



Henry Lawson Drive Upgrade, Stage 1B

Between Keys Parade & the M5 Motorway, NSW

Urban design report including landscape
character and visual impact assessment

HLD1B-AURC-NWW-DU-RPT-000001

April 2023

scape DESIGN

Acknowledgement of Country

We acknowledge the Darug and Eora People, the traditional custodians of the land on which the Henry Lawson Drive Upgrade Stage 1B proposals refer.

Existing site tree *Eucalyptus cinerea*

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Abbreviations

Acronym	Description
ACHAR	Aboriginal Cultural Heritage Assessment Report
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
BAR	Biodiversity Assessment Report
BFPL	Bush fire prone land
BFPV	Bush fire prone vegetation
BOK	Back of kerb
C	Celsius
CBD	Central Business District
CoCB	City of Canterbury Bankstown
CPTED	Crime Prevention through Environmental Design
DPIE	Department of Planning, Industry and Environment
DP	Deposited plan - defining legal boundaries of land
EIS	Environmental Impact Statement
EP&A	Environmental Planning and Assessment Act
GA	General Aviation
HPV	High Productivity Vehicles
LCVIA	Landscape character and visual impact assessment
KMZ	File extension for a place mark file used by Google Earth
LCZ	Landscape character zone
LEP	Local Environmental Plan
LGA	Local Government Area
m.a.s.l	Metres above mean sea level
mm	Millimetres
NSW	New South Wales
NSW SES	New South Wales State Emergency Service
OEH	Office of Environment and Heritage
PCT	Plant Community Types
REF	Review of Environmental Factors
NSW RFS	New South Wales Rural Fire Service
SEPP	State Environmental Planning Policies
SHR	State Heritage Register
SHI	State Heritage Inventory
SUP	Shared user path
TfNSW	Transport for NSW (formerly Roads and Maritime)
TSC Act	Threatened Species Conservation Act 1995

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1 Introduction

1.1 Background

Transport for NSW (TfNSW) is investigating a 7.5 kilometre upgrade of Henry Lawson Drive between the M5 Motorway, Milperra and Hume Highway, Lansdowne. The upgrade would be carried out in four stages (Stages 1A, 1B, 2 and 3). In June 2018, the NSW Roads Minister and the Treasurer announced \$100 million to upgrade Henry Lawson Drive between Tower Road and the M5 Motorway (Stages 1A and 1B).

The stage one upgrade of Henry Lawson Drive intends to provide more capacity for vehicles travelling through the intersection of Henry Lawson Drive, Milperra Road and Newbridge Road. Improving efficiency along the road corridor and safety for motorists and pedestrians.

1.2 Proposal description

Transport for NSW (Transport) proposes to upgrade a 1.8-kilometre section of Henry Lawson Drive between Auld Avenue, Milperra and the approach to the M5 Motorway (known as the Henry Lawson Drive Upgrade Stage 1B) (the proposal). This includes road widening to increase traffic capacity and improve travel time as well as upgrades of key intersections to enhance capability and driver safety. Key features of the proposal would include:

- Widening Henry Lawson Drive from two to four lanes between Auld Avenue, Milperra and the M5 Motorway, Milperra with a raised central median
- Upgrading the Henry Lawson Drive / Bullecourt Avenue signalised intersection, including:
 - an additional right-turn lane from Henry Lawson Drive (northbound) to Bullecourt Avenue (two right-turn lanes total)
 - an additional right-turn lane from Bullecourt Avenue to Henry Lawson Drive (northbound) (two right-turn lanes total)
 - converting the existing dedicated left-turn lane from Bullecourt Avenue to Henry Lawson Drive (southbound) into a dedicated left-turn slip lane
 - maintaining the dedicated left-turn lane from Henry Lawson Drive (southbound) to Bullecourt Avenue
- Upgrading the Henry Lawson Drive / Pozieres Avenue signalised intersection, including:
 - a new dedicated right-turn lane from Henry Lawson Drive (southbound) to Pozieres Avenue
 - a new dedicated left-turn lane from Henry Lawson Drive (northbound) to Pozieres Avenue and relocation of the existing bus stop north of the intersection
- Providing a new two-lane local link road between Auld Avenue and Keys Parade (about 160 metres), crossing over Milperra Drain, providing access to / from southbound lanes of Henry Lawson Drive and Auld Avenue, and removing up to eight parking spaces on Auld Avenue to accommodate the link road
- Extending Raleigh Road about 120 metres to connect with Keys Parade at a roundabout, and

