pedestrian bridge over Mount Ousley Road
- University of Wollongong where views are partially screened by vegetation barriers and institutional buildings

### 5.4.1. IDENTIFICATION OF VIEWPOINTS

The selection of viewpoints, for discussion, has been based on identifying:

- Views that assess the impact of the proposal at a range of distances (short, medium and long) from the proposal and therefore provide a range of visual detail
- Particular views that address issues specific to a certain viewpoint.

All of the viewpoints have been illustrated with 'before' (existing view) and 'after' views with the 'after' view bring extracted from the three dimensional visualisation.

The viewpoints are:

- Viewpoint 1 (VP1) : Looking east from Mount Keira lookout
- Viewpoint 2 (VP2): Looking east along Princes Motorway
- Viewpoint 3 (VP3): Looking southeast from the corner of Dumfries Avenue and Bellebrae Avenue

- Viewpoint 4 (VP4): Looking east from Falder Place
- Viewpoint 5 (VP5): Looking east from the Princes Motorway
- Viewpoint 6 (VP6): Looking northeast from the University of Wollongong
- Viewpoint 7 (VP7): Looking southwest from the corner of Dumfries Avenue and McMahon Street
- Viewpoint 8 (VP8): Looking west from Mount Ousley Road
- Viewpoint 9 (VP9): Looking north from Princes Motorway on approach to Mount Ousley Road
- Viewpoint 10 (VP10): Looking northwest from open space west of Gowan Brae Avenue
- Viewpoint 11 (VP11): Looking north along Princes Motorway
- Viewpoint 12 (VP12): Looking north along Princes Motorway towards the pedestrian bridge extension over the M1 Motorway.

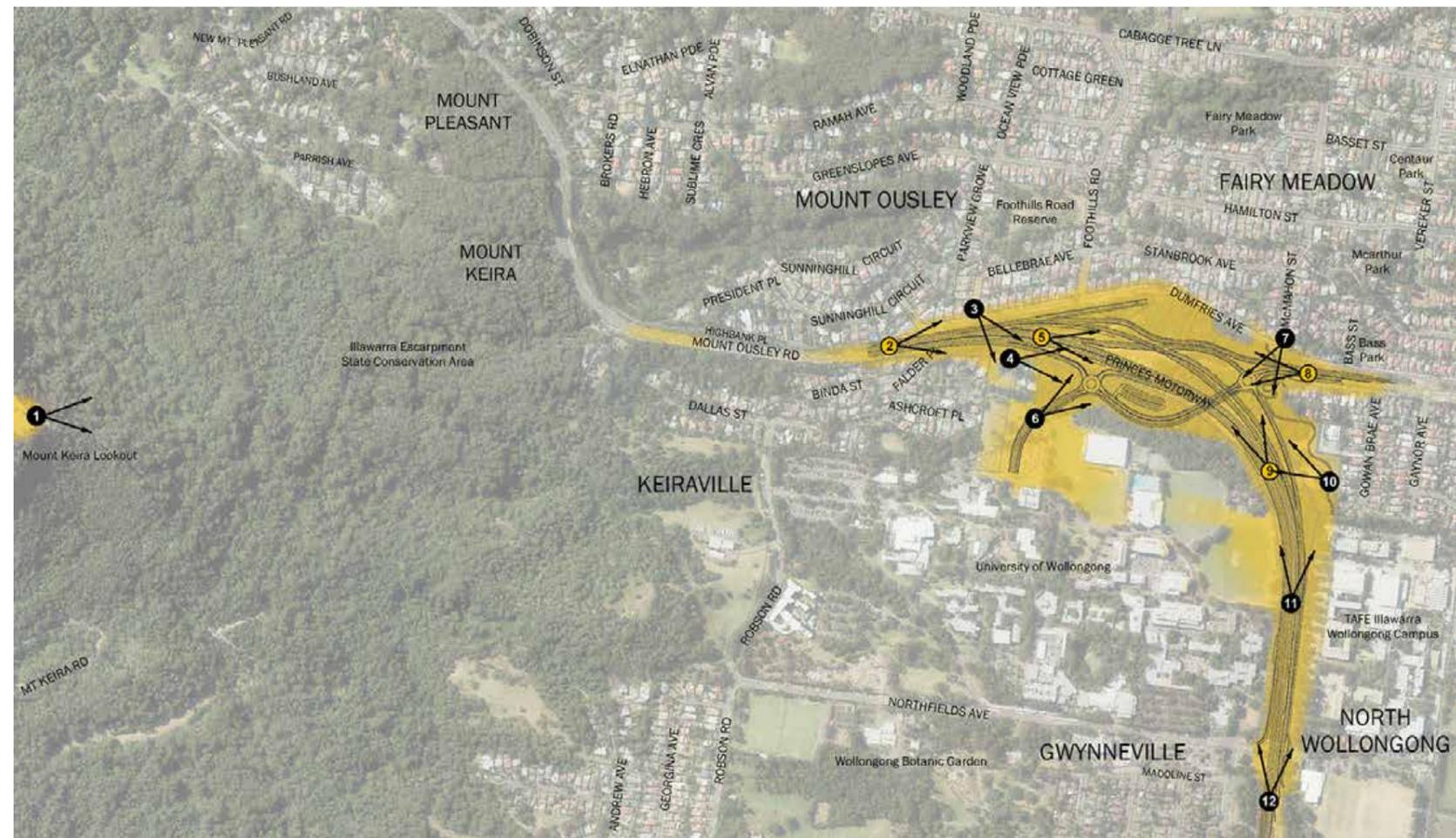


Figure 123. Viewpoints and Visual Envelope Map



## 5.4.2. ASSESSMENT OF SELECTED VIEWPOINTS

### VIEWPOINT 1 - LOOKING EAST FROM MOUNT KEIRA LOOKOUT (VP1)

**Description:** The view is from the Mount Keira Lookout approximately 2km west from the proposed interchange. Broad sweeping panoramic regional views take in the forested foothills of the Illawarra escarpment leading to the suburban, institutional and commercial developments on the flatter coastal plains with the view extending beyond to the Tasman Sea. The existing interchange, as well as the proposal, with surrounding vegetation is an identifiable feature from this view.

**Sensitivity:** This is a popular lookout with foreign tourists and local tourists alike. It is an attractive regional view including the coastline and therefore the sensitivity is considered to be **high**.

**Magnitude:** The majority of the proposal would be viewed from this elevated viewpoint including the road widening and associated paved areas, three new bridges and one bridge extension, on ramps and off ramps, University Access Road, safety ramps, two heavy vehicle safety ramps, two proposed roundabouts and commuter car park, gantry structures, retaining walls and noise walls. Vegetation clearing throughout the proposal would be prominent from Dumfries avenue in the north, to the realignment of Mount Ousley Road in the South and east towards the back of properties along Gowan Brae Avenue. Revegetation is proposed in these cleared roadside areas as well as throughout the interchange, however it would take 10 to 15 years for the trees to mature. Due to the long range nature of this view the magnitude of change is considered to be **low** reducing over time as the vegetation matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain a **low** impact rating, yet with a higher magnitude of change when compared to the smaller walls, in the long term i.e. with little or no reduction in impact over time as the planting matures.

It should be noted that the heights of the proposed noise walls are to be further assessed and the final heights are to be determined in the Detailed Design stage of the project.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of,

- **moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.



Figure 124. Viewpoint 1 Looking east from Mount Keira lookout - Existing

## VIEWPOINT 2 - LOOKING EAST ALONG THE PRINCES MOTORWAY (VP2)

**Description:** The view is from the M1 Princes Motorway looking east along the Motorway as it begins a sweeping turn to the south (right of view) with Mount Ousley Road seen extending towards the centre of view towards the background.

Dense roadside vegetation is seen on both sides of the M1 Princess Motorway with the tall native forest visible along both sides on Mount Ousley Road. To the left of the view, the sand and grass surface of the heavy vehicle safety ramp can be seen extending into the roadside vegetation. On the right of view, extending above the concrete noise wall, established shrubbery vegetation restricts views beyond. Poorly maintained concrete medians with weed growth along the M1 Princess Motorway and also where Mount Ousley Road diverges from the main alignment is visible in this view. Gateway tree plantings of Cabbage Tree Palms can be seen in the median between Mount Ousley Road and M1 Princess Motorway at the centre of view in the mid distance. Road signage, light poles and steel safety barriers are significant visible roadside elements framed within the vegetation.

