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# **Jane Street and Mulgoa Road Infrastructure Upgrade Review of Environmental Factors**

Appendix K – Landscape Character, Visual Impact  
Assessment and Urban Design Study

**October 2016**



## Jane Street + Mulgoa Road Upgrade

# Landscape Character, Visual Impact Assessment + Urban Design Study

September 2016



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# 1. Introduction

## 1.1 Project Overview

Arup has been engaged by Roads and Maritime Services (RMS) to provide concept design services, a Review of Environmental Factors (REF) and community consultation support for the Jane Street and Mulgoa Road infrastructure upgrade project.

The upgrade project is driven by the level of existing congestion, anticipated population growth and local employment growth, including growth driven by the nearby North West Growth Centre and Broader Western Sydney Employment Area. RMS has forecast that by 2019 the average traffic speeds could be less than half of the current posted speed limit for roads within the project area if the infrastructure is not upgraded.

## 1.2 The Proposal

The proposed upgrade works will include the following key features:

- Widening of Mulgoa Road - Castlereagh Road between Museum Drive and Union Road to allow for six through lanes and auxiliary lanes at intersections.
- Upgrading the Mulgoa Road and High Street intersection to provide increased capacity.

Figure: 1. Landscape and urban concept plan

- Upgrading the T-intersection of Jane Street and Castlereagh Road / Mulgoa Road to provide increased capacity.
- Replacement of the existing rail underbridge to allow three lanes of traffic in each direction on Castlereagh Road and a left turn lane into Jane Street. The new bridge will be constructed immediately to the south of the existing bridge, and slid into position during a possession.
- A shared pathway (pedestrian and cycle path) along the eastern side of Mulgoa Road - Castlereagh Road. Including introducing staged pedestrian crossing on Mulgoa Road - Castlereagh Road.
- Introducing bus priority ('queue-jump') lane at Jane Street and High Street.
- Local realignment and protection of existing utility services including RMS assets.

The proposal forms part of a joint Federal and State Government commitment to improve traffic flow between the Nepean River and Penrith CBD. Strategic design estimates indicate that the proposal could cost about \$76 million.

Construction of the proposal would be staged in order to minimise impacts to traffic and rail services.

### 1.3 Project Wide Objectives

The Jane Street and Mulgoa Road project will aim to:

- Reduce congestion and delays.
- Improve the integration of the arterial road within the existing road network to meet the current road user needs and anticipated future needs.
- Deliver infrastructure that provides effective network performance for at least 10 years after opening.
- Meet RMS sustainability objectives.
- Contribute to safe and effective pedestrian and cycling infrastructure.
- Provide a safer road environment that reduces the frequency and severity of crashes.
- Minimise impact to the local environment including no adverse flooding impact, while improving opportunities for river access and enhancing urban design.

### 1.4 Purpose of Landscape Character, Visual Impact Assessment and Urban Design Study

Arup and DesignInc have been engaged by RMS to prepare a Landscape Character, Visual Impact Assessment (LCVIA) and Urban Design Study for the Jane Street and Mulgoa Road project. The purpose of the report is to:

- Develop and present an integrated engineering, landscape and urban design outcome that:
  - Fits sensitively into the built, natural and community environments through which it passes, is well designed and contributes to the character and function of the area.
  - Contributes to the accessibility and connectivity of people within the region and communities.
  - Contributes to the overall quality of the public domain for the community and all road users.

The results of the LCVIA and urban design study is iteratively fed into the concept development process and REF to ensure a integrated and coordinated design response.

## 1.5 Study Methodology

### 1.5.1 Approach

The study follows an iterative process where key issues, constraints and mitigation related to the landscape character and visual assessment are integrated into the engineering and landscape and urban concept design.

The study comprises the following key components:

1. Context Analysis | An analysis of the local context is undertaken with a focus on landscape and urban features, visual amenity and landscape character.
2. Landscape Character Assessment | An analysis of the existing character of Jane Street and Mulgoa Road to capture the baseline conditions to assess the anticipated effects as a result of the proposed works.
3. Visual Impact Assessment | An analysis of the existing visual amenity of Jane Street and Mulgoa Road and selection of representative viewpoints to comprehensively illustrate and assess the anticipated effect as a result of the proposed works.
4. Urban Design Strategy | The development of core

landscape and urban objectives that align with the project wide vision study, RMS guidance and the overall project aspirations. Each objective is supported by clear principles to articulate how the objective will be achieved through the landscape and urban concept design.

5. Urban Concept Design | Summary of anticipated impacts that will arise from the proposed works. Delivery of an overarching illustrative landscape and urban design plan
6. Mitigation Recommendations - Identification of mitigation measures to reduce adverse impacts where possible

The methodology used in this Landscape Character and Visual Impact Assessment is based on the RMS “Environmental Impact Assessment Guidance Note *EIA - N04 (2013) Guidelines for Landscape Character and Visual Impact Assessment.*”

### 1.5.2 Landscape Character Zones

A Landscape Character Zone is an area of distinct and consistent character and the impact of the proposed upgrade work within it may differ from that within another zone. Landscape character zones are mapped and described in Section 3.

Two primary factors are used to determine Landscape Character Zone impacts:

- Sensitivity of the character zone.
- Magnitude of the proposal in that zone.

The sensitivity of a Landscape Character Zone is used in both Landscape Character Zone Impact Assessment and in the subsequent Visual Impact Assessment. The Roads and Maritime Service Environmental Impact Assessment Guidance Note (2013) defines sensitivity as: “The sensitivity of a Landscape Character Zone or view and its capacity to absorb change. Combined with magnitude, sensitivity provides a measure of impact.” (Roads and Maritime Service, EIA-N04, p.6). It further states: “Sensitivity refers to how sensitive the character of the setting is to the proposed change. For example a pristine natural environment will be more sensitive to change than an industrial area.” (Roads and Maritime Service, EIA-N04, p.9).

The more pristine the landscape, the greater the consequence of introducing new development and therefore the higher the sensitivity of the zone.

The magnitude of a proposal in a Landscape Character Zone depends firstly on the scope of that proposal. Widening an existing road at ground level would typically have a lesser magnitude than a new elevated road on a viaduct, for example. The location of the proposal in relation to the character zone also influences magnitude. For example, a proposal which passes through the middle of a character zone would have greater magnitude than one which skirts the edge of a zone.

The Landscape Character Zone Impact is determined using the matrix shown in Table 1. Rankings for sensitivity and magnitude are combined to generate the impact in the body of the table. It is important to note that Landscape Character Zone Impact Assessment has to do with the way and extent to which a proposal alters the perceived nature or sense of place of a zone.

### 1.5.3 Visual Impact Assessment

To assess the likely visual impact of the proposal, the following tasks were undertaken:

- A desktop analysis to ascertain the visual catchment of the proposal within the area, and potential receptors of the visual impact determined through topographic analysis and Google Maps. This provides the basis for the establishment of the Visual Envelope Map (VEM), view corridors, and key viewpoints.
- An on-site field inspection to confirm the visual catchment, gain an understanding of the proposal within the context of the study area and to identify and confirm key viewpoints and the sensitivity of potential visual receptors.
- The sensitivity of each viewpoint is assessed and is based on the sensitivity ranking of the Landscape Character Zone in which it is located and the transient or permanent natures of the receptor.
- The magnitude of change as a result of the proposed development is assessed.
- In a process similar to that used for Landscape Character Zone impact assessment, the visual impact is assessed by combining the viewpoint sensitivity and the magnitude of the proposal in the matrix in Table 1.