removing the direct connection between Raleigh Road and Henry Lawson Drive

- Converting the Henry Lawson Drive intersections to be left-in left-out only, at:
 - Ruthven Avenue
 - Whittle Avenue
 - Amiens Avenue
 - Ganmain Crescent
 - Fromelles Avenue
 - Hermies Avenue
- Modifying the Bullecourt Avenue / Ashford Avenue intersection to better accommodate heavy vehicle movements
- Constructing a three-metre-wide shared path:
 - on the western side of Henry Lawson Drive between Pozieres Avenue and Keys Parade
 - along Keys Parade, the new Auld Avenue local link road and the extended section of Raleigh Road
- Reconstruction of some existing shared paths within the proposal area
- Constructing a new footpath within the proposal area:
 - on the eastern side of Henry Lawson Drive between the Flower Power and Ingram Avenue
 - along the northern side of Ingram Avenue
 - along the eastern side of Fromelles Avenue
- Installing new drainage infrastructure and water quality controls within the proposal area, including:
 - an upgraded longitudinal and transverse drainage pits and pipes network along Henry Lawson Drive
 - a bioretention basin between Henry Lawson Drive, Bullecourt Avenue and Fleurbaix Avenue and maintenance access to this basin
 - swales along Henry Lawson Drive and Keys Parade and installation of Gross Pollutant Traps
- Construction activities and ancillary work, including:
 - relocation of utilities (including electrical, gas, water and telecommunications)
 - civil earthworks, drainage work, water quality controls and tie-in work to adjoining sections of Henry Lawson Drive and local roads
 - final roadworks including pavement, kerb and gutters, signs, road furniture, landscaping, lighting and line marking
 - new traffic signals and intelligent transport systems including, but not limited to, closed-circuit television
 - establishment of temporary ancillary facilities to support construction, including compound sites, site offices, stockpile and laydown locations, temporary access tracks and water quality devices.

The concept design would be further refined during detailed design to minimise environmental and social impacts and to consider community feedback to the exhibition of the REF

1 Introduction

1.3 Purpose and scope of this report

This report presents the urban design considerations and landscape character and visual impact assessment (LCVIA) for Stage 1B of the Henry Lawson Drive Upgrade. The purpose of this report is to:

- Analyse the study area, formulating a series of proposal-specific design principles and urban design vision, illustrating the urban design concept, documenting the potential landscape character and visual impacts of the proposal and preparing a strategy to mitigate these impacts
- Inform the audience of the REF of the potential landscape character and visual impacts of the proposal in accordance with the relevant environmental assessment requirements of Division 5.1 of the EP&A Act.

Refer [Section 5.1 on page 50](#) of this report for a detailed description of the landscape character impact assessment methodology and [Section 7 on page 68](#) for a detailed description of the visual impact assessment methodology.

1 Introduction

1.4 Study area

Figure 1-1 captures the 1.8km extent of the Stage 1B proposal along Henry Lawson Drive, Milperra. The study area is situated between Keys Parade to the M5 Motorway.

At the southern end of Henry Lawson Drive, existing housing is predominantly low rise and detached with private driveways. Streets are often tree-lined avenues, which provide visual screening and are identifiable.

Soldier settlements are located within the study area as shown in the local environmental plan. These sites are located on:

- Amiens Avenue
- Pozieres Avenue
- Two sites on Bullecourt Avenue
- Eynham Road
- Corner of Bullecourt Avenue and Henry Lawson Drive
- Henry Lawson Drive
- Ashford Avenue.

There are educational facilities in Milperra which are:

- KU Milperra preschool
- Milperra public school
- Western Sydney University.

There are two major light commercial activity nodes located within the vicinity of the study area:

- Corner of Milperra Road and Henry Lawson Drive
- Intersection of Henry Lawson Drive, Keys Parade and Raleigh Road.

Henry Lawson Drive can be accessed by the following key intersections:

- M5 Motorway
- Bullecourt Avenue
- Milperra Road.

The City of Canterbury Bankstown in support of the Department of Planning & Environment (DPE) through the Metropolitan Green space Program has proposed to promote a connected Green and Blue grid for the LGA. Three within the local context of the study area are:

- Cooks River Corridor
- Sydenham-Bankstown Corridor
- Wolli Creek Corridor.