**Sensitivity:** Southbound motorists approaching the Wollongong exit at Mount Ousley Road and also those continuing south on the M1 Princes Motorway would experience this view. Despite the attractive established vegetated surrounds, the extent of road pavement and roadside infrastructure results in the sensitivity being assessed as **moderate**.

**Magnitude:** The proposal would see substantial changes as seen from this viewpoint. A considerable amount of vegetation would be cleared to accommodate the proposal and significant new structures would be prominent elements in this view.

To the left of the view, the retaining wall and partially or wholly transparent panelled noise wall (NW01) clad with a weathering steel wave pattern would be a highly visible element and be seen to extend above a concrete road barrier adjacent to the heavy vehicle safety ramp. Along the left hand side of the heavy vehicle safety ramp this weathering steel cladding would transition into the sandstone clad retaining wall (RW02). Cleared vegetation between Dumfries Avenue and the heavy vehicle safety ramp 1 would reveal distant views towards the residents along Dumfries Avenue as seen through and above the partially or wholly transparent panels of the noise wall (NW01). Proposed dense planting of this area would screen this view as shrubs and trees mature with time.

At centre of view Mount Ousley off ramp can be seen leading directly towards the pedestrian bridge over Mount Ousley Road as seen in the background of this view. The formal planting of Cabbage Tree Palms along both sides of Mount Ousley Road would highlight the alignment and the approach to this northern entry point to Wollongong. The sculptural forms of pedestrian bridge elements and the structured planting of the Cabbage Tree Palms would be a visible gateway element in this view aiding road legibility and wayfinding. Where Mount Ousley Road diverts from the main alignment two gantries would be prominent elements, one over Mount Ousley Road and one over the M1 Princes Motorway.

Between the Heavy Vehicle safety ramp and Mount Ousley Road a number of road elements can be seen. The sandstone clad retaining wall (RW04) extending for approximately 140 meters can be seen extending along the northern side

of the heavy vehicle off ramp southbound. Also, the painted, precast concrete clad retaining wall (RW05) associated with the heavy vehicle underpass would be partly visible. The land between the heavy vehicle safety ramp 1 and the heavy vehicle bypass as well as the cut embankment extending beyond the retaining walls (RW04, RW13d and RW13e) would be cleared and revegetated with Escarpment Blackbutt Forest species and be highly visible from this view. In the longer term, trees and other planting would help screen RW05.

As the M1 Princes Motorway turns to the right a formal line of Sydney Blue Gum trees would establish a strong presence along the left hand side of the road aiding in improving the legibility of the Motorway alignment. The alignment of these trees would lead the motorist view towards the bridge over the M1 Motorway seen above and /or through the partially or wholly transparent panelled noise wall (NW02) towards the right and background of this view. The sandstone clad eastern abutment (RW09) and eastern bridge span would also be visible above and through the partially or wholly transparent panelled noise wall (NW02).

Behind this formal line of trees on the left of the M1 Princes Motorway, the revegetation of Escarpment Blackbutt Forest species is proposed. This planting would mature in time and re-establish a natural forested character for the upgrade helping to mitigate the perceived scale of the bridge over the M1 Motorway.

The concrete barrier, with the partially or wholly transparent panelled noise wall (NW02) above, on the western side of view, extends along the main alignment and continues adjacent to Mount Ousley Road on ramp. Clearing of vegetation behind this noise wall would reveal views, if wholly transparent panelled noise wall were to be adopted, towards the western roundabout, University Access Road and the commuter car park. Revegetation of this area with Escarpment Blackbutt Forest species and also feature planting of the Illawarra Flame tree would screen this view as the trees and shrubs mature in time.



Figure 125. Viewpoint 2 looking east along Princes Motorway - Existing

It should be noted that the height of the noise wall (NW01 and NW02) would be further assessed and the final height would be determined in the Detailed Design stage of the project. Any variation to the height of either of these two walls as seen from this viewpoint would be highly visible and noticeable to motorists on the M1 Princes Motorway.

These proposed planting works would help to screen views towards residential areas, mitigate the magnitude of the bridge over the M1 Motorway, gantry, noise and retaining wall structures. However it would take approximately 1 - 5 years for the proposed shrubs and screen planting to reach a mature height and trees 10 - 15 years. The magnitude of change in the first five years is therefore considered **high** reducing over time as the vegetation matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures..

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of

- **high-moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high - moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.

It is to be noted that the assessment of the visual impact considers the entire visual catchment, and therefore a change to one element such as noise walls may not necessarily result in a higher rating. However it is acknowledged that higher noise wall heights will influence the level of visual connectivity to areas beyond the corridor, and contribute to an increase in bulk and scale, and sense of visual enclosure.

ARTISTS IMPRESSIONS OF VIEWPOINT 2 (VP2) LOOKING EAST ALONG PRINCES MOTORWAY



Figure 126. VP2 - Proposal showing the potential range of noise wall heights and planting at road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

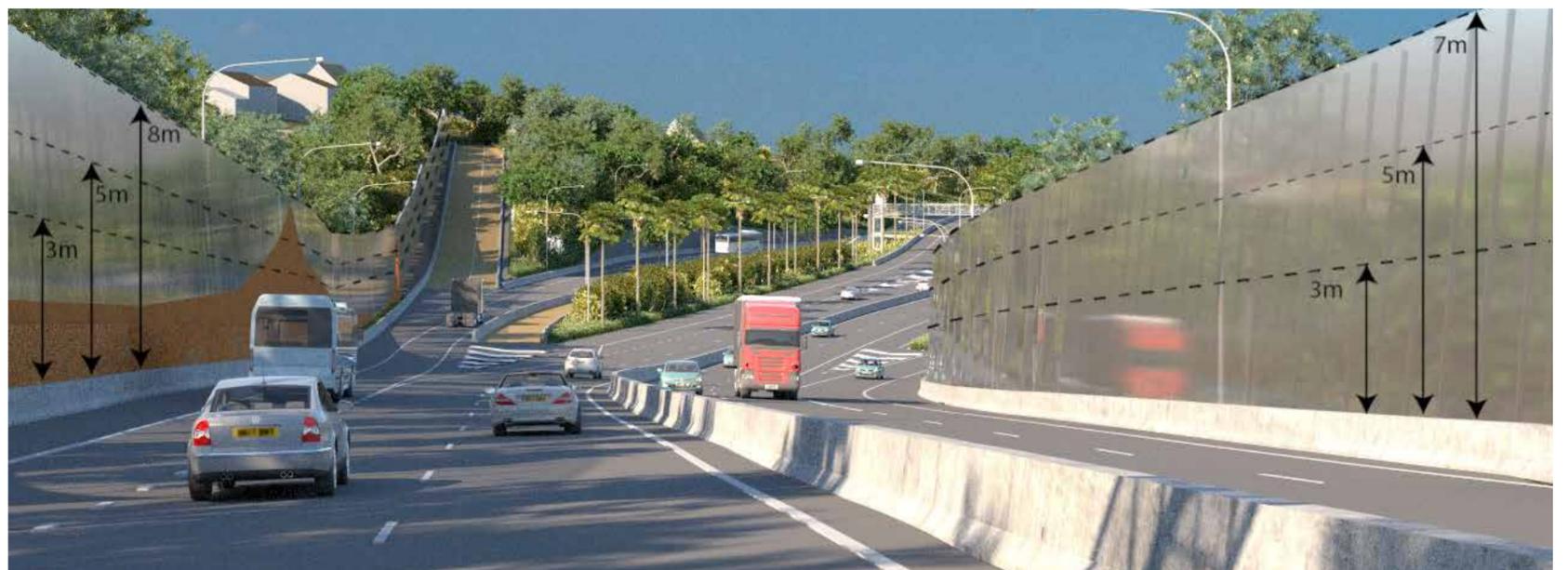


Figure 127. VP2 - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

### VIEWPOINT 3 - LOOKING SOUTHEAST FROM THE CORNER OF DUMFRIES AVENUE AND BELLEBRAE AVENUE (VP3)

**Description:** The view is from the corner of Dumfries Avenue and Bellebrae Avenue looking southeast towards the roadside vegetation extending between Dumfries Avenue and the Princes Motorway below. A grass verge adjacent to the road transitions to a densely planted understory with trees screening views. Predominately native trees establish a more open canopy allowing for filtered sky views. It should be noted that this view is representative for a number of properties along Dumfries Avenue, with similar views experienced from the properties at 56 Dumfries Avenue through to 96 Dumfries Avenue.