		Magnitude			
		High	Moderate	Low	Negligible
Sensitivity	High	High Impact	High-Moderate Impact	Moderate Impact	Negligible Impact
	Moderate	High-Moderate impact	Moderate Impact	Moderate - Low Impact	Negligible Impact
	Low	Moderate Impact	Moderate - Low Impact	Low Impact	Negligible Impact
	Negligible	Negligible Impact	Negligible Impact	Negligible Impact	Negligible Impact

Table: 1. Landscape Character and Visual Impact Grading Matrix, Roads and Maritime Services (2013)

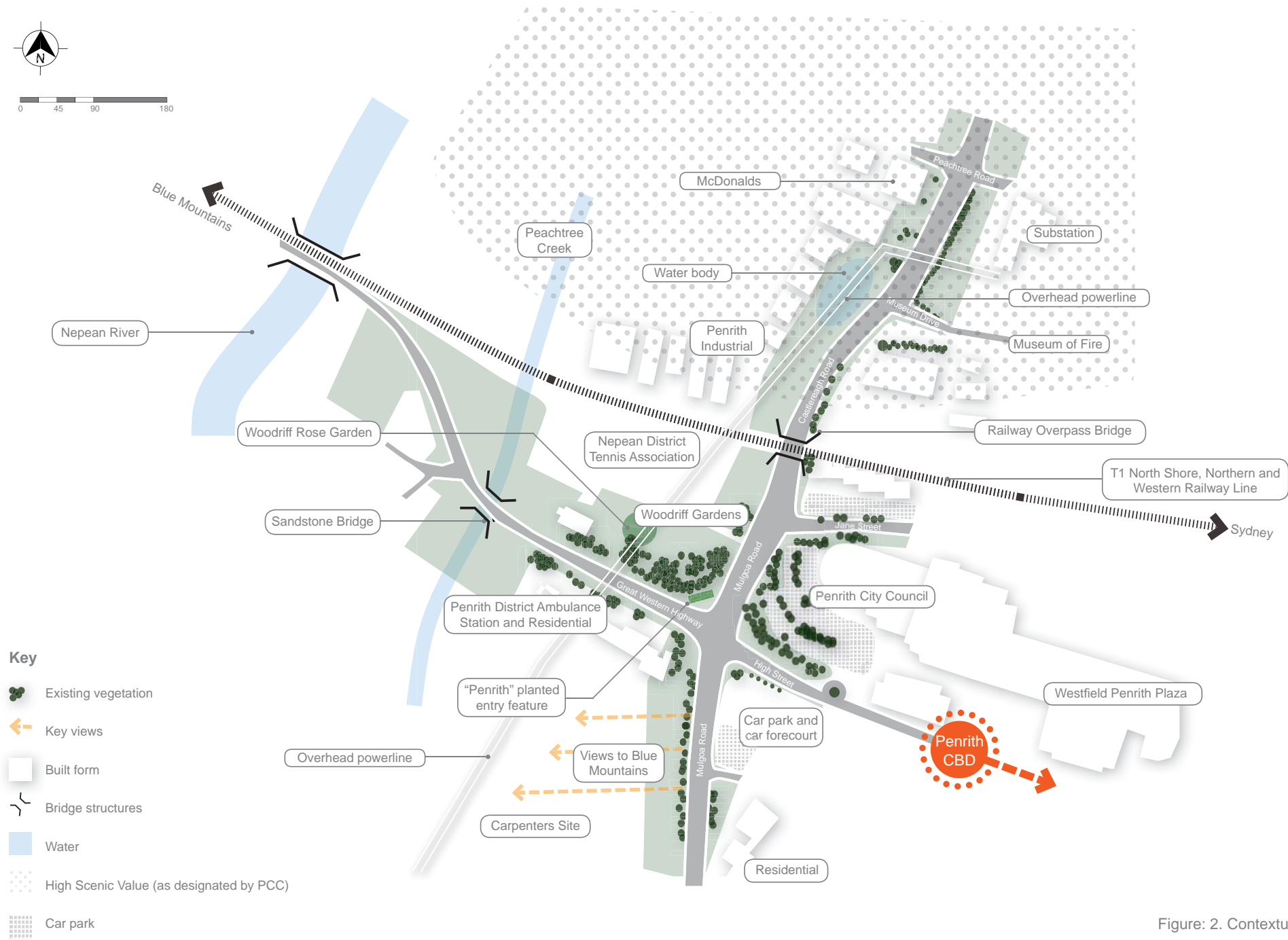
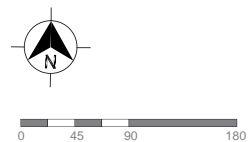


Figure 2. Contextual Analysis

## 2. Contextual Analysis

### 2.1 Regional context

The Jane Street and Mulgoa Road Upgrade is located mid way along Mulgoa Road, a key north-south link in Penrith and the Western Region of Sydney. Mulgoa Road provides access to key development areas in and around Penrith CBD including Penrith Lakes, Parkview, Penrith Panthers and Thornton.

The project is located on the Penrith CBD extents and as such is a major gateway entry to Penrith, both from the north on Mulgoa Road and from the west on High Street/Great Western Highway.

### 2.2 Site context

The following provides a summary of the key urban and landscape features, as shown in Figure 2: Contextual Analysis.

- Penrith City Council (PCC) office is situated at the intersection of Mulgoa and Jane Street, with a car park to its western edge.
- The Mulgoa Road/ High Street intersection is the major gateway entry, as identified in 'The Riverlink DCP.' A planted garden bed entry statement exists on the north-western verge
- The topography is generally flat with localised man-made variations created by the underpass of the Western Railway Line.

- Peachtree Creek runs in a north-south direction, adjacent to Woodriff Gardens and the Nepean Tennis Association.
- Mulgoa Road is located on the western edge of the Cumberland Plain with views to the Blue Mountains to the east.
- Remnant vegetation scattered throughout the project area provides an informal parkland character, extending the informal character of Peachtree Creek to the western edge of Penrith.
- High Street provides the main pedestrian and vehicular connection to the Nepean River from the CBD and the "Great River Walk."
- Great Western Highway comprises a mix of residential and special uses. Mulgoa Road comprises a mix of civic, open space, industrial and car yard uses.
- The Penrith Railway land and the Ambulance Station along Great Western Highway has heritage significance.
- Woodriff Gardens includes a Rose Garden where weddings were previously performed, but less so in recent years due to the noisy road environment of Mulgoa Road.

### Visual Amenity

The area is of high visual amenity adjacent to key features including Woodriff Gardens, Penrith Council Chambers, Peachtree Creek, Nepean River and heritage items such as the Museum of Fire and the District Ambulance Station.

Penrith City Council in their DCP has designated land as having scenic and landscape value. All land to the north of the railway line has been designated to be of high value.

Significant views to the Blue Mountains are apparent to the west from High Street and Mulgoa Road, particularly at the intersection of these two roads (Carpenters Site).

High voltage power lines dominate views to the west with power lines converging at the substation to the north of Museum Drive.

There is a rail overpass over Castlereagh Road. It is a utilitarian structure with adhoc advertising signage and does not contribute positively to the Penrith CBD arrival experience from the north.

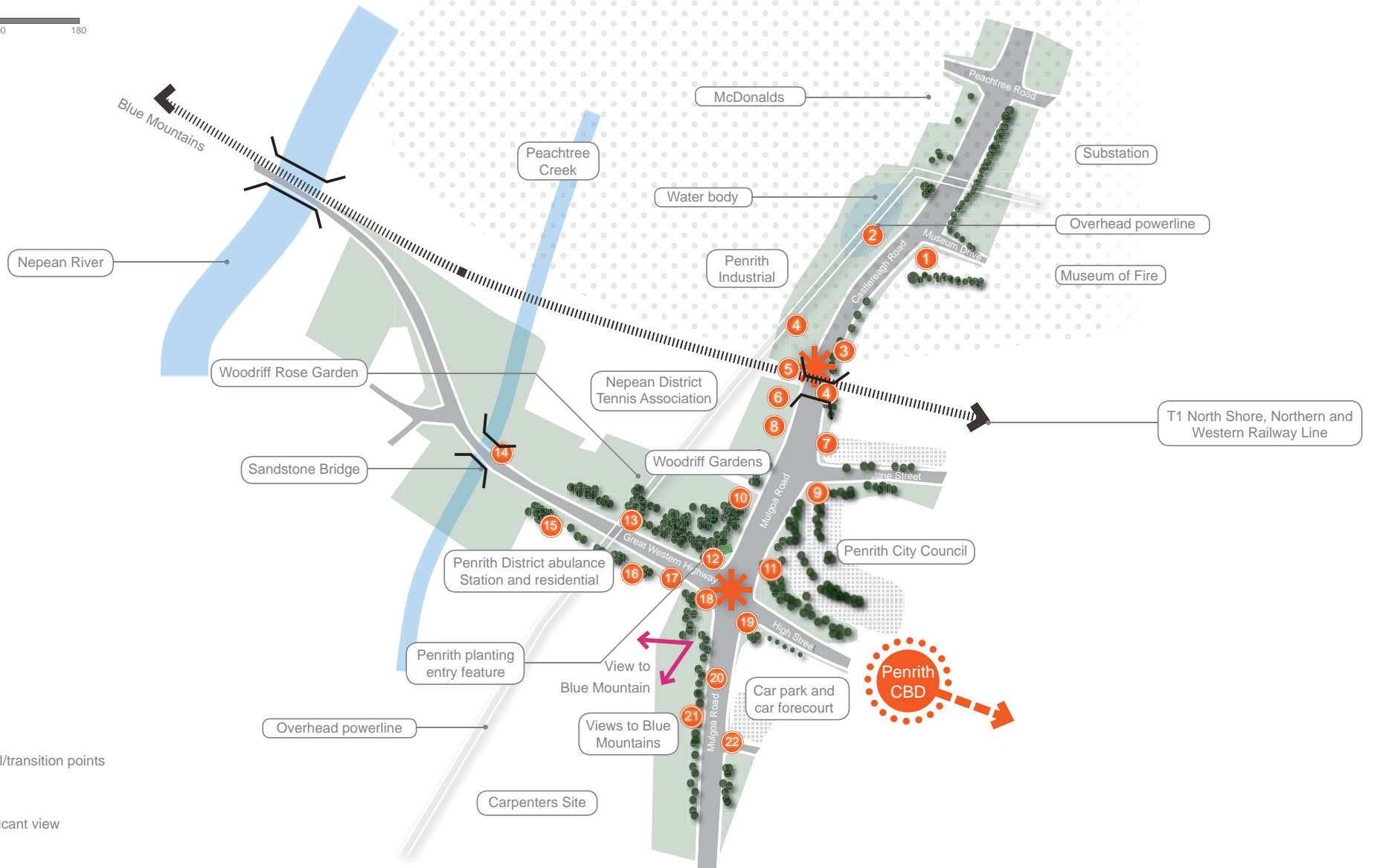
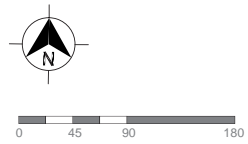