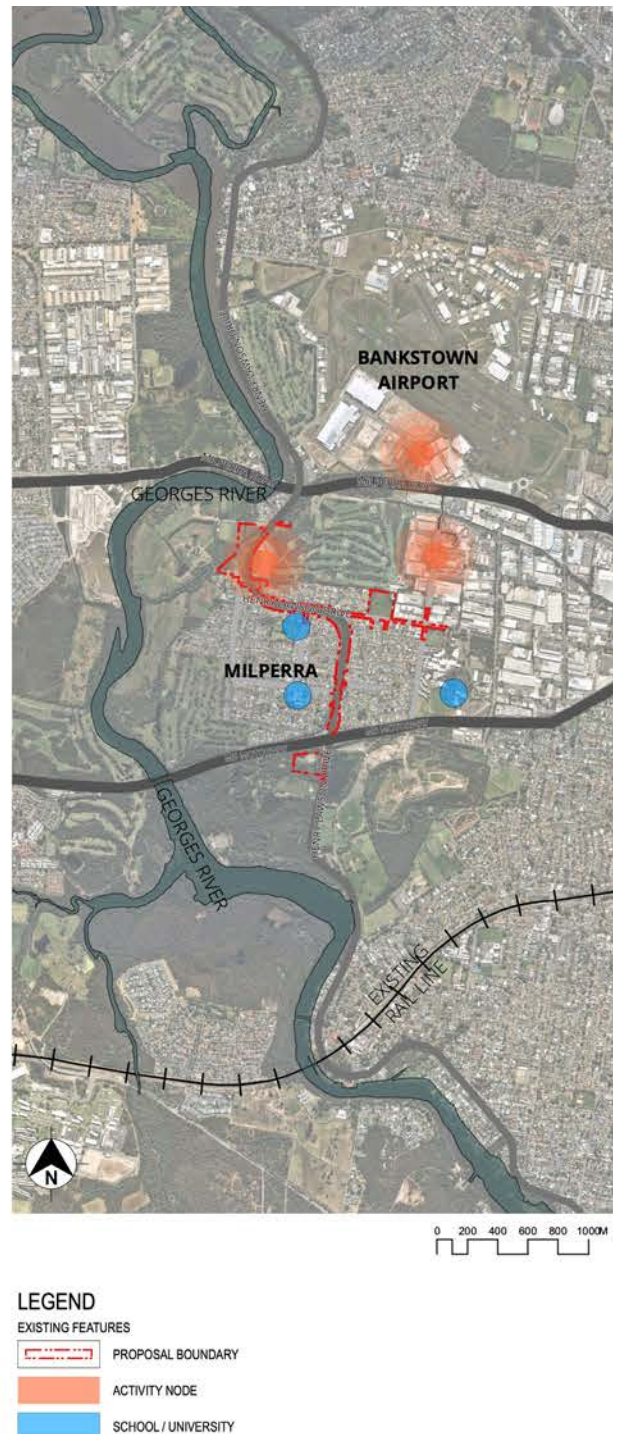


Figure 1-1: Study Area

1 Introduction

1.5 Planning framework

The proposal is subject to environmental assessment under Division 5.1 of the Environmental Planning and Assessment Act 1998 (EP&A Act), which requires Transport for NSW to prepare a review of environmental factors (REF) for the proposal. This urban design report and LCVA has been prepared to support the REF.

1.6 Strategic planning policy context

A number of state wide legislative and policy guideline documents have been referred to in order to guide the proposal and include:

- *A Plan for Growing Sydney, NSW Planning and Environment, December 2014*
- *NSW Premiers Priorities, 2020*
- *Future Transport Strategy 2056*
- *NSW Freight and Ports Strategy, NSW Government, 2013*
- *NSW Infrastructure Strategy 2018-2038*
- *Greater Metropolitan Regional Environmental Plan No 2 - Georges River Catchment (NSW Legislation, Updated 2020)*
- *Draft Road Safety Plan 2021 (Transport for New South Wales, 2017)*
- *Road Network Plan Summary Report - Henry Lawson Drive (Transport for New South Wales, 2018).*

A number of Local Government Area policy guideline documents were reviewed in order to inform the development of the proposal and these include:

- *Canterbury Bankstown Local Environment Plan, 2021 (LEP)*
- *Canterbury Bankstown Development Control Plan 2021 (DCP)*
- *Local Strategic Planning Statement (LSPS) Connective City 2036 (Canterbury Bankstown City Council 2020).*

Other documents that have provided background reference information for the study area include:

- *Australia International Council on Monuments and Sites (ICOMOS)*
- *Charter for Conservation of Places of Cultural Significance 2013 (The Burra Charter)*
- *Henry Lawson Drive- Strategic Design Report, August 2017*
- *State Environmental Planning Policy (Precincts-Western Parkland City) 2021.*
- *Environmental Planning and Assessment Act 1979*
- *Biodiversity Conservation Act 2016.*

1.7 Urban design guidance

NSW guidance

The following guideline and policy documents define best practice for road infrastructure proposals across NSW, these documents include:

- *Beyond the Pavement*, Transport for NSW, 2020
- *Biodiversity Guidelines*, Roads and Maritime Services, September, 2011.
- *Bridge Aesthetics*, Roads and Maritime Services, 2019
- *Guideline for Batter Surface Stabilisation using vegetation*, Roads and Maritime Services, 2015
- *Landscape Design Guideline*, Roads and Maritime Services, December, 2018
- *No net loss guidelines*, Biodiversity Policy, Transport for NSW, 2022
- *Reconciliation Action Plan*, Transport for NSW, 2019-2021
- *Tree and hollow replacement guidelines*, Biodiversity Policy, Transport for NSW, 2022

At a state level *Beyond the Pavement* is the over-arching document that provides guidance for the development of infrastructure proposals ensuring that urban design is considered early, integrated from the initial phase and continued through to the finalisation and operation phases.

Broad urban design objectives

Proposal specific urban design objectives and principles are listed in **Table 3-1 on page 23** and have been adapted from the following four physical urban design objectives listed in *Beyond the Pavement*:

1. Proposals are to fit sensitively into the built, natural, and cultural environment in both urban and rural locations
2. Proposals are to contribute to the accessibility and connectivity of communities and a general permeability of movement through areas by all modes of movement
3. The design and management of proposals would contribute to the overall design quality of the public domain for the community, including transport users
4. Proposals would help revitalise areas and contribute to the local and broader economy.