**Sensitivity:** This view would be predominantly experienced by local residents. The road corridor boundary screen planting of predominately native species provides a vegetated character and contributes to the sensitivity being considered as **moderate**.

**Magnitude:** The proposed upgrade includes widening of the M1 Motorway including the new alignment of the heavy vehicle safety ramp requiring the clearing of all roadside vegetation between Dumfries Avenue and the top of the proposed retaining wall (RW01) adjacent to the M1 Princes Motorway in this location. The partially or wholly transparent panelled noise wall (NW01) proposed on top of the new retaining wall (RW 01) along the northern side of the M1 Princes Motorway would be visible in this location. The noise wall panels would be partially or wholly transparent and designed to reduce the perceived scale of the noise wall. Revegetation of native trees and shrubs are proposed in this area for screening of the structure and reinstating a character similar to the existing in the long term. Short-term views from this location are anticipated to project over the proposed upgrade below revealing long distance view of the Wollongong CBD and Tasman Sea beyond. Elements of the proposal visible towards the centre of this view include; two gantries located where Mount Ousley Road diverts from the main alignment, retaining walls of the heavy vehicle off ramp, Mount Ousley Road off ramp southbound. Towards the back of this view visible elements include, the Bridge over M1 Motorway (BR1) and the pedestrian bridge over Mount Ousley Road (BR2) with associated retaining wall (RW11) and noise walls (NW04b). Distant, regional views to the south would be visible through the partially or wholly transparent panelled noise wall until proposed screening plants and trees establish.

The height of the noise wall (NW01) would be further assessed and the final height would be determined in the Detailed Design stage of the project. Any variation to the height of the wall as seen from this viewpoint would be visible and noticeable to residents along Dumfries Avenue due to the close proximity.

It would take approximately 1 – 5 years for the shrubs to reach a mature height and 10 - 15 years for the trees. The magnitude of change in the first five years is therefore considered **high** reducing over time as the vegetation matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of

- **high-moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high - moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.

It should be noted however that some residents may consider this a positive rather than a negative impact.

It is also to be noted that the assessment of the visual impact considers the entire visual catchment, and therefore a change to one element such as noise walls may not necessarily result in a higher rating. However it is acknowledged that higher noise wall heights will influence the level of visual connectivity to areas beyond the corridor, and contribute to an increase in bulk and scale, and sense of visual enclosure.



Figure 128. Viewpoint 3 looking southeast from the corner of Dumfries Avenue and Bellebrae Avenue - Existing

ARTISTS IMPRESSIONS OF VIEWPOINT 3 (VP3) LOOKING SOUTHEAST FROM THE CORNER OF DUMFRIES AVENUE AND BELLEBRAE AVENUE



Figure 129. VP3 - Proposal showing the potential range of noise wall heights and planting at road opening  
Note: Artists impression is indicative only and subject to further design development and consultation



Figure 130. VP3 - Proposal showing mature planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 4 - LOOKING EAST FROM FALDER PLACE (VP4)

**Description:** The view is from the end of Falder place where the road terminates in a cul de sac adjacent to the Princes Motorway. The view is looking east towards a highly vegetated block of land containing residential properties. The M1 Princes Motorway is concealed behind roadside vegetation along the left of view at a higher elevation. Dense mid ground plantings in the centre of view provide a visual screen to the existing noise walls adjacent to the motorway alignment. Established native trees are scattered within the private property and beyond. The tops of the forested hills in the background are part of the native vegetation community located south of Dumfries Avenue. The foreground is characterised by grass verges, power poles and overhead electrical cables and high panel and palisade property boundary fences.

**Sensitivity:** This view would be experienced primarily by local residents. A car park is proposed by the University of Wollongong to the immediate right of the view (not visible in Figure 131) within this vicinity as part of the University of Wollongong's Master plan, so in the future it is anticipated those attending the university would also experience this view. It is a relatively well vegetated residential setting and the sensitivity is considered to be **moderate**.

**Magnitude:** As part of the proposal the motorway is to be widened, a retaining wall (RW03) and fill batter would extend along the southern side of the alignment. A noise wall (NW02) proposed along the southern side of the motorway alignment would be secured to the top of the retaining wall (RW03), with the noise wall constructed of partially or wholly transparent panels to reduce the magnitude of the structure for nearby residents on Falder Place and future University access.

These works would remove the vegetation along the back of the existing concrete noise wall to the left of view. New trees and screening shrubs are proposed adjacent to the new retaining wall (RW03) and the noise wall (NW02).

Towards the centre and in the mid ground of this view, and beyond the University Access Road the commuter car park and the bridge over the M1 Princes Motorway with sculptural throw screens supports can be seen towards the back of view. Proposed vegetation along the southern side of the University Access Road and adjacent to Mount Ousley Road on ramp northbound would screen views towards these areas in time as proposed planting matures.

The height of the noise wall (NW02) would be further assessed and the final height would be determined in the Detailed Design stage of the project. Any variation to the height of the wall as seen from this viewpoint would be visible and noticeable to residents along Falder Place.

It would take approximately 1 – 5 years for the proposed shrubs to reach a mature height in this location and trees 10 - 15 years. There would be substantial tree clearing in the centre of the view and along the Motorway. Revegetation is proposed in these areas, however these would take 10 to 15 years to mature. The magnitude of change in the first five years is therefore considered **high** reducing over time as the vegetation matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of.

- **high-moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high-moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.

It is to be noted that the assessment of the visual impact considers the entire visual catchment, and therefore a change to one element such as noise walls may not necessarily result in a higher rating. However it is acknowledged that higher noise wall heights will influence the level of visual connectivity to areas beyond the corridor, and contribute to an increase in bulk and scale, and sense of visual enclosure.



Figure 131. Viewpoint 4 looking east from Falder Place - Existing

**ARTISTS IMPRESSION OF VIEWPOINT 4 (VP4) LOOKING EAST FROM FALDER PLACE**



Figure 132. VP4 - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
 Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 5 - LOOKING EAST FROM THE PRINCES MOTORWAY (VP5)

**Description:** The view is from the M1 Princes Motorway looking southeast along the Motorway alignment as experienced by southbound motorists. To the left of the view, vehicles can be seen waiting to leave Mount Ousley Road prior to joining the M1 Princes Motorway. A strong presence of established native vegetation is a prominent feature along both road corridors. To the left of the view, a mature native forest environment establishes a dense planted boundary condition to Mount Ousley Road. Between Mount Ousley Road and the M1 Princes Motorway, gateway planting of native Cabbage Tree Palms species is visible in the median. A poorly maintained grass central median is seen to the right of view. Road signage, light poles and steel safety barriers are visible roadside elements.

**Sensitivity:** Southbound motorists travelling beyond the Mount Ousley off ramp experience this view. Despite the attractive established forested surrounds, the view is amidst a busy interchange resulting in the sensitivity being assessed as **low**.

**Magnitude:** The proposal would see substantial changes as seen from this viewpoint. A considerable amount of vegetation would be cleared to accommodate the proposal and significant new structures would be prominent elements in this view.

In the centre of this view, two large gantry structures would be highly visible, one extending over Mount Ousley Road off ramp on the left, and a larger gantry extending over the M1 Princes Motorway.

To the left of view, the sandstone clad retaining wall (RW02) and partially or wholly transparent panelled noise wall (NW01) can be seen along the northern side of the heavy vehicle safety ramp.