Figure: 3. Issues and Opportunities

## 2.3 Issues and Opportunities

A range of issues and opportunities associated with the Jane Street and Mulgoa Road Upgrade have been identified during the site analysis and are summarised below and illustrated on Figure 3 'Issues and Opportunities.'

- 1 Ensure signage and views towards the Museum of Fire signage (Fire Truck), which marks the entry point to Museum Drive, are retained.
- 2 Widening could potentially result in extensive earthworks at the water body and retaining wall adjacent to Castlereagh Road.
- 3 Existing steep cutting with exposed earth and small trees lining the top. Widening may require treatment of this slope.
- 4 Wide verge - opportunity to utilise bridge and available land to create clear gateway and transition point to Penrith CBD.
- 5 The Rail overpass is a utilitarian structure which does not contribute to the Penrith CBD arrival experience. The adhoc advertising signage creates an unappealing appearance. Opportunity to provide a new structure or new facade to contribute to defining a gateway to Penrith.
- 6 The retaining wall at the bridge overpass is in poor condition. There is an opportunity to upgrade the wall to provide a more urban 'CBD' appearance.
- 7 There is an opportunity to provide an improved landscape edge which retains views for safety and security for the commuter car park associated with the rail station.
- 8 Open views across Nepean District Tennis Association provide an informal edge to Penrith. Retain views and character where possible.
- 9 There is a mature avenue of trees to the northern boundary of Penrith Council office, extending along Jane Street. Retain this character and extend to Jane Street as far as practicable.
- 10 Scattered mature trees within Woodriff Gardens offer an informal parkland character on approach to Penrith. Retain the informal parkland character to this edge.
- 11 Mature avenue planting to the north of High Street with Penrith City Council signage. Retain this character and views to signage.
- 12 Gateway feature comprises a planted bed with plants arranged to display 'Penrith.' The angle of planting and low hedge at the front make the letters difficult to read and the road upgrade will result in the relocation of this feature. Replace gateway feature in consultation with Council.
- 13 Mature trees and power lines adjacent to the road edge. Retain landscape character where possible.
- 14 Peachtree Creek Bridge crossing marks a transition point to a river corridor character with populus trees.
- 15 Residential properties with low boundary wall and clear views to passing traffic. Retain character of this area.
- 16 Penrith District Ambulance Station is a local heritage item. Ensure any works are sensitive to the heritage setting.
- 17 Connection to the Nepean River from the CBD to the "Great River Walk." Ensure works retain this connection.
- 18 The pedestrian crossing at the High Street intersection is difficult to navigate with no crossing from north to south of High Street / Great Western Highway. Improve crossing and pedestrian movement where possible.
- 19 The car sales forecourt and car park front the High Street and Mulgoa intersection. Pine trees appear out of character with the parkland river edge vegetation.
- 20 Mulgoa Road is a designated Flood Evacuation Route. Ensure upgrade works enable flood evacuation.
- 21 Significant views to the Blue Mountains from Mulgoa Road, particularly on approach to the High Street intersection. Ensure views are retained.
- 22 Wide verges with power lines dominant in views from Mulgoa Road. Retain the existing character as far as practicable. Consider opportunities to screen lower level views of pylons where possible.
- 23 Ensure urban design approach is consistent with the Mulgoa Road Strategic Design Report.

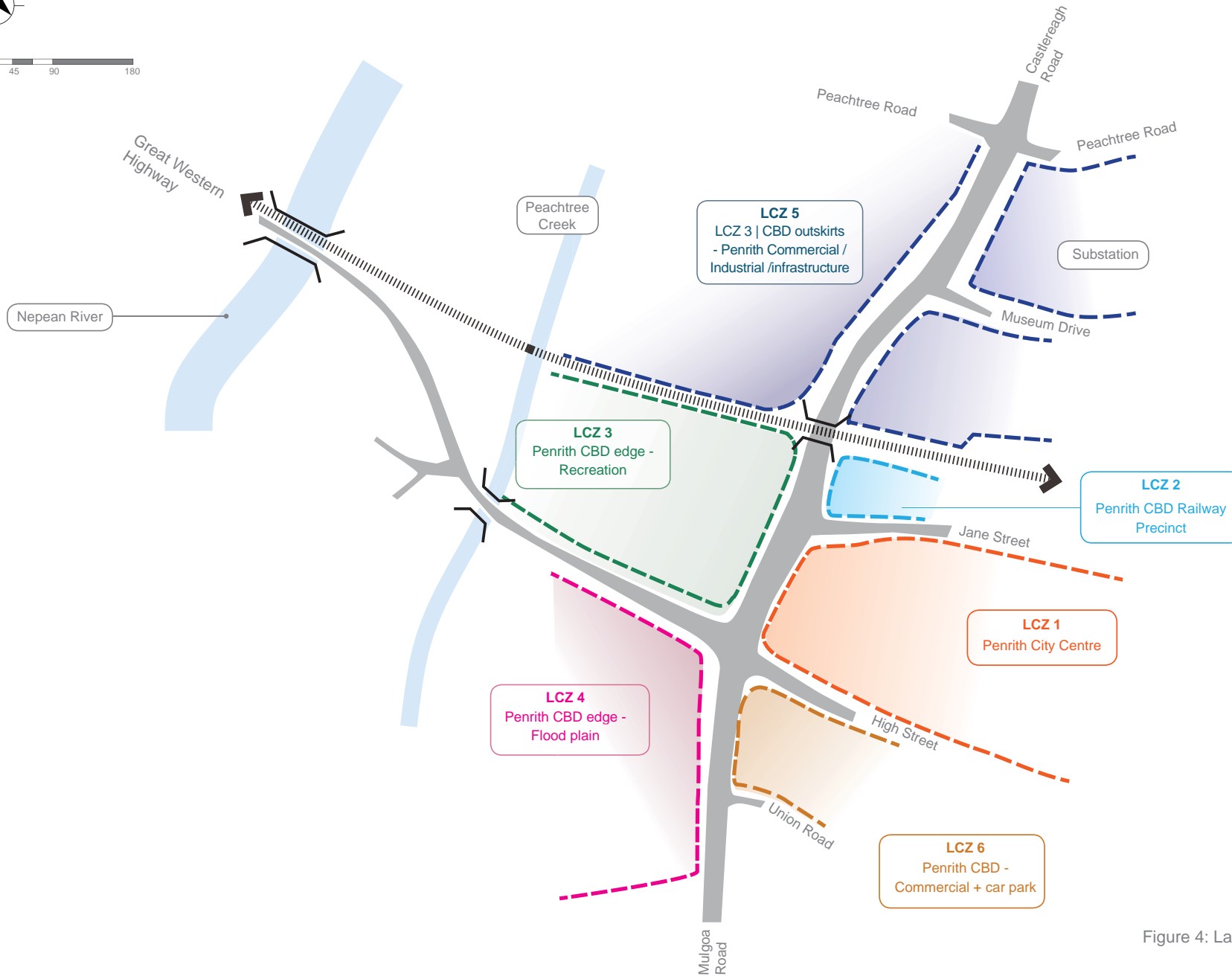
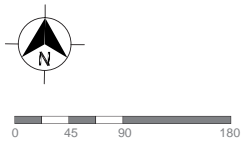


Figure 4: Landscape Character Zones

# 3. Landscape Character Assessment

## 3.1 Landscape Character Zones

An analysis of the landscape character of Jane Street and Mulgoa Road was carried out to provide a baseline against which to assess the significance of likely change resulting from the upgrade. The analysis involved the identification of a number of landscape character zones (LCZs). These are mapped in Figure 4: Landscape Character Zones.