1 Introduction

Broad urban design principles

Complementing these four objectives are nine urban design principles that further help to ensure an integrated urban design and engineering outcome. These are:

1. Contributing to urban structure, urban quality and the economy
2. Fitting with the built fabric
3. Connecting modes and communities and promoting active transport
4. Fitting with the landform
5. Contributing to green infrastructure and responding to natural systems
6. Connecting to Country and incorporating heritage and cultural contexts
7. Designing an experience in movement
8. Designing self explaining roads that respond to their role and context
9. Achieving integrated and minimal maintenance design.

Western Sydney urban design guidance

The following guideline and policy documents define best practice for road infrastructure upgrade proposals across western Sydney, these documents include:

- *Draft Cumberland Plain Conservation Plan, NSW Department of Planning, Industry and Environment, August 2020*
- *Sydney Green Grid Spatial Framework and Project Opportunities, Government Architect NSW, Final report 23.03.17.*

Canterbury Bankstown Council urban design guidance

The following strategy and policy documents define the best practice for works within the Canterbury Bankstown Council LGA and include:

- *Connective City 2036*
- *Greening our City Initiative*
- *Native Plant Selector.*

1.8 Reference documents

This report is to be read in conjunction with the following documents:

1. The REF and associated specialist reports:
 - *Aboriginal Cultural Heritage Assessment*, Henry Lawson Drive- Hume Highway to M5 Upgrade, September 2020, Keller Nightingale Consulting Pty Ltd, Archaeological and Heritage Management
 - *Biodiversity Assessment Report*, Henry Lawson Drive Upgrade Stage 1B, Transport for NSW, 2022
 - *Draft Statement of Heritage Impact*, Henry Lawson Drive Stage 1B, November 2022, Aurecon
 - *Arboricultural Impact Assessment & Tree Protection Plan*, Henry Lawson Drive Upgrade, Tree Survey, November 2022, with supplement March 2023
2. Urban design drawings within this report:
 - HLD1B-AURC-NWW-DU-DRG-001101 - 001108 [D]
 - HLD1B-AURC-NWW-DU-DRWG-001201 - 001203 [D]

1 Introduction

1.9 Report methodology

Preparation of this urban design and landscape character and visual impact assessment report has been an iterative process with the whole design team. Urban design opportunities and constraints have been fed into the design development process to ensure integration and cost efficiencies, including:

- Visual inspection of the study area and surrounding broader context on 9th February 2022 and 23 August 2022 (for extended areas of proposal) with photographic records
- Desktop studies of the regional context and site analysis of the local natural and built environment, human intervention and the shaping of the landscape and the interaction between place and community
- Desktop review of background reports and relevant planning policies
- Development of urban design vision and objectives and principles
- Development of the urban design concept
- Assessment of the potential landscape character impacts of the proposal
- Assessment of the potential visual impacts of the proposal
- Development of mitigation strategy, which includes principles and strategies to mitigate landscape character and visual impacts in the ongoing development of the design.

This process has occurred in collaboration with the project team and with TfNSW urban designers with the aim of achieving an integrated urban design and engineering outcome that realises the design outcomes described in TfNSW urban design guideline and policy documents listed in [Section 3 on page 22](#).

1.10 Report structure

The LCVIA report is structured into nine sections:

1. Introduction

Provides a brief overview, report purpose, assessment requirements, the legislative context and the report structure

2. Existing environment

Describes the urban and landscape setting and character, and how they have informed the design and assessment process. Defines distinct landscape character zones according to topography, drainage and urban form etc.

3. Urban design vision

Presents the urban design strategy for the proposal including an urban design vision, objectives and principles that are derived from the contextual analysis

4. Urban design concept

Describes the major elements of the proposal and offers design approaches for the future development of these elements

5. Landscape character impact assessment

Assesses impacts from the proposal on the identified landscape character zones by analysing how well the proposal fits into the natural and built landscape

6. Visibility of the proposal

Identifies the areas where the proposal would be visible, also known as the visual envelope and determines a range of representative viewpoints within that catchment

7. Visual impact assessment

Assesses impacts of the proposal on each of the selected viewpoints and leads to the identification of mitigation measures

8. Mitigation strategy

Outlines recommended mitigation measures to be incorporated into future planning and design of the proposal. These measures would be discussed with the design team and would be integrated into future design stages

9. Summary of Urban Design Findings

Provides a summary of the outcomes the community can expect including urban and landscape design outcomes, the likely level of landscape character and visual impacts, and how they be further reduced through the application of mitigation measures in future stages.



Gordon Parker Reserve , opposite Henry Lawson Drive

2 Existing environment

2.1 Chapter overview

The following section of the report provides a summary of the existing landscape context and cultural influences on the study area. This background information has informed the development of the concept design and ultimately the mitigation measures that respond to any residual impacts. Further detail on each sub-section can be obtained by reviewing the relevant specialist report provided in the appendix of the REF.

2.2 Regional context

Stage 1B of the Henry Lawson Drive upgrade is located in Milperra within the City of Canterbury Bankstown local government area (LGA) around 20 km south east of Sydney's CBD. It extends approximately 1.8 kilometres, between Keys Parade and the approach to the M5 Motorway.