A sandstone clad retaining wall (RW04) extends along the northern side of the heavy vehicle off ramp. The pedestrian bridge over Mount Ousley Road which would be a highly visible gateway element in the background of this view. Beyond the retaining walls (RW04 and RW13e), a landscape embankment, cleared to accommodate the heavy vehicle off ramp, would be planted with native species to reinforce the Escarpment Blackbutt Forest vegetation community. In time this planting would mature and establish a roadside forested environment.

This view along Mount Ousley Road off ramp would be characterised by the planting of a formal line of mature Cabbage Tree palms along the right hand side of Mount Ousley Road off ramp and would provide a strong visual cue and direct the motorists line of sight towards the pedestrian bridge over Mount Ousley Road. To the left of view, at the gore area leading into Mount Ousley Road off ramp southbound, the existing metal sculpture is proposed to be located (subject to further consultation).

A formal line of Sydney Blue Gum trees would establish a strong presence along the left hand side of the M1 Princes Motorway and aid in the legibility of the Motorway alignment. The alignment of these trees would lead the motorist view towards the bridge over the M1 Motorway. This bridge would be a highly

visible structure with a sculptural throw screen supports and sandstone clad abutments.

Behind this formal line of trees on the left of the M1 Princes Motorway, the revegetation of Escarpment Blackbutt Forest species is proposed. This planting would mature in time and re-establish a natural forested character for the upgrade screening views of the noise wall (NW04b) located east of the new-shared path connecting to the existing shared path along TAFE Illawarra.

To the right of view, a partially or wholly transparent panelled noise wall (NW02) extends along Mount Ousley Road on a ramp northbound. The existing vegetation would be cleared for the upgrade including the realignment of Mount Ousley Road and the new commuter car park. From this viewpoint clear sight lines are proposed to extend towards and beyond the new commuter car park. Views would extend beneath canopy trees and above low growing groundcovers and grasses to promote passive surveillance and safety for users of the car park. The proposed trees are to be a mix of Escarpment Blackbutt Forest species, and the iconic Illawarra Flame tree used to provide identity and presence to the University of Wollongong and signal the new entry to the University.

The height of the noise walls (NW01, NW02 and NW04b) would be further assessed and the final heights would be determined in the Detailed Design stage of the project. The noise walls along the Motorway (NW01 and NW02), as seen from this viewpoint would be visible and noticeable to motorists on the M1 Princes Motorway. A taller wall would constrain views beyond towards vegetated embankments south of Dumfries Avenue (NW01; and would alter

peripheral views towards the university and existing and proposed planting behind the wall (NW02).

Proposed planting works would help mitigate the magnitude of extended roadway, noise and retaining wall structures. However it would take approximately 1 – 5 years for the proposed shrubs and screen planting to reach a mature height and trees 10 - 15 years. The magnitude of change in the first five years is therefore considered **high** reducing over time as the vegetation matures for noise wall heights in the range of 3.0 to 5.0 metres. Noise wall heights of over 5.0 metres are likely to retain an impact rating of **high** in the long term i.e. not reduce in impact over time as the planting matures.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of

- **moderate** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **moderate** (retained impact over long term) for noise wall heights of over 5.0 metres.

It is to be noted that the assessment of the visual impact considers the entire visual catchment, and therefore a change to one element such as noise walls may not necessarily result in a higher rating. However it is acknowledged that higher noise wall heights will influence the level of visual connectivity to areas beyond the corridor, and contribute to an increase in bulk and scale, and sense of visual enclosure.



Figure 133. Viewpoint 5 looking east from Princes Motorway - Existing

ARTISTS IMPRESSIONS OF VIEWPOINT 5 (VP5) LOOKING EAST FROM PRINCES MOTORWAY



Figure 134. VP5 - Proposal showing the potential range of noise wall heights and planting at road opening  
Note: Artists impression is indicative only and subject to further design development and consultation



Figure 135. VP5 - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

## VIEWPOINT 6 - LOOKING NORTHEAST FROM THE UNIVERSITY OF WOLLONGONG (VP6)

**Description:** The view is from just north of the existing car park within the University of Wollongong looking north east. The view takes in rolling lawn in the foreground with a few scattered trees and a strong vegetated backdrop of medium sized native trees. A water tank and sports field lighting can be seen to the right of view. The native planting provides a strong visual barrier to the Motorway beyond.

**Sensitivity:** People at the University, the car park as well as the adjacent sporting facilities, would experience this view. This boundary planting of predominantly native species provides a natural vegetated character to the northern edge of the University contributing to the sensitivity being considered as **high**.

**Magnitude:** As part of the proposal, a new University Access Road would extend from University Link Road to the new western roundabout. This proposed new road would involve new fill embankments and retaining walls and the removal of vegetation. These works would change the spatial qualities of this location and open up views along the alignment of the new University Access Road and beyond the vegetated boundary of the University. The proposed planting surrounding the roundabout would help mitigate views beyond the roundabout. It would be characterised by a mix of Escarpment Blackbutt Forest tree species and the Illawarra Flame tree as an identity tree to the University.

To the right of the view, a shared path would extend along the eastern side of the University Access Road. Also to the right of the view, and along the southern side of Mount Ousley Road, the new retaining wall (RW07) would vary in height to 11.7 metres would be partially visible until proposed screening and tree planting matures. The proposed finish to the retaining wall would be precast concrete, painted in a recessive colour and have a ribbed texture to reduce the apparent scale of the wall and to blend in with the surrounding forested landscape.

To the left of view there would be distant views towards the weathering steel and sandstone clad retaining wall (RW02) and partially or wholly transparent panelled noise wall (NW01) associated with the heavy vehicle safety ramp. This view would be mitigated by the revegetation on the embankments between the University Access Road and Mount Ousley Road on ramp northbound, in the long term. In the mid ground the partially or wholly transparent panelled noise wall (NW02) would be visible above retaining wall (RW03) until proposed planting located south of the Mount Ousley Road on ramp northbound matures.

The height of the noise wall (NW01 and NW02) would be further assessed and the final heights would be determined in the Detailed Design stage of the project.

This view would be restricted to the area nearby to the motorway. Views would initially extend to the existing vegetation located to the east of the heavy vehicle safety ramp 1 and towards some properties along Dumfries Avenue until proposed screening shrub and tree planting matures along the southern

side of Dumfries Avenue. Proposed planting in a number of locations including: south of the heavy vehicle safety ramp 1, south of the heavy vehicle safety ramp 2 and south of the southbound service road would help to screen views beyond the main alignment of the motorway.

Proposed planting visible on the left and right of this view, on either side of the University Access Road, would include the revegetation of the Escarpment Blackbutt Forest and also include tree plantings of the Illawarra Flame tree to identify this entry with the University of Wollongong.

These proposed planting works would help mitigate the magnitude of the proposed retaining walls both in the mid and background of this view. It would take approximately 1 – 5 years for the proposed shrubs and screening plants to reach a mature height, and trees 10 – 15 years. The magnitude of change in the first five years is therefore considered **high**, reducing over time as the vegetation matures. It should be noted that noise wall heights closer to 8.0 metres would have a **high** impact that will be retained over time

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of

- **high** (reducing impact over long term) for noise wall heights of 3.0 - 5.0 metres and,
- **high** (retained impact over long term) for noise wall heights of over 5.0 metres.

It should be noted that the visibility of the proposal as viewed from within the University of Wollongong is restricted to a few locations due to the existing vegetation, topography and locations of buildings. Where views towards the proposal are afforded, they are restricted to the areas adjacent to the upgrade and are illustrated in the VEM (Figure 123).

To the south and east of the University Access Road, views towards the upgrade are constrained by the Sports Hub, UniActive (Recreation & Aquatic Centre) and the Medicine and Creative Arts buildings.

Along the northern boundary of the university the established native vegetation restricts views towards the upgrade. Easterly views across Ovals 1 and 3 are directed towards the upgrade and beyond to TAFE Illawarra.

To the north of the Eastern Entrance of the University at the intersection with Northfields Avenue, the buildings associated with the Kids' Uni (Child Care Centre), UOW Enterprises and the IT resources centre provide a defining edge to views close to the boundary of the University.