The character of the Jane Street and Mulgoa Road project is heavily influenced by the existing land use and built form, marked and clearly defined by existing rail and road corridors that intersect and divide the area.

A summary of the LCZs and contributing characteristics has been provided below.



### LCZ 1 | Penrith City Centre

- Penrith City Council (PCC) building dominant in views from Castlereagh Road, filtered by roadside boundary planting.
- Building is bound by car parking to the west, enclosed by mature vegetation with avenue planting to the south adjacent to High Street and to the north along Jane Street.



### LCZ 2 | Penrith CBD Railway Precinct

- This area consists of railway and commuter car parks with railway services buildings. There is limited provision for landscape amenity, eg street trees or landscape verges.



### LCZ 3 | Penrith CBD Edge - Recreation

- Nepean District Tennis Courts and Woodriff Gardens provide a soft landscape boundary to Penrith with a planted entry statement at High Street / Mulgoa Road intersection.
- Woodriff Gardens features a Rose Garden. Tennis courts provide a district and local recreational facility.



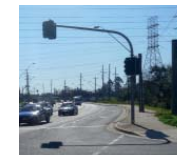
### LCZ 4 | Penrith CBD edge - Flood plain

- The south western extent of the project area is marked by Peachtree Creek floodplain.
- The absence of development allows clear open views from Mulgoa Road to the Blue Mountains to the east.
- The northern extent of this character area comprises residential properties and the Penrith District Ambulance Station, a registered heritage building.



### LCZ 5 | Penrith CBD outskirts - Commercial / Industrial / Infrastructure

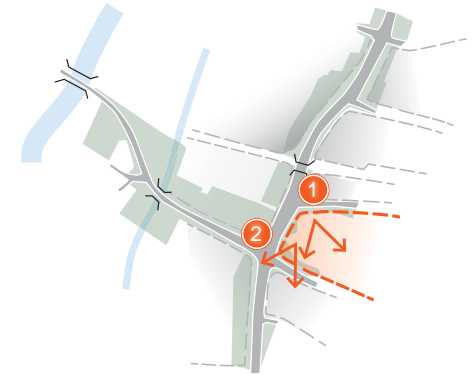
- Large single storey linear warehouse buildings surrounded by hardstand car parks. Limited provision for landscape amenity, eg street trees or landscape verges.
- High voltage power lines and transmission towers are dominant in views from Castlereagh Road to industrial development to the west.
- Mature vegetation filters views towards the ground level infrastructure and storage areas.



### LCZ 6 | Penrith CBD - Commercial + car park

- This zone comprises a car yard and car park
- Limited landscape or verges within the road corridor.
- Mature tree at the High Street and Mulgoa Road corner





### 3.1.1 LCZ 1 | Penrith Centre

The Penrith City Council building is dominant in views from Mulgoa Road. The building is surrounded by a car park to the west and enclosed by mature vegetation with avenue and parkland planting to the south and north.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade within the LCZ include:

- Widening of High Street into the curtilage of Penrith City Council car park.
- Removal of vegetation along High Street and Jane Street, impacting on the parkland character of this area.
- Introduction of a 4.5m shared path to the western boundary of Penrith City Council.
- Introduction of improved pedestrian crossing at High Street and Jane Street intersection.

#### *Sensitivity : Moderate*

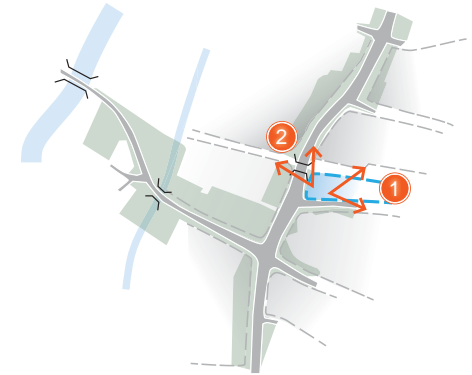
- Offices enclosed by mature planting with a moderate level of visual coherence and landscape quality, contributing to the Penrith parkland character.

#### *Magnitude of change : Moderate*

- The proposed upgrade works will be undertaken within the existing road corridor and result in an incremental expansion of road with localised impacts on the parkland character.

#### *Landscape Character Impact : Moderate*

Moderate sensitivity and moderate magnitude of change resulting in a moderate landscape impact.



### 3.1.2 LCZ 2 | Penrith CBD Railway Precinct

The zone is characterised by the railway corridor and rail infrastructure with a car park and railway services building. The area has limited provision for landscape amenity, eg street trees or landscape verges.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade Project within the LCZ include:

- Introduction of a new rail overbridge.
- New retaining walls adjacent the upgraded road and under the bridge.
- Allowance for a 4.5m wide footpath to the east of Castlereagh Road.
- Localised earthworks to the eastern edge of Castlereagh Road within the existing road corridor boundary, resulting in removal of road side vegetation.

#### *Sensitivity : Low*

- High degree of modification and industrial use of this LCZ with low landscape value

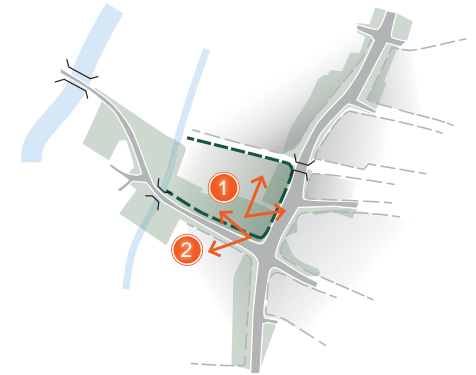
#### *Magnitude of change : Moderate*

- The works would result in localised vegetation removal along Castlereagh Road and an incremental enlargement of road pavement adjacent to this character area.
- New structures including a bridge and a 90m retaining wall.

#### *Landscape Character Impact : Moderate - Low*

The low sensitivity and low magnitude of change results in a moderate - low landscape impact.





### 3.1.3 LCZ 3 | Penrith CBD Edge - Recreation

This Landscape Character Zone provides a soft parkland edge between Peachtree Creek and the urban environment associated with Penrith. Features include Woodriff Garden and Nepean District Tennis buffered from the Great Western Highway by a broad band of mature parkland vegetation. The southern edge of this character area is marked by a planted entry statement at High Street / Mulgoa Road intersection.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade Project within the LCZ include:

- Removal of the planted entry statement.
- Removal of mature parkland trees along the southern and eastern boundary of this character area.
- Introduction of improved pedestrian crossing facilities at the High Street interchange.
- Additional turning lanes and widening of pavement.

#### Sensitivity : High

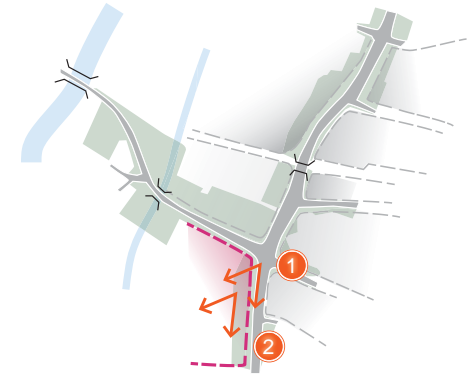
- Recreational facilities providing a soft parkland edge extending the parkland character edge to Penrith.

#### Magnitude of change : Moderate

- The works would result in vegetation removal with localised impacts on the parkland character and removal of the planted entry statement.

#### Landscape Character Impact : Moderate - High

High sensitivity and moderate magnitude of change result in a Moderate - High landscape impact.



### 3.1.4 LCZ 4 | Penrith CBD edge - Flood plain

The absence of development allows clear open views from Mulgoa Road to the Blue Mountains to the east, framed by mature vegetation along Mulgoa Road. The open landscape adds to the natural parkland character of Penrith. The northern extent of this character area is marked by residential properties and the Penrith District Ambulance Station, a local heritage item.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade Project within the LCZ include:

- Removal of mature vegetation to the west of Mulgoa Road.
- Widening of the High Street intersection encroaching into the eastern corner of this character area
- Localised earthworks to the eastern western edge of Mulgoa Road, encroaching into the eastern corner of this character area.

#### *Sensitivity : High*

- Predominantly native tree vegetation and informal recreational use.
- Promotes parkland, rural character within a largely unmodified landscape setting.