Henry Lawson Drive is a key transport corridor in close proximity to the Western Sydney Employment Area, Bankstown Airport and southwest urban growth areas.

Considerable population and employment growth is expected across not only the City of Canterbury

Bankstown LGA but the wider Western Sydney region. Major regional development areas are illustrated in **Figure 2-1** and listed below:

- Western Sydney University
- Bankstown Airport
- Sydney Airport
- Holsworthy Airport

Major open space areas, National Parks and Nature Reserves across the wider region include:

1. Daruk Island
2. Vale of Ah Reserve
3. Georges River National Park
4. Salt Pan Creek Reserve
5. Oatley Park
6. Sydney Park.

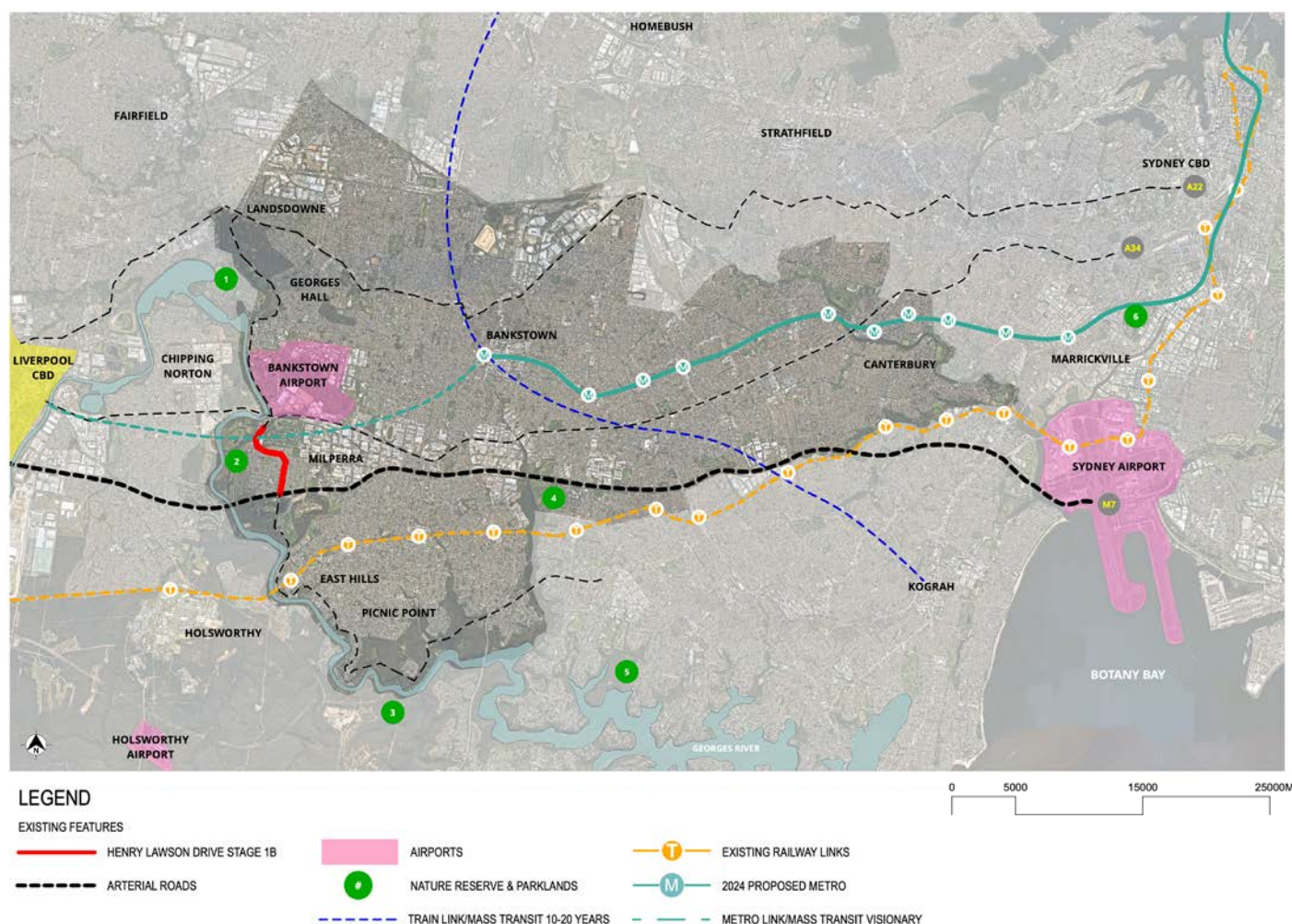


Figure 2-1: Regional context of the proposal

2 Existing environment

2.3 Site context

The study area illustrated in **Figure 2-2** is bordered and surrounded by predominantly R2 low density residential and sporadic recreational reserves. On the western edge of the study area there is Avenue tree planting dominating the landscape character, creating an edge between the urban density and the existing road infrastructure.

The road corridor acts as a main link between the M5 Motorway and the Hume Highway. It would potentially be a critical transport link for the planned development of the Bankstown Airport.