Figure 136. Viewpoint 6 looking northeast from the University of Wollongong - Existing

ARTISTS IMPRESSIONS OF VIEWPOINT 6 (VP6) LOOKING NORTHEAST FROM THE UNIVERSITY OF WOLLONGONG



Figure 137. VP6 - Proposal showing planting at road opening

Note: Artists impression is indicative only and subject to further design development and consultation



Figure 138. VP6 - Proposal showing mature planting at approximately 10 years after road opening

Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 7 - LOOKING SOUTHWEST FROM THE CORNER OF DUMFRIES AVE AND MCMAHON ST (VP7)

**Description:** The view is from the corner of Dumfries Avenue and McMahon Street looking southwest towards the roadside vegetation extending between Dumfries Avenue and Mount Ousley Road. Adjacent to the kerb low shrubs and native grasses provide a suitable under planting to the overhead electrical cables. Beyond this planting, an established vegetated native plant community provides a dense understorey with mature canopy trees.

**Sensitivity:** The view would be experienced primarily by local residents. This boundary planting of predominately native species establishes a natural vegetated character that contributes to the sensitivity being considered as **moderate**.

**Magnitude:** This view would be of the new pedestrian bridge and shared path leading from Dumfries Avenue. The proposal would see significant clearing of this prominent vegetation. Clear views towards these elements and throughout this area would be promoted by the planting of trees with no low growing branches and low growing native understorey to promote passive surveillance and establish a safe pedestrian and cyclist environment. The characteristic weathering steel handrail supports on the shared path and the throw screen supports on the bridge would become identifiable elements within this view and compliment the native vegetated context of it surrounds.

As a result of the removal of roadside vegetation, and to the left of view, the top of the new sandstone clad retaining wall (RW11) facing the roadway and the partially or wholly transparent panelled noise wall (NW04a) located along the southern side Mount Ousley Road would also be visible from this location. Proposed revegetation of native screening plants on the northern side of Mount Ousley Road would mitigate this view as the plants mature. It should be noted that the placement of these screening plants would not impact on the pedestrian and cyclist safety in this location.

The height of the noise wall (NW04a) would be further assessed and the final height would be determined in the Detailed Design stage of the project.

These proposed planting works would help mitigate the visual magnitude of the proposed noise wall and retaining wall, however it would take approximately 1 – 5 years for the proposed shrubs and screen planting to reach a mature height, and trees 10 – 15 years. The magnitude of change in the first five years is therefore considered as **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **high-moderate**.



Figure 139. Viewpoint 7 looking southwest from the corner of Dumfries Avenue and McMahon Street - Existing

ARTISTS IMPRESSIONS OF VIEWPOINT 7 (VP7) LOOKING SOUTHWEST FROM THE CORNER OF DUMFRIES AVENUE AND MCMAHON STREET

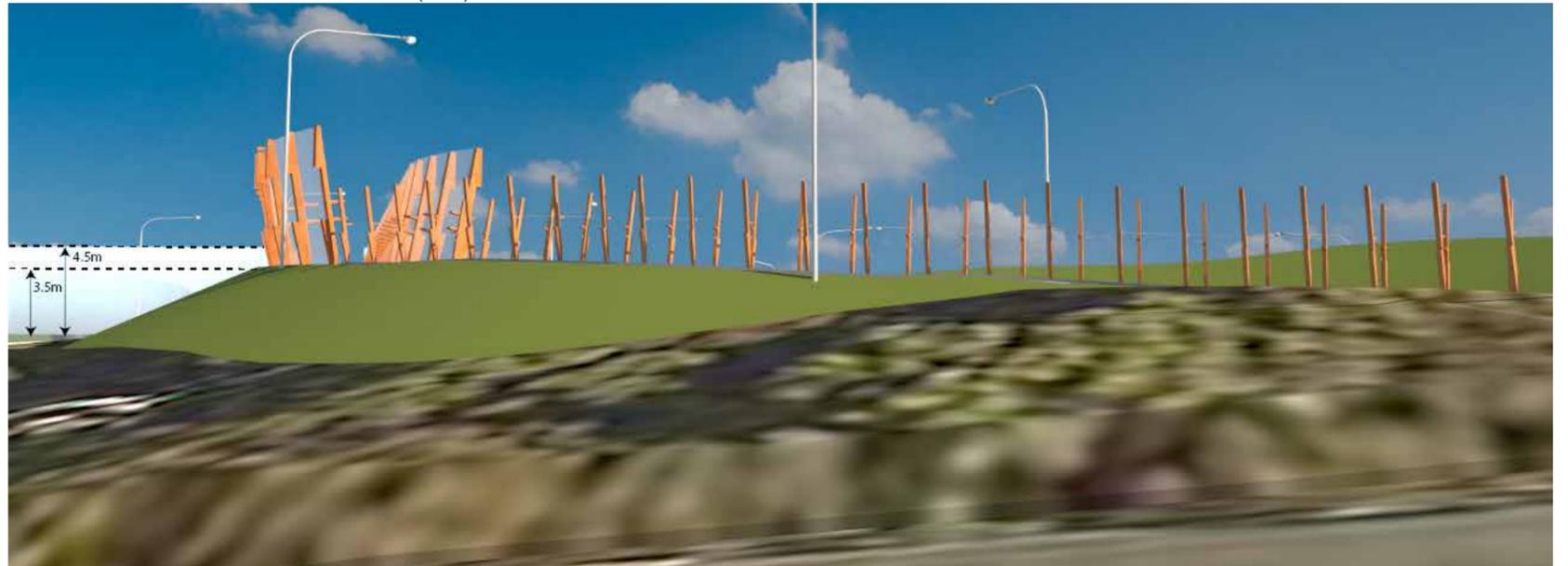


Figure 140. VP7 - Proposal showing the potential range of noise wall heights and planting at road opening  
Note: Artists impression is indicative only and subject to further design development and consultation



Figure 141. VP7 - Proposal showing planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 8 - LOOKING WEST FROM MOUNT OUSLEY ROAD (VP8)

**Description:** The view is from Mount Ousley Road looking west. Established trees scattered throughout the roadside with an open understorey characterises the steep cut batters rising quickly from the kerbs on both sides of the road. The geometry of the steep banks and the arching branches of the canopy trees, which extend over the road, creates an enclosed character casting interesting filtered light patterns on the road pavement. The batters restrict peripheral views and strengthen the motorist's perspective along the road towards the vegetated backdrop of Mount Keira.

**Sensitivity:** Motorists heading west towards the Princes Motorway experience this view. The enclosed character established by the landform with an open canopy of native vegetation creates an interesting and pleasant experience for motorists. The sensitivity is considered to be **moderate**.

**Magnitude:** The proposal would see an increase in road pavement on both sides of the road, in particular the northern side to accommodate the heavy vehicle off ramp. The new pedestrian bridge over Mount Ousley Road in the mid ground of this view would be a visually dominant element with its sculptural weathering steel throw screen supports.

On the left and right side of the road, nearing the pedestrian bridge over Mount Ousley Road, new weathering steel and sandstone clad retaining walls (RW10 & RW11) are proposed. These walls would be highly visible elements and are designed as visual markers highlighting the entry and departure from Wollongong. These walls would complement the materiality and form of the pedestrian bridge as well as the dominant retaining wall at the interchange (RW01). The Wollongong welcome signage and artwork would be partially visible beyond the pedestrian bridge from this viewpoint.

Along the northern side of the road (right of view) and in the foreground, cleared vegetation on the northern side of the road would reveal views towards properties along Dumfries Avenue. The revegetation of Escarpment Blackbutt Forest species and understory planting to provide screening to/from these residences would help mitigate this view in time when the vegetation matures. On approach to the pedestrian bridge over Mount Ousley Road the retaining wall (RW10) approximately 60 metres long would vary in height to about 4.8 metres near to where it passes beneath the pedestrian bridge.

Along the southern side of the road (left of view) a noise wall (NW04a) would be a continuous roadside element up to the pedestrian bridge. The noise wall would continue on top of the concrete vehicle safety barrier and then on the top of the retaining wall (RW11) on approach to the pedestrian bridge over Mount Ousley Road.

The noise wall (NW04a) above this retaining wall would be highly visible and would be composed partially or wholly transparent panels which would help reduce the perceived scale and mass of this wall as seen by motorists on Mount Ousley Road and residents along Old Mount Ousley Road. Revegetation

of native screening plants and trees along the southern side of the noise wall would help to screen views to these residents along Old Mount Ousley Road.