#### *Magnitude of change : Moderate*

- The works would result in vegetation removal along Mulgoa Road and an incremental enlargement of road pavement adjacent to this character area.

#### *Landscape Character Impact : Moderate - High*

High sensitivity and moderate magnitude of change results in a Moderate - High landscape impact.



### 3.1.5 LCZ 5 | Penrith CBD outskirts - Commercial / Industrial / Infrastructure

This zone is characterised by large single storey linear warehouses and buildings with hardstand car parks. The industrial and commercial buildings have limited landscape amenity with high power lines dominant in views from Castlereagh Road and industrial development to the west. A wide landscaped verge is located to the west of Castlereagh Road and contains a large water body.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade Project within the LCZ include:

- Introduction of a new rail bridge over Castlereagh Road.
- Retaining wall to the east and west bridge abutments.
- Allowance for a 4.5m wide footpath to the east of Castlereagh Road.
- Widening of Castlereagh Road approximately 20m to west, encroaching in to the Penrith Industrial site with localised removal if existing vegetation.
- Allowance of a 1.5m footpath to the west of Castlereagh Road with localised vegetation removal and introduction of a retaining wall

- New entrance to the car park to the south of the new rail bridge structure.

#### Sensitivity : Low

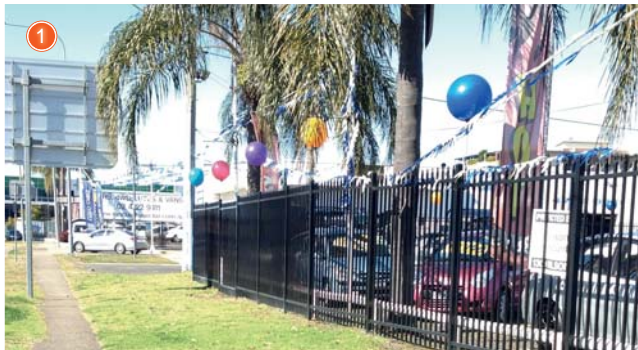
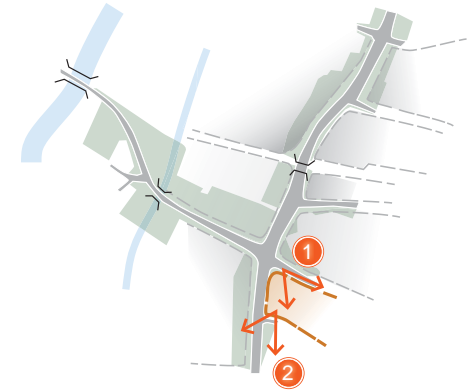
- High degree of modification and industrial use in this LCZ.
- Moderate to low level of visual coherence in the landscape although predominantly commercial/industrial built structure.

#### Magnitude of change : Low

- The works would result in vegetation removal and localised impacts on the existing pond to the west of Castlereagh Road and relocation of the Museum Station entry sign.
- The proposed upgrade works will be undertaken within the existing road corridor.
- Replacement of retaining walls and bridge. Bridge will be a similar scale but retaining walls will be increased in length on both sides of the road.

#### Landscape Character Impact : Low

Low sensitivity and moderate magnitude of change will result in a low to moderate landscape impact.



### 3.1.6 LCZ 6 | Penrith CBD - Commercial + car park

This zone comprises a car yard and car park with limited landscape or verges within the road corridor.

#### Description of proposed works

The extent of proposed works associated with the Jane Street and Mulgoa Road Upgrade Project within the LCZ include:

- Allowance for a 4.5m wide footpath to the east of Mulgoa Road.
- Localised earthworks to the eastern edge of Mulgoa Road within the existing road corridor boundary.
- Minor encroachment in to the tree canopy of a mature tree on the High Street and Mulgoa Road corner

*Sensitivity : Low*

- High degree of commercial use of this LCZ with low landscape value

*Magnitude of change : Low*

- The proposed upgrade works will be undertaken within the existing road corridor boundary.
- Removal of some grass verge will occur and potential minor canopy trimming to mature tree on the High Street and Mulgoa Road corridor

*Landscape Character Impact : Low*

Low sensitivity and low magnitude of change results in a negligible landscape impact.

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4.3 Summary of Landscape Impacts

Table 1 'Landscape Impacts' captures the anticipated impact on each of the Landscape Character Zones.

Table 1. Landscape Impacts

LCZ No.	Description	Sensitivity	Magnitude	Impact
1	Penrith Centre	Moderate	Moderate	Moderate
2	Penrith CBD Railway	Low	Moderate	Moderate - Low
3	Penrith CBD Edge - Recreation	High	Moderate	Moderate - High
4	Penrith CBD Edge - Flood plain	High	Moderate	Moderate - High
5	Penrith CBD outskirts - Commercial / industrial / infrastructure	Low	Low	Low
6	Penrith CBD - Commercial + Car Parks	Low	Low	Low



Figure: 5. Visual Envelope

## 4. Visual Impact Assessment

### 4.1 Visual Envelope

The Visual Envelope map (Figure 5) illustrates the visual catchment of the proposed Jane Street and Mulgoa Road Upgrade Project. It generally describes the area surrounding the proposal from which directional views towards it are possible. Based on existing landform, the visual catchment also takes into account vegetation, landscape use and structures.

Key viewpoints from which potential visual impacts are to be assessed were determined on site and from further desktop analysis. View points include:

- ① Viewpoint 1 - Penrith Commercial / industrial park
- ② Viewpoint 2 - Nepean District Tennis Association
- ③ Viewpoint 3 - Jane Street
- ④ Viewpoint 4 - Penrith City Council office
- ⑤ Viewpoint 5 - Woodriff Gardens
- ⑥ Viewpoint 6 - Great Western Highway residential
- ⑦ Viewpoint 7 - Mulgoa Road

4.2 Visual Impact Assessment

The following section documents the anticipated visual impact from each of the view points.

4.2.1 Viewpoint 1

Description of anticipated visible elements

- Widening of Castlereagh Road from a two lane carriageway to three lanes each way
- New rail overbridge over Castlereagh Road in the far distance with view towards vehicle protection gantry
- 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.

Impacts

The view has a low sensitivity due to the highly modified landscape, including surrounding commercial and industrial buildings and overhead power lines. The change will be an incremental expansion of an existing road corridor with localised vegetation removal and the introduction of the vehicle protection gantry. The magnitude of change is judged to be moderate, resulting in a Moderate - Low visual impact.



Visual sensitivity	Low
Magnitude of change	Moderate
Visual impact	Moderate - Low

4.2.2 Viewpoint 2

Description of anticipated visible elements

- Widening of the Castlereagh Road from a two lane carriageway to three lanes each way, encroaching approximately 20m into the Woodriff Gardens and Nepean District Tennis sites.
- View of new rail and vehicle protection gantry
- 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east
- View of retaining wall along eastern side of road (western side not visible in view)

Impacts

The view has moderate sensitivity due to the recreational receptors using the tennis courts and shared path, however, this view is in the context of the existing road and rail corridors. The visual change will be high due to the physical footprint of the scheme, localised vegetation removal, vehicle protection gantry, retaining wall and bridge structure. The overall visual impact will be Moderate - High.



Visual sensitivity	Moderate
Magnitude of change	High
Visual impact	Moderate - High

4.2.3 Viewpoint 3

Description of anticipated visible elements

- Widening of Jane Street and encroachment into the road side vegetation and grass verge.
- 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.

Impacts

The view has a low sensitivity due to the highly modified landscape with civic buildings, rail infrastructure and a car park to the north. The change will include the removal of mature avenue trees to the south of Jane Street and incremental enlargement of the road corridor, resulting in a moderate magnitude of change. The overall visual impact is Moderate - Low.



Visual sensitivity	Low
Magnitude of change	Moderate
Visual impact	Moderate - Low

4.2.4 Viewpoint 4

Description of anticipated visible elements

- Widening of Castlereagh Road from a two lane carriageway to three lanes each way with additional turning lanes.
- 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.

Impacts

The view has moderate sensitivity due to the highly modified setting and moderate visual coherence. The visual change will be moderate due to the physical footprint of the scheme and vegetation removal. The overall visual impact will be Moderate.



Visual sensitivity	Moderate
Magnitude of change	Moderate
Visual impact	Moderate

4.2.5 Viewpoint 5

Description of anticipated visible elements

- Widening of Castlereagh Road and Great Western Highway from a two lane carriageway to three lanes each way, resulting in the removal of the planted entry statement and vegetation along Great Western Highway.
- 1.5m wide foopath to the west of the alignment and a 4.5m shared path to the east.