Across the study area there is a mixed use setting of low density peri-urban residential housing, light commercial, industrial estates, environmental conservation areas, green corridors and public recreation.

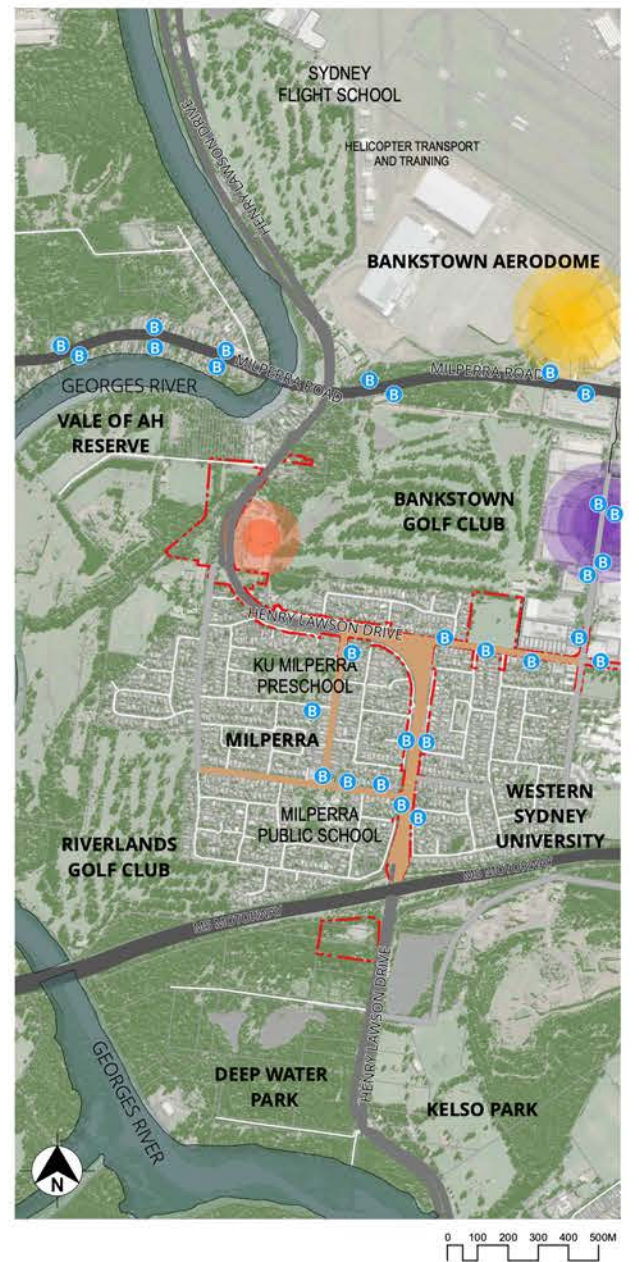
Infrastructure within the study area includes, arterial and local road networks, water supply pipelines and high voltage power (11kV).

Important regional landmarks in the local context of the study area include:

- Local Heritage of the Milperra Soldier Settlement (former) as a part of the Local Environmental Plan is located in multiple locations as extensive as Amiens Avenue, Ashford Avenue and Bullecourt Avenue
- Western Sydney University
- Georges River National Park.

The future north-south rail link of the Sydney Metro alignment (refer **Figure 2-1 on page 8** Regional Context) would include Metro stops from Sydenham to Bankstown, including :

- Punchbowl
- Wiley Park
- Lakemba
- Belmore
- Campsie
- Canterbury
- Hurlstone Park
- Dulwich Hill
- Marrickville.



LEGEND

EXISTING FEATURES

- PROPOSAL BOUNDARY
- ARTERIAL ROAD
- SUB-ARTERIAL ROAD
- COLLECTOR ROAD
- LOCAL ROAD
- PRIVATE PROPERTY ACCESS TRACK
- OVERHEAD TRANSMISSION LINE
- WATER COURSE/BODY
- GENERAL VEGETATION
- HERITAGE
- MILPERRA SOLDIER SETTLEMENT (FORMER)
- BANKSTOWN CANTERBURY LEP

- STRATEGIC CENTRE
- COMMERCIAL HUB
- BUSINESS PARK
- PROPOSED METRO STATION HUB
- EXISTING BUS STOP

Figure 2-2: Local Context

2 Existing environment

2.4 Land use

Existing urban form

Figure 2-3 illustrates the land use zones across the study area, which are regulated by Canterbury Bankstown Council through the Bankstown Local Environmental Plan 2015 (Bankstown LEP). The major land uses in this stage that shape the character of the area surrounding the proposal and influence the experience of the area are:

- B6 - Enterprise corridor
- C3 - Environmental conservation
- IN1 - General industrial
- IN2 - Light industrial
- R2 - Low density residential
- RE1 - Public recreation
- RE2 - Private recreation
- RU4 - Primary production small lots zone
- SP2 - Infrastructure
- W1 - Natural waterways

Examples of some of these land uses are illustrated by Plate 2-1 on page 11 to Plate 2-4 on page 11