The height of the noise wall (NW04a) would be further assessed and the final height would be determined in the Detailed Design stage of the project. A shorter wall would minimise the physical and visual scale of the noise wall and create a less dominant roadside element.

Widening of Mount Ousley Road would remove the existing roadside vegetation and change the character of the roadside environment and introduce numerous highly visible roadside and gateway elements. Due to site constraints, there would be no space for planting of vegetation in front of the retaining walls. New planting works would help mitigate the magnitude of proposed structures however it would take approximately 1 – 5 years for the proposed shrubs to reach a mature height and trees 10 – 15 years. The magnitude of change in the first five years is therefore considered to be **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **high-moderate**.



Figure 142. Viewpoint 8 looking west from Mount Ousley Road - Existing

ARTISTS IMPRESSIONS OF VIEWPOINT 8 (VP8) LOOKING WEST FROM MOUNT OUSLEY ROAD



Figure 143. VP8 - Proposal showing the potential range of noise wall heights and planting at road opening  
Note: Artists impression is indicative only and subject to further design development and consultation



Figure 144. VP8 - Proposal showing the potential range of noise wall heights and mature planting at approximately 10 years after road opening  
Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 9 - LOOKING NORTH FROM PRINCES MOTORWAY ON APPROACH TO MOUNT OUSLEY ROAD (VP9)

**Description:** The view is looking north from the M1 Princes Motorway on approach to its intersection with Mount Ousley Road. The view is positioned halfway around the sweeping bend in the road where a mature grouping of tall native trees present a dominant element in the view (centre of view). Open lawn areas to the right of view located amidst roadside trees is the open space located west of residential properties on Gowan Brae Avenue. A grassed verge is visible in some locations along the eastern side of the Motorway and also in the foreground on the western side. Mature canopy trees are also visible on the western side of the road. A green painted metal palisade fence can be seen in the foreground to the left of view that defines the boundary of the University of Wollongong.

**Sensitivity:** Northbound motorists approaching Mount Ousley Road Interchange would experience this view. Despite the road environment, the attractive roadside vegetated environment on both sides of the road contributes to the sensitivity being considered as **moderate**.

**Magnitude:** The proposal would see significant clearing of this prominent vegetation and the introduction of numerous road elements and structures.

On the north eastern side of the motorway, centre and right of view, vegetation would be lost due to the increase in pavement associated with the proposed heavy vehicle bypass, southbound service road, eastern roundabout, Mount Ousley Road on ramp southbound and the shared path. At the far right of view, vegetation clearing would reveal filtered views towards the back of properties along Old Mount Ousley Road and also the partially or wholly transparent panelled noise wall (NW04b) proposed to the east of the new shared path connecting to the existing shared path along TAFE Illawarra. The revegetation with Escarpment Blackbutt Forest species to the land south of these properties, as well as along the eastern edge of the Mount Ousley Road on ramp southbound would help to screen and mitigate the visual impact of this view as plants mature over time. Revegetation of the Escarpment Blackbutt Forest of the area between the heavy vehicle bypass lane and the southbound service road would help to re-establish a strong native vegetated roadside character through this section of the Interchange over time. Towards the right of the view Mount Ousley Road on ramp southbound would be visible from this viewpoint.

Towards the mid-ground of the view two commanding structures are visible, firstly the large steel gantry that spans the width of the north and southbound lanes as well as the heavy vehicle bypass lane. Beyond the gantry, the bridge over the M1 Motorway would be a dominating element in this view. This bridge would be a defining element for the proposal with the 6.5 metre high eastern sandstone clad abutment wall (RW09), the 6.5 metre high sandstone return wall for the western abutment (RW08a), the central concrete pier and the sculptural throw screen supports being visible from this viewpoint. Along the left side of the main alignment the proposed structured planting of Sydney Blue Gums are visible on approach to the bridge, and also seen to continue beyond

the bridge, would provide a visual cue to the highway alignment and when mature would aid in mitigating the perceived scale of the bridge. Behind these trees the revegetation of the Escarpment Blackbutt Forest would establish a vegetated backdrop and reinforce the native forest setting. Until these plants establish, long range glimpses of the sandstone clad retaining wall (RW04) associated with the heavy vehicle off ramp and textured and painted concrete retaining wall (RW05) associated with the heavy vehicle underpass would be seen beneath the western bridge span.

In the short term, the retaining wall (RW01) noise wall (NW01) along the Motorway would be partially visible in the distance. Views to the walls would be screened over time with the median planting maturing over time.

To the left of view, the revegetation of the cleared roadside vegetation would reinforce the adjoining Escarpment Blackbutt Forest and Escarpment Moist Blue Gum Forest vegetation communities. This planting would establish a natural roadside forested environment and help to screen and mitigate views towards the 9 metre high retaining wall (RW08a) and the left hand side of the bridge when trees and shrubs mature with time.

The height of the noise wall (NW04b) would be further assessed and the final height would be determined in the Detailed Design stage of the project.

The new planting works would help mitigate the magnitude of proposed elements and structures as well as existing residences. It would however take

approximately 1 – 5 years for the proposed screening shrubs to reach a mature height and trees 10 – 15 years. The magnitude of change in the first five years is therefore considered to be **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **high-moderate**.



Figure 145. Viewpoint 9 looking north from Princes Motorway on approach to Mount Ousley Road - Existing

ARTISTS IMPRESSION OF VIEWPOINT 9 (VP9) LOOKING NORTH FROM PRINCES MOTORWAY ON APPROACH TO MOUNT OUSLEY ROAD



Figure 146. VP9 - Proposal showing the potential range of noise wall heights and planting at road opening

Note: Artists impression is indicative only and subject to further design development and consultation



Figure 147. VP9 - Proposal showing mature planting at approximately 10 years after road opening

Note: Artists impression is indicative only and subject to further design development and consultation

#### VIEWPOINT 10 - LOOKING NORTHWEST FROM OPEN SPACE WEST OF GOWAN BRAE AVE (VP10)

**Description:** The view is from the road reserve west of the residential properties on Gowan Brae Avenue looking northwest towards the interchange. The road reserve space is characterised by open lawn generally sloping from the north to the south towards the M1 Princes Motorway with scattered mature native trees, some with understory planting, scattered throughout. Glimpses and filtered views towards the Motorway (towards the left of view) are seen from this viewpoint. Denser mature native trees and understory planting extend into the background of this view. Despite this area being a restricted road reserve, it is currently being used by the local community as an open space amenity used for walking dogs, community garden and open space uses in general.

**Sensitivity:** Local residents using the road reserve experience this view. Despite its adjacency to the Motorway, given the highly vegetated character of the space, the sensitivity is considered to be **moderate**.

**Magnitude:** As part of the proposal, a substantial amount of the vegetation within this view would be removed for the construction of the proposed interchange including Mount Ousley Road on ramp southbound, heavy vehicle bypass lane, southbound service road, eastern roundabout and bridge over the M1, the pedestrian bridge over Mount Ousley Road, a spill basin, drainage culvert extending beneath the M1 Princes Motorway, shared path and for the construction compound. Vegetation in the midground and along the roadside would be cleared in this location revealing open views towards the interchange and beyond. Some existing vegetation in the background, towards the right of view, is proposed to be retained near the backs of the properties on Old Mount Ousley Road.

Extensive clearing of vegetation would enable open views towards significant elements of the interchange and beyond to the University and towards the foothills of Mt Keira.

In the foreground the proposed shared path and a spill basin would be seen behind. The establishment of scattered trees with understorey planting set amongst adjacent to the footpath with open lawn areas would characterise this area. These open areas would have the potential to be used by the RMS as a permanent compound site as an incident response unit.

Towards the mid-ground of this view, visible elements of the interchange include the concrete vehicle barriers and landscaped embankment associated with Mount Ousley on ramp southbound. Beyond this, significant visible elements of the interchange would include the steel gantry, the bridge over the M1 and the sandstone retaining wall (RW08a) and concrete panel retaining wall (RW07) near the western bridge abutment. Proposed planting in front of the retaining walls (RW08a) and (RW07) would help to screen and mitigate the magnitude of the walls as seen from this viewpoint.