Impacts

The view has moderate sensitivity as receptors are users of the gardens and the landscape has a reasonable level of visual coherence. The visual change will be moderate due to the physical footprint of the scheme and localised vegetation removal. The overall visual impact will be Moderate.



Visual sensitivity	Moderate
Magnitude of change	Moderate
Visual impact	Moderate

4.2.6 Viewpoint 6

Description of anticipated visible elements

- Widening of the Great Western Highway from a two lane carriageway to three lanes each way.
- 1.5m wide footpath to the south and a 4.5m shared path to north.
- Removal of vegetation to the southern boundary of Woodriff Gardens.

Impacts

The view has moderate sensitivity due to the residential receptors and the Penrith District Ambulance Station, a local heritage item. The visual change will be moderate due to the incremental enlargement of the road corridor and the removal of vegetation along Woodriff Gardens. The overall visual impact will be Moderate.



Visual sensitivity	Moderate
Magnitude of change	Moderate
Visual impact	Moderate

4.2.7 Viewpoint 7

Description of anticipated visible elements

- Widening of Mulgoa Road and clearance of mature vegetation adjacent to the the Carpenters site.
- 1.5m wide foopath to the west of the alignment and a 4.5m shared path to the east.

Impacts

The view has moderate sensitivity due to framed distant views to the Blue Mountains to the west for footpath users. The visual change will be moderate due to the physical footprint of the scheme and extent of vegetation removal. The overall visual impact will be moderate.



Visual sensitivity	Moderate
Magnitude of change	Moderate
Visual impact	Moderate

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4.3 Summary of Visual Impact

The visual impacts are low to moderate, reflecting the highly modified nature of the project area on the edge of Penrith CBD and the commercial, industrial and recreational areas either side of the road upgrade. More moderate impacts are found where adjoining land use is recreational, residential or has heritage significance. The table below summaries the preceding viewpoints analysis indicating the overall visual impact without mitigation.

Table 2. Overall visual impact for each viewpoint

View point number	Sensitivity	Magnitude	Impact
1	Low	Low	Moderate - Low
2	Moderate	High	Moderate - High
3	Low	Moderate	Moderate - Low
4	Moderate	Moderate	Moderate
5	Moderate	Moderate	Moderate
6	Moderate	Moderate	Moderate
7	Moderate	Moderate	Moderate

## 5. Urban Strategy

This chapter outlines the landscape and urban design vision for the upgrade and a set of urban design objectives and principles to guide design development of the upgrade.

Mulgoa Road is a vital north-south arterial road in the Western Sydney region. It serves as a freight, light vehicle and cycling route and caters in places for localised pedestrian movements. The road extends from Wallacia to the south to Richmond in the north. A separate strategy for the whole length of Mulgoa Road has been prepared by CM+ for RMS called the *Mulgoa Road Strategic Urban Design Report*.

The Jane Street and Mulgoa Road Upgrade is an 550 metre section adjacent the Penrith CBD edge. The upgrade is intended to be consistent with the overall strategy for the length of Mulgoa Road identified in the Mulgoa Road Strategic Urban Design Report.

Jane Street/ Great Western Highway is a vital east-west link intersecting Mulgoa Road at Penrith CBD. Great Western Highway is a major arterial road that locally links Penrith CBD to the Nepean River and beyond, east to the Sydney CBD and west to the Blue Mountains.

### 5.1 Urban Design Corridor Vision

The following Vision adapts the vision and strategy articulated for the whole of Mulgoa Road in the Mulgoa Road Strategic Urban Design Report<sup>1</sup> to the Jane Street and Mulgoa Road upgrade.

*Jane Street and Mulgoa Road upgrade will be an attractive green corridor gateway to Penrith that takes its identity and character from its unique relationship to the regional geography of the mountains, rivers, creeks and CBD location while providing for various modes of movement that promote universal accessibility and sustainability. It will help to connect the Penrith CBD, the Nepean River, the Green Bridge, the Great River Walk and Museum of Fire and provide shade, cooling, healthy air and water quality essential for a liveable city.*

The road journey offers a variety of experiences, designed in response to the adjacent built and landscape context. This responsiveness to context provides a degree of legibility along the road for local people as well as wider regional users. These landscape experiences include distant views to the Blue Mountains across Carpenters Site, local views to adjacent landmarks such as Penrith Council Offices, Woodriff Gardens, Nepean District Tennis courts, the District Ambulance Station (a local heritage item) and the Western Railway Line. Woodriff Gardens and edge planting to the Council Offices and Carpenters Site provide an informal tree edge to the Penrith CBD supported by more formal planting in the road corridor to establish the road as a gateway to Penrith CBD.

### 5.2 Urban Design Strategy

The urban design strategy for the road corridor recognises the existing urban and landscape character and seeks to integrate the widened road sensitively into its CBD setting. The design aims to reinforce and reveal the attributes of the adjacent landscape, localities and landmarks while introducing new structures and elements where needed. Broadly speaking, the urban design approach is to maintain a level of consistency with the adjacent existing landscape character while introducing a more formal design approach in the road corridor to establish this section of Mulgoa Road as the gateway to Penrith CBD.

Key Blue Mountain and local park views, as well as landmark views, will be maintained. Disturbance to the natural and built environment is planned to be minimised through careful consideration of the most appropriate alignment while the suite of proposed architectural elements will contribute to the route's distinctiveness and legibility.

## Urban Design Objectives and Principles

*Objective 1: To reinforce the Penrith CBD gateway entry, fit sensitively with its CBD setting, and improve the character and appearance of the road.*

Ensure that the urban, landscape and engineering design are well integrated, respond to context and create legibility in the journey.

The principles to achieve this are:

- Maintain consistency with the strategy for the length of Mulgoa Road.
- Extend the concept of Mulgoa Road as a scenic drive with mountain/ city views.
- Acknowledge Mulgoa Road as an active transport green link connecting open spaces.
- Capitalise on natural features for placemaking and identity reinforcement.
- Provide entry treatment planting to create a sense of arrival and transition to the Penrith CBD area.
- Improve pedestrian and cyclist amenity along and across

the corridor, by providing connecting paths from the Penrith CBD, residential areas, employment zones and open space/ recreation areas to the Great River Walk and Nepean River.

- Ensure planting reinforces the landscape character zones described within this report within an overall structure.
- Maximise tree planting opportunities.
- Utilise a combination of trees and understorey treatments which respond to the existing adjacent context.
- Respond to existing landform in the horizontal and vertical alignment of the road and road related structures.
- Minimise as far as possible the use of retaining walls.
- Carefully consider the form, colour and texture of retaining walls in relation to the predominantly urban setting in which they are proposed.
- Built forms provide/establish a consistent and strong architectural language.

*Objective 2: To incorporate the heritage and cultural attributes of the corridor.*

The principles to achieve this are:

- To respond sensitively to the heritage, cultural and natural sites and elements that occur adjacent to the road corridor.
- Minimise the road footprint and promote a considered design response to the Penrith CBD edge.
- To provide a considered design response for roadside retaining walls and other structures and associated landscaping.
- Conserve existing prominent landscape features and significant views and create a distinct identifiable character.
  - Maintain views to built form to establish a sense of place along Mulgoa Road particularly the views to cultural landmarks such as the Council Offices and District Ambulance Station.
  - Maintain views to landscape landmarks to establish a sense of place along Mulgoa Road particularly the views to a new gateway feature and Woodriff Gardens and Carpenters Site.
- Incorporate design elements that help create a unique identity for Mulgoa Road at the Penrith CBD edge.

*Objective 3: To achieve improved accessibility and connectivity across and along the corridor*

The principles to achieve this are:

- Design for convenient connections to and across the road upgrade to the Penrith CBD and other adjacent areas such as Woodriff Gardens and the Nepean District Tennis Centre.
- Consider walking, cycling and public transport modes as part of the project scope and design
- Maintain clear, safe vehicle crossings at driveways and local road connections
- Optimise the shared path route to create a stimulating experience for users and design to coordinate with local road connections; consider shade provision and visual interest as well as sight lines in planting design.

*Objective 4: To achieve a legible experience in movement*

Ensure a stimulating travel experience that highlights the features of the existing urban and landscape character.

The principles to achieve this are:

- Maintain and enhance existing views to the Blue Mountains and ensure new views are exploited to improve the road user experience.
- Maintain localised views to local built and landscape/ recreation landmarks such as Penrith Council Offices, the District Ambulance Station, Woodriff Gardens and the Nepean District Tennis Centre.
- Reinforce the informal parkland edges on the road corridor fringes.
- Create a formal entryway within the road corridor to create a sense of arrival and transition to the Penrith CBD area.