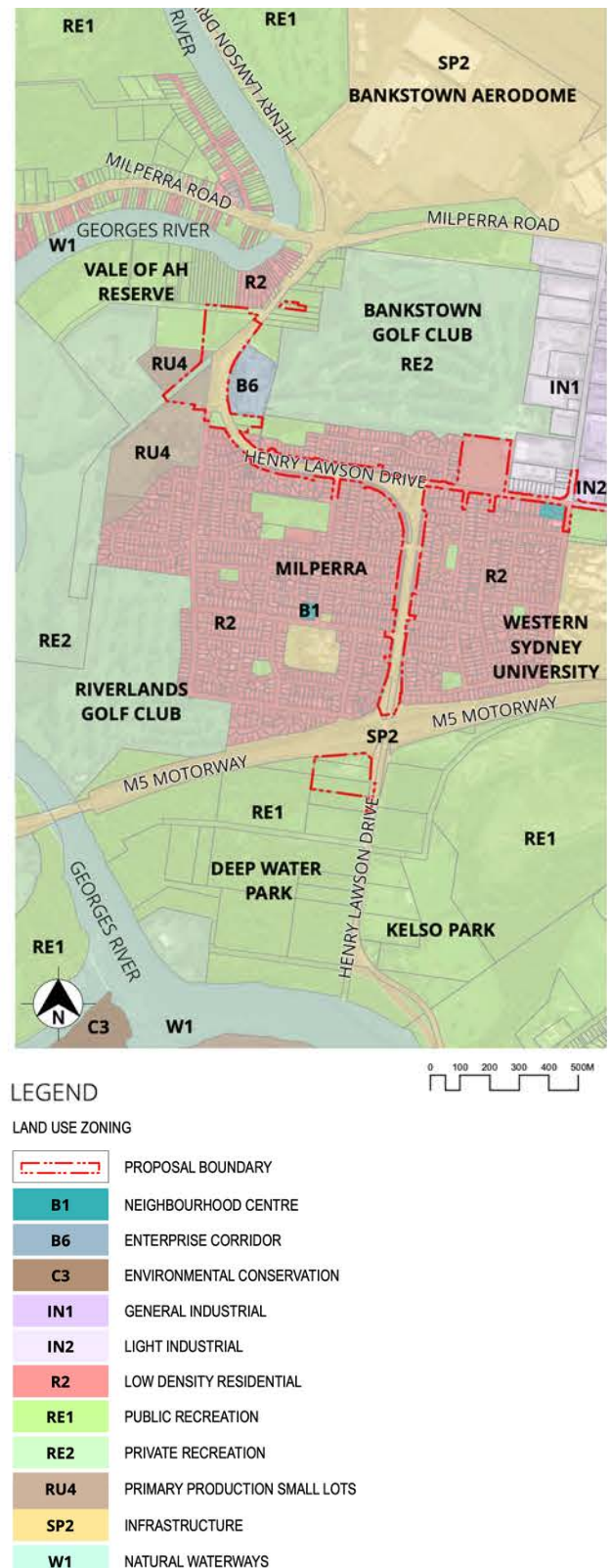


Figure 2-3: Existing land use zoning

2 Existing environment

Stakeholders

The following stakeholders have been identified as having a potential interest in the upgrade:

- Canterbury Bankstown Council
- NSW Department of Planning & Environment (DPE)
- Bicycle NSW
- NSW Environmental Protection Authority
- Heritage NSW
- Emergency services
- Water NSW
- Utility providers
- Landowners, residents and local businesses.

Co-ordination with relevant stakeholders and the local community would be undertaken during the development of the proposal to ensure that the final design meets expectations and ensures that impacts on the surrounding community and environment are minimised as much as possible.

Considerations for the proposal

- In providing access across the corridor, it is important to align the proposal design with broader strategic planning aspirations, including development projects for Riverlands and Bankstown airport.



Plate 2-1: R2 Low density residential zone of Milperra



Plate 2-2: RE1 Public recreation zone



Plate 2-3: W1 Natural waterways



Plate 2-4: B6 Enterprise corridor

2 Existing environment

2.5 Land form and drainage

The terrain of the site is impacted by the surrounding catchment found within the Canterbury Bankstown region, which is comprised of the Cooks River, Wolli Creek as its tributary, flowing into Botany Bay and Salt Pan Creek and lastly feeding into the Georges River. The Georges River is the major catchment area to the proposed site.

The topography of the area is gently undulating encased with clay soils created by Wianamatta Shale. It has been suggested the dominant vegetative community was the Turpentine-Ironbark Forest (Benson 1992, Benson & Howell 1994).

The Cooks River, once a salt water body was infiltrated by freshwater with the construction of a dam in 1870. In contrast, Salt Pan Creek which feeds into the Georges River remains closest to its original habitat, with remnant mangroves and smaller saltmarsh vegetation. The Georges River which is closest in proximity to the proposal area is also tidal and largely saltwater in the vicinity.