The proposed revegetation of Escarpment Blackbutt Forest species along both sides of Mount Ousley on ramp southbound would provide an effective

screen to the interchange and re-establish a vegetated boundary between this open space and the interchange. Views to the backs of properties along Old Mount Ousley Road would be mitigated by the revegetation of the Escarpment Blackbutt Forest by screening views to these properties.

The Tree and shrub planting proposed throughout the proposal would help to mitigate the magnitude of proposed structures and existing residences over time as the vegetation matures. It would take approximately 1 – 5 years for the proposed screening shrubs to reach a mature height and trees 10 – 15 years to reach maturity. The magnitude of change in the first five years is therefore considered as **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **high-moderate**.



Figure 148. Viewpoint 10 looking northwest from open space west of Gowan Brae Ave - Existing

#### VIEWPOINT 11 - LOOKING NORTH ALONG PRINCES MOTORWAY (VP11)

**Description:** The view is from the Princes Motorway looking north adjacent to the University of Wollongong and TAFE Illawarra.

Along the western side of the road (left of view), a grass verge extends from the road pavement to the green metal palisade boundary fence of the University. Mature native trees establish a strong vegetated edge along the boundary of the University and define the edge of the road reserve.

Along the eastern side of the road (right of view), mature trees provide a significant vegetated boundary to the TAFE Illawarra. As the Motorway turns towards the west, in the centre of this view, along the eastern side of the road, areas of open lawn with mature tree planting associated with the road reserve west of the residential properties along Gowan Brae Avenue can be seen.

**Sensitivity:** Northbound motorists approaching the interchange would experience this view. An attractive roadside vegetated environment on both sides of the road contributes to the sensitivity being considered as **moderate**.

**Magnitude:** The proposal involves widening of the road along the western side of the Motorway where a small cut batter is proposed adjacent to the road. Road widening along the eastern side of the road, and adjacent to the TAFE, would accommodate the southbound service road. Removal of roadside planting is proposed in this location however existing boundary planting within the TAFE car park would continue to provide partial visual separation to the buildings.

To the left of view, proposed roadside vegetation would be native trees with low understorey planting allowing for filtered views towards the west over the University sporting fields. Also extending from the left of view a large road sign that would cantilever over the road.

To the right of view, filtered views to the TAFE would be reinforced with new planting of native trees and low understorey planting.

Beyond the TAFE, and closer to the centre of view, on the eastern side of the road where the Motorway begins to change direction, the clearing of vegetation for the spill basin and temporary construction compound within the road reserve west of Gowan Brae Avenue would reveal filtered views towards the back of properties along Old Mount Ousley Road as well as distant views towards the partially or wholly transparent panelled noise walls (NW04a and NW04b). Revegetation of this area with Escarpment Blackbutt Forest is proposed to reinstate the strong vegetated roadside environment and would screen views to the backs of these properties and the noise walls in time as the trees and shrubs mature. Towards the centre of view, Mount Ousley on ramp southbound with landscaped embankment would be seen. The revegetation of this embankment with Escarpment Blackbutt Forest species would reinforce this native vegetation community and forested context of the surroundings and help to screen Mount Ousley on ramp southbound as the trees and shrubs mature.

The height of the noise wall (NW04b) would be further assessed and the final height would be determined in the Detailed Design stage of the project

Tree and shrub planting is proposed to screen and mitigate the magnitude of elements including the road sign, TAFE Illawarra, Mount Ousley on ramp southbound and towards the existing residences along Old Mount Ousley Road. It would take approximately 1 – 5 years for the proposed shrubs to reach a mature height and trees 10 – 15 years to reach maturity. The magnitude of change in the first five years is therefore considered as **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **high-moderate**.



Figure 149. Viewpoint 11 looking north along M1 Princes Motorway - Existing

#### VIEWPOINT 12 - LOOKING NORTH ALONG PRINCES MOTORWAY TOWARDS THE PEDESTRIAN BRIDGE EXTENSION OVER THE M1 MOTORWAY (VP12)

**Description:** The view is from the Princes Motorway looking north on approach to the pedestrian bridge over the M1 Princes Motorway near Northfields Avenue.

The pedestrian bridge extending over the M1 Princess Motorway is a significant element in this view. The galvanised throw screens, concrete columns and spiral shaped ramp on the eastern side of the ramp are characteristic elements of this bridge.

Along the western (left of view) side of the road the off ramp to Northfields Avenue can be seen. Mature fig trees and University signage suitably mark the approach of the University of Wollongong.

Beyond the bridge, mature roadside vegetation establishes a strong visual boundary to the road, screening the University on the left and TAFE Illawarra on the right. A gantry can be seen in the distance spanning the M1 Princes Motorway. In the background, and as the M1 Princes Motorway turns to the left on approach to the interchange, the forested roadside planting on the eastern side of the road terminates this view.

**Sensitivity:** Northbound motorists travelling towards Mount Ousley Road Interchange would experience this view. Despite the attractive roadside vegetated environment on both sides of the road beyond the bridge, the existing bridge, road pavement and roadside elements are dominant visual elements and contribute to the sensitivity being considered as **low**.

**Magnitude:** The proposal involves widening of the M1 Motorway, extension of the pedestrian bridge and a new shared path ramp to the pedestrian bridge on the eastern side of the road. Road widening is proposed along the entire eastern side (right of view) of the road for the southbound service road and along the western side, north of the pedestrian bridge, for the realignment of the northbound lanes.

On the western side of the road, north of the pedestrian bridge, clearing of roadside vegetation would reveal filtered views towards the University of Wollongong and new roadside planting would reinforce the existing native planting retained adjacent to the University. Proposed tree and low growing understorey planting in this location would reinforce the Escarpment Blackbutt Forest vegetation community and would re-establish a stronger vegetated boundary to the road as trees mature in time.

New planting of the Illawarra Flame trees is proposed north of the pedestrian bridge and on both sides of the road to establish an identity and presence to the University of Wollongong. Planting arrangement would be informal.

On the eastern side of the road, the removal of the spiral ramp, the new bridge extension and new shared path ramp would be highly visible structures. The weathering steel throw screen supports and handrail supports on the bridge and ramp would be highly visible sculptural elements. Existing vegetation in

the foreground would be removed for the road widening and construction of the new-shared path ramp. Few trees are proposed in this location to ensure clear views towards the ramp are maintained and passive surveillance is ensured. Beyond the bridge on the eastern side of the road, the removal of roadside trees would provide filtered views towards the TAFE. Proposed new native trees and low growing understorey along the road boundary would re-establish a stronger vegetation buffer between the TAFE and the M1 Princes Motorway as the plantings mature with time.

Beyond the pedestrian bridge a new gantry, spanning the M1 Princess Motorway would be positioned approximately 140 metres closer to this viewpoint than the existing gantry. In the background of this view, the vegetation cleared along the eastern side of the road would be reinstated, however this would take time for the trees and shrubs to mature and re-establish a strong vegetated boundary to the road.

Tree planting is proposed to screen and mitigate the magnitude of elements including the gantry, the pedestrian bridge and buildings within TAFE Illawarra and University of Wollongong, as well as constrain long range views. It would take approximately 1 - 5 years for the proposed shrubs to reach a mature height and trees 10 - 15 years to reach maturity. The magnitude of change in the first five years is therefore considered as **high**.

**Assessment of impact:** The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides an integrated impact of **moderate**.



Figure 150. Viewpoint 12 looking north from the M1 Princes Motorway towards pedestrian overpass - BR04 - Existing

## VISUAL ASSESSMENT SUMMARY

The scale of the works represents a substantial change in overall character of the road interchange and therefore a large number of viewpoints are considered to have a high to moderate, and high visual impact. Large areas of new native tree and shrub planting are proposed in the areas to reinstate and reinforce local vegetation communities and therefore some of these impacts would lessen substantially overtime as the screening shrubs and trees mature.