*Objective 5: To design a simple, unified and maintainable suite of road and roadside elements*

The principles to achieve this are:

- Use standard road elements such as safety barriers, pedestrian fencing, shared path fencing, bus stops, traffic management, street lighting and signage in a neat, uncluttered and well-articulated manner.
- Ensure that road furniture does not detract from, or impede, existing or new views along the corridor.
- Ensure that road furniture and elements are easily maintained.

*Surveillance and Safety*

The design development phase of the project should consider Safety in Design and Crime Prevention Through Environmental Design (CPTED) in accordance with the guidelines as set out in the following document: 'Crime prevention and the assessment of development applications: Guidelines under section 79C of the Environmental Planning and Assessment Act (1979)', NSW Department of Urban Affairs and Planning (2001).

## 6. Urban Design Concept

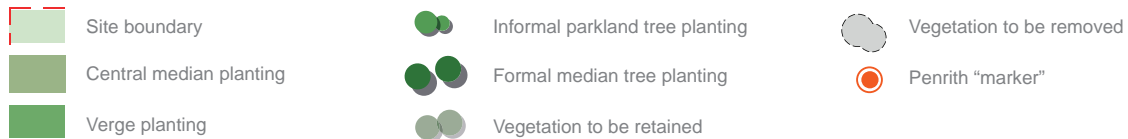
### 6.1 Concept Design Overview

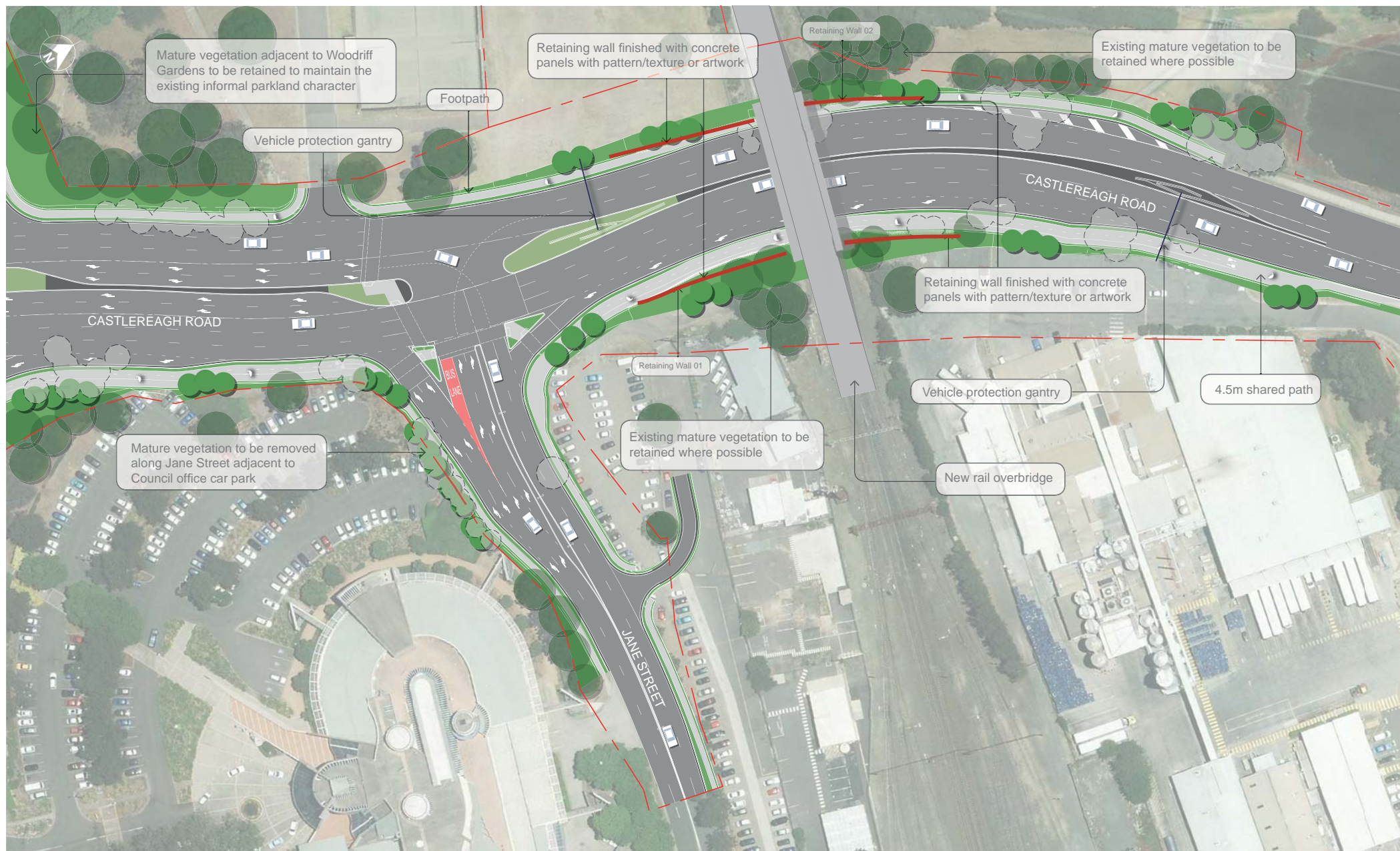
The concept design applies the urban and landscape design principles developed in Section 5 'Urban Design Strategy' and provides a concept that can be further discussed and developed with Penrith City Council to deliver a collective design response as the project progresses through to future design stages.

The Jane Street and Mulgoa Road urban design concept comprises four plans that illustrate the response for the upgrade with Section 6.2 providing an indication of the anticipated species selection.



Figure 6. Key Plan

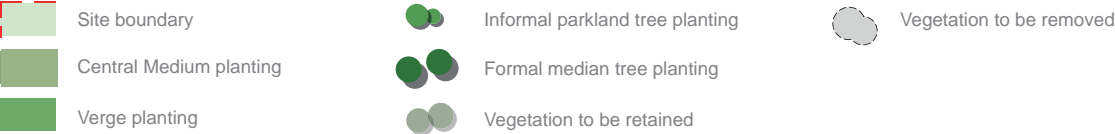




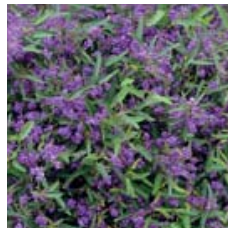
- |  |                         |  |                                 |  |                          |
|--|-------------------------|--|---------------------------------|--|--------------------------|
|  | Site boundary           |  | Informal parkland tree planting |  | Vegetation to be removed |
|  | Central Median planting |  | Formal median tree planting     |  | Retaining wall           |
|  | Verge planting          |  | Vegetation to be retained       |  |                          |



- Site boundary
- Central median planting
- Verge planting
- Informal parkland tree planting
- Formal median tree planting
- Vegetation to be retained
- Vegetation to be removed



## 6.2 Indicative planting palette



### Trees

*Eucalyptus moluccana*  
*Eucalyptus fibrosa*  
*Eucalyptus tereticornis*  
*Eucalyptus crebra*  
*Eucalyptus eugenioides*  
*Corymbia maculata*

### Shrubs and ground cover

*Dodonaea viscosa*  
*Dianella caerulea*  
*Hardenbergia violacea*  
*Lomandra filliformis subsp. filliformis*  
*Microlaena stipoides subsp. stipoides*

## 6.3 Design Criteria for Retaining Walls and Rail Bridge

### 6.3.1 Design Criteria for the Retaining Walls

Retaining Walls are expected in the following two locations:

- RW01: Along the eastern side of Castlereagh Road/ Mulgoa Road to replace an existing wall that is required to be removed for the road widening (approximately 70 metres long and a maximum height of approximately 2.0 metres).
- RW02: Along the western side of Castlereagh Road/ Mulgoa Road to replace an existing wall that is required to be removed for the road widening (approximately 95 metres long and a maximum height of approximately 4.2 metres).

The new retaining walls, located below the Railway Bridge, will be highly visible and continuous built elements along the Jane Street and Mulgoa Road Upgrade and provide one of the few opportunities to create a recognisable identity for Mulgoa Road and the Penrith CBD. The walls will be viewed as a pair, with form and alignment playing a major role, a secondary layer of design in the form of colour, patterning or public artwork on the new retaining walls will relate the walls to their context.

Outlined below are the urban design requirements for the two retaining walls.

These walls face the upgrade, are close to the carriageway and the shared path/ footpath, and travel parallel to the road shoulder. Pedestrians and traffic will be in close proximity to these walls and

the surface finish must be tactile and of high quality. A distinctive high quality finish is required to enhance the gateway journey to Penrith CBD.