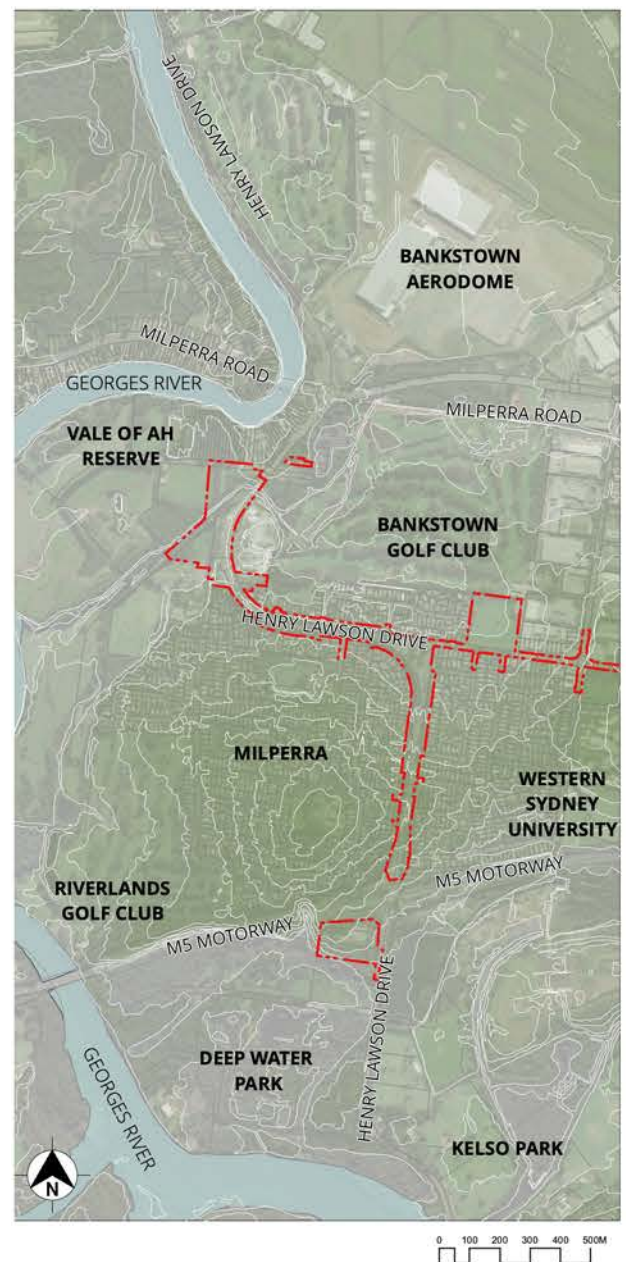
Geology and soils

Soil landscape mapping shows that the study area is predominantly Wianamatta Shale with Hawkesbury Sandstone outcrops on the eastern end of the region near Earlwood and Hurlstone Park (refer to) (Benson 1992, Benson & Howell 1994).

- Wianamatta Shale
- Hawkesbury Sandstone.

Considerations for the proposal

- Plant species are to be suitable to the different soil landscapes across the region
- Species should be selected for Blacktown soil landscape areas that would thrive in conditions including seasonal water logging (localised).
- Protection of areas of Remnant Native Vegetation deemed under threat to clearing for development.



LEGEND

EXISTING FEATURES





-  PROPOSAL BOUNDARY
-  WATER COURSE/BODY
-  LOW LYING LAND
-  HIGH LYING LAND

Figure 2-4: Landform and drainage

2 Existing environment

2.6 Biodiversity

Vegetation communities

The dominant vegetation of the study area is avenue planting of native vegetation in the form of mature canopy trees with exotic mown grass or groundcover understorey.

The biodiversity report (Eco Planning Draft Dec 2022) identified 14.6 hectares (ha) of vegetation required for removal to facilitate the proposed works, comprising:

- 8.5 ha of Exotic vegetation
- 3.4 ha of Native vegetation communities
- 2.7 ha of native Planted vegetation

Five Threatened Ecological Communities (TECs) were identified in the proposal area (Eco Planning Draft Dec 2022), although it was determined that the proposal would not have a significant impact on these TEC's associated with the small stream near Auld Avenue and adjacent to ancillary facilities, since all were determined to be of poor condition: (only list if room)

- Cooks River/ Castlereagh Ironbark Forest
- River -Flat Eucalypt Forest
- Cumberland Plain Woodland
- Castlereagh Swamp Woodland
- *Swamp Oak Floodplain Forest*

As part of the biodiversity report mapping (Eco Planning Draft Dec 2022), six Plant Community Types (PCT's) were identified within the proposal area:

- Broad-leaved Ironbark - Melaleuca decora shrubby open forest
- Coastal freshwater lagoons
- Forest Red Gum – Rough barked Apple grassy woodland
- Grey Box – Forest Gum grassy woodland
- Parramatta Red Gum woodland
- Swamp Oak open forest

Some of these plant community species may form the basis of proposed landscape planting.

Figure 2-5 illustrates remnant vegetation (endangered ecological communities) as sourced from the Native Vegetation of the Cumberland Plain map produced by National Parks and Wildlife (2002), for the local context of the proposal area.

Threatened fauna

Based on a habitat suitability assessment, the Biodiversity report (Eco Planning Draft Dec 2022) determined 16 threatened species as having a moderate to high likelihood of