The extent of visibility is largely contained within the corridor due to the nature of the surrounding environment, assuming noise wall heights up to 5.0 metres. Areas of retained vegetation, existing topography and existing buildings constrain views within close proximity to the proposal. A number of areas where views extend to sensitive receivers include;

- Dumfries Avenue with views towards the noise wall (NW01)
- Falder place and Binda Street with views towards the noise wall (NW02)
- Old Mount Ousley Road with views towards the noise wall (NW04a) and the pedestrian bridge over Mount Ousley Road
- University of Wollongong where views are largely constrained by vegetation barriers and institutional buildings.

It should be noted that taller noise walls, i.e. walls over the height of 5.0 metres, is likely to have an impact extending to a wider area than those identified above.

Table 5. Viewpoint summary

View Point	Type of Viewer	Sensitivity	Magnitude	Impact
VPT 1	Pedestrian / Tourist	high	low	moderate
VPT 2	Southbound Motorists	moderate	high	high-moderate
VPT 3	Local residents	moderate	high	high-moderate
VPT 4	Local residents / future motorists attending University	moderate	high	high-moderate
VPT 5	Southbound motorists	low	high	moderate
VPT 6	Motorists/ pedestrian / cyclists attending University	high	high	high
VPT 7	Local residents	moderate	high	high-moderate
VPT 8	Motorists	moderate	high	high-moderate
VPT 9	Northbound Motorists	moderate	high	high-moderate
VPT 10	Local residents / pedestrian / future cyclists	moderate	high	high-moderate
VPT 11	Northbound motorists	moderate	high	high-moderate
VPT 12	Northbound motorists	low	high	moderate

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# CHAPTER 6

## MITIGATION MEASURES

The upgrade of Mount Ousley interchange is of a substantial scale and footprint. The requirement for the upgrade to be constructed whilst maintaining traffic flows, within its steep landform, requires extensive clearing of vegetation in the area. A large number of retaining walls are required due to the steep topography, and the new construction requires current and future noise impact to be attenuated through numerous noise walls and architectural treatment of houses. These requirements, together with the widened roadway, could have potentially substantial visual impacts.

The development of the Concept Design to date has included extensive design measures to mitigate visual impacts. These include:

- Identification of a visual hierarchy to ensure that only select elements are highlighted and all other structural elements are designed to recede from view
- The perceived height of retaining walls are reduced through the use of different materials, and/ or the use of materials that are 'softer' in appearance such as sandstone
- New noise wall panels are partially or wholly transparent clear acrylic to ensure that through views to the surrounding landscape and sky are maintained and perceived height of noise walls are reduced
- Noise wall along the pedestrian and cyclist path is proposed to incorporate artwork and poetry to provide interest and relief
- At all noise walls facing residents, a vegetation zone of tall shrubs and trees is provided for screening of the structure
- The roadway, wherever possible, is screened in general from residential areas overlooking the interchange
- Planting zones are provided in front of retaining walls to screen the structure from view, wherever space permits an adequate width for planting
- The treatment of structures along local roads and shared paths are more detailed and finer in scale and language to achieve a more 'human scale'. These elements include retaining walls, noise walls, shared path bridges and their ramps, and approach paths
- Remnant areas cleared for construction will be revegetated with native species complementing existing vegetation communities of the locality
- Medians greater than 3 metres are planted to restore vegetation at the interchange
- The requirements for maintenance access along structures have been rationalised as far as practicable at Concept Design stage

- The size of spill basins have been minimised to ensure better integration of these elements within their landform and land use.

The Landscape Character and Visual Impact Assessment undertaken above is based on the current Concept Design incorporating all of the above changes. The Detailed Design will ensure that a high degree of attention is paid to the final detailing of the various elements of the proposal including their materials and finishes.

The following mitigation measures will be considered during the Detailed Design stage:

- Roads and Maritime urban design policy 'Beyond the Pavement' (2014) and their design guideline documents (Bridge Aesthetics (2012), Noise Wall Design Guideline (2016), and Landscape Guidelines (2008) will guide the development of the Detailed Design. Other relevant guidelines include Guideline for Batter Surface Stabilisation Using Vegetation (2015) and Biodiversity Guidelines - Protecting and Managing Biodiversity (2011)
- The urban design objectives and principles contained in this report will underpin and guide Detailed Design development
- The urban design concept described in this report will form the basis for development of the Detailed Design
- This Concept Design report touches on the importance of responding to the rich aboriginal heritage and culture of Wollongong. It is recommended that more extensive discussion/ research is carried out in formulating the final design outcome
- The Wollongong gateway concept as discussed in this report will be further developed in Detail Design, including the investigation of opportunities to incorporate aspects of local indigenous heritage and culture into the design. The process to develop the gateway concept will include collaboration and consultation with a range of stakeholders including Wollongong City Council and local Aboriginal communities.
- All reasonable measures would be taken to minimise the loss of vegetation at and surrounding the interchange, including rationalisation of the requirements for maintenance access
- At locations where higher visual impacts have been identified, the specification and planting of more mature sized shrubs and trees should be considered to help reduce the visual impact at the opening of the road. Further, early planting should be considered in relation to construction staging to achieve a greater maturity of plants at road opening

- Management of the natural environment will include rehabilitation of any affected areas of important native habitat and creek embankments; use of endemic vegetation in these and other areas where habitat values are important; during the detailed design phase identify and retain as many mature trees as possible
- Noise wall requirements will be further reviewed and analysed in the Detailed Design stage. Measures such as detailed refinement of noise wall location and the material selection including the possible use of partial or wholly transparent panels will be investigated in consultation with affected properties through a community consultation process
- The integration and placement of signs are to ensure that the interchange is not cluttered and visually dominated by signage. The location of road signage should consider impact on key long distance views and sightlines where possible.



Figure 151. View from Mount Keira outlook with Princes Motorway below

# CHAPTER 7

## CONCLUSION

The proposal is for the upgrade of the M1 Motorway at the base of Mount Ousley at Wollongong. The dramatic setting of the interchange is characterised by the transitional landscape between the steeper sloping terrain associated with the foothills of the Illawarra escarpment, and the surrounding more gently undulating and flatter coastal areas. The undulating terrain supports a mix of vegetation types. There are significant areas of mature forest communities present, typically of trees with large open canopies with understory planting of different densities that frame the road corridor.

The existing interchange covers an expansive footprint. In the provision of a heavy vehicle bypass; two heavy vehicles safety ramps; legible and safe access to and from the interchange and Mount Ousley Road to Wollongong; a new entry in to the university; and a widened carriageway for the M1 Motorway, the footprint would be further expanded. The onerous task of construction of the proposal, in steep terrain, whilst maintaining traffic flows, requires the removal of most of the mature vegetation at and around the interchange.

The urban design concept seeks to integrate the new interchange with the existing landform and landscape as much as possible, improve overall legibility at the interchange, provide an interesting and safe driving experience, as well as reduce the visual impact of the upgrade on existing residential properties. Throughout the concept design process a large number of potential impacts were identified and have either been avoided or minimised. The concept design is presented as the result of an integrated design process, with recommendations for further design development during the Detailed Design stage. New planting has been introduced in disturbed roadside areas, which will mature in time helping to provide a more vegetated road curtilage and greater visual buffer between residential properties and the road. The extent of vegetation clearing assumed during concept design would be reassessed during the Detailed Design stage to ensure the removal of existing vegetation, and in particular mature trees, is minimised. Design principles have been identified for each of the design elements, and further mitigation strategies recommended to guide the development of the Detailed Design.

The considered design approach and concept design proposed for the upgrade relates to the social and cultural heritage of Wollongong and provides for enhanced pedestrian and cyclist accessibility at the interchange as well as to its connecting land uses including the University of Wollongong, TAFE Illawarra and Wollongong town centre. The proposal achieves its overall objectives and secondary considerations in relation to urban design and landscape, which are:

- Overall proposal objective:
  - *“Enhance accessibility to/from the M1 Princes Motorway and the Wollongong CBD”.*
- Secondary considerations:
  - *“Consider enhanced accessibility to/from the M1 Princes Motorway and the University of Wollongong*
  - *Maintain or improve the visual driving experience and amenity in this section of the M1 Princes Motorway.*
  - *Improve amenity by considering the needs of pedestrians, cyclists and public transport*
  - *Minimise the broader social and environmental impacts of the development*
  - *Achieve an overall proposal result that provides the best value for money for the entire proposal lifecycle”.*

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