The following design criteria should be explored in the detailed design process:

- Tilt walls outwards at no less than 5 degrees from the vertical to reduce the perceived height.
- Ensure a smooth top edge to walls in elevation, with no steps.
- Ensure bridge abutment and retaining walls either side provide a seamless presentation.
- Utilise precast concrete facing panels with either a strong pattern and texture or public artwork theme to discourage graffiti, reduce the visual scale of the walls and provide a CBD entry feature.
- Provide fixings that are concealed and discreet.
- Dish drains at the rear of the wall are to be set lower than the top of the wall by a minimum of 200mm.
- Extend the precast concrete panels higher than the required retained height by a minimum of 1000mm to avoid the need for maintenance handrails or fencing. If safety fencing is unavoidable, it is to be integrated with the visual design of the wall and follow the geometry of the top of the wall with smooth flowing lines.
- Consider splaying retaining walls in plan to provide planting

to the base of the walls as far as practicable given clear zone, shared path and maintenance requirements.

### 6.3.2 Design Criteria for the Railway Bridge

The bridge design has currently been designed to meet Railcorp requirements and to minimise rail disruptions during construction and comprises two precast concrete I girders spanning 39 metres with precast concrete cross girders. As such it is aesthetically a utilitarian structure.

It is recommended that the retaining walls and bridge should be designed together as a composition that enhances the sense of arrival and departure from Penrith CBD. Colour, texture and signage could be incorporated in the treatment of the bridge parapet as a separate element. Refer photos to the right.

### 6.3.3 Vehicle Protection Gantry

An overhead vehicle protection beam is required to prevent over height vehicles from impacting with the rail bridge. The following gantry criteria should be further explored in the detailed design process:

- Minimise visual clutter, bulk and massing of the gantry
- Explore the use of simple box section shapes that are unobtrusive

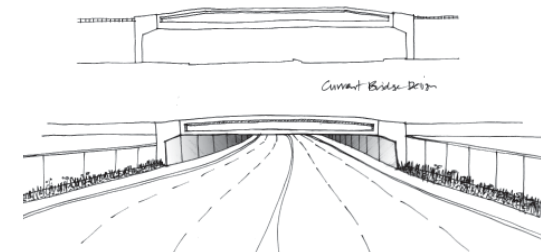


Bridge parapet as Gateway using colour

Artwork on retaining walls



Retaining walls



Current bridge design sketch perspective

# 7. Mitigation Recommendations

The landscape and urban concept design responds to the overall project objectives and is underpinned by a set of landscape and urban design objectives and more specific principles. The concept design on the preceding pages illustrates the application of these principles to the project. It adopts the mitigation measures detailed in Table 3: Recommended Mitigation Measures, integrating them into a coherent urban and landscape composition for the corridor.

Table 3: Recommended Mitigation Measures

Location	Visible elements	Impact / Issue	Mitigation
Viewpoint 1  Penrith Commercial / industrial park	<ul style="list-style-type: none"><li>• Widening of Castlereagh Road from a two lane carriageway to three lanes each way.</li><li>• New rail overbridge over Castlereagh Road in the far distance.</li><li>• 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li></ul>	<ul style="list-style-type: none"><li>• Incremental expansion of an existing road corridor.</li><li>• Potential localised impacts to the water body and areas of vegetation clearance.</li></ul>	<ul style="list-style-type: none"><li>• Provide tree planting, taking into account requirements for clear zones, to filter views from the road corridor to the Penrith commercial/ industrial park and provide shade for footpath users.</li><li>• Planting to median and verge between pedestrian and shared paths and the carriageways.</li><li>• Relate retaining walls to the CBD context. Utilise colour, patterning or public artwork in the panel design. Retaining walls and bridge to be designed together as a composition that enhances the sense of arrival and departure from Penrith CBD.</li></ul>
Viewpoint 2  Nepean District Tennis Association	<ul style="list-style-type: none"><li>• Widening of the Castlereagh Road from a two lane carriageway to three lanes each way, encroaching approximately 20m into the Woodriff Gardens and Nepean District Tennis sites.</li><li>• View of new rail overbridge to the north.</li><li>• 1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li><li>• View of retaining wall along eastern side of road (western side not visible in view).</li></ul>	<ul style="list-style-type: none"><li>• Expansion of the existing road corridor and impact to Woodriff Gardens.</li><li>• Localised vegetation removal.</li><li>• New structures such as bridge and retaining wall.</li></ul>	<ul style="list-style-type: none"><li>• Provide clusters of native trees and shrubs along Castlereagh Road to screen traffic and provide shade for footpath users.</li><li>• Planting to median to enhance approach to new bridge structure and contribute to redefining the sense of arrival and departure from Penrith CBD.</li><li>• Relate retaining walls to the CBD context. Utilise colour, patterning or public artwork in the panel design. Retaining walls and bridge to be designed together as a composition that enhances the sense of arrival and departure from Penrith CBD.</li></ul>

Location	Visible elements	Impact / Issue	Mitigation
Viewpoint 3 Jane Street	<ul style="list-style-type: none"> <li>Widening of Jane Street and encroachment into the road side vegetation and grass verge.</li> <li>1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li> </ul>	<ul style="list-style-type: none"> <li>Removal of mature avenue trees to the south of Jane Street.</li> <li>Incremental enlargement of the scale and dominance of road corridor within the view.</li> </ul>	<ul style="list-style-type: none"> <li>Provide replacement tree planting to re-establish the mature landscaped boundary to Penrith City Council.</li> <li>Provide shade trees along the footpath.</li> </ul>
Viewpoint 4 Penrith City Council Office	<ul style="list-style-type: none"> <li>Widening of the Castlereagh Road from a two lane carriageway to three lanes each way with additional turning lanes.</li> <li>1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li> </ul>	<ul style="list-style-type: none"> <li>Incremental expansion of an existing road corridor.</li> <li>Localised vegetation clearance.</li> </ul>	<ul style="list-style-type: none"> <li>Provide replacement tree planting to re-establish the mature landscaped boundary to Penrith City Council.</li> <li>Provide shade trees.</li> </ul>
Viewpoint 5 Woodriff Gardens	<ul style="list-style-type: none"> <li>Widening of Castlereagh Road and Great Western Highway from a two lane carriageway to three lanes each way.</li> <li>1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li> </ul>	<ul style="list-style-type: none"> <li>Incremental expansion of an existing road corridor.</li> <li>Vegetation removal along Great Western Highway impacting the parkland character.</li> <li>Removal of the planted entry statement and vegetation along Great Western Highway.</li> </ul>	<ul style="list-style-type: none"> <li>Provide replacement tree planting to re-establish the mature parkland character.</li> <li>Provide shade trees.</li> <li>Provide a new gateway feature that will assist with redefining the arrival and departure to Penrith CBD.</li> </ul>
Viewpoint 6 Great Western Highway	<ul style="list-style-type: none"> <li>Widening of the Great Western Highway from a two lane carriageway to three lanes each way.</li> <li>1.5m wide footpath to the south and a 4.5m shared path to north.</li> <li>Removal of vegetation to the southern boundary of Woodriff Gardens.</li> </ul>	<ul style="list-style-type: none"> <li>Incremental enlargement of the road corridor.</li> <li>Removal of vegetation along Woodriff Gardens.</li> <li>Removal of vegetation along Castlereagh Road.</li> </ul>	<ul style="list-style-type: none"> <li>Provide native trees to the boundary of Woodriff Gardens to re-establish the parkland edge.</li> <li>Provide native trees to the boundary of Penrith City Council car park to re-establish the mature landscape.</li> <li>Provide a new gateway features that will assist with redefining the arrival and departure to Penrith CBD.</li> </ul>
Viewpoint 7 Mulgoa Road	<ul style="list-style-type: none"> <li>Widening of Mulgoa Road</li> <li>1.5m wide footpath to the west of the alignment and a 4.5m shared path to the east.</li> </ul>	<ul style="list-style-type: none"> <li>The change will be an incremental expansion of an existing road corridor.</li> <li>Clearance of mature vegetation adjacent to the the Carpenters site.</li> </ul>	<ul style="list-style-type: none"> <li>Provide clusters of native trees to the boundary of of Mulgoa Road to re-establish the framed views out to the Blue Mountains.</li> <li>Provide avenue trees to the central median to connect with the wider Mulgoa Road Urban Strategy.</li> <li>Provide shade trees.</li> </ul>

Jane Street + Mulgoa Road Upgrade  
Landscape Character, Visual Impact Assessment  
+ Urban Design Study





[www.rms.nsw.gov.au/JaneStreetMulgoaRoad](http://www.rms.nsw.gov.au/JaneStreetMulgoaRoad)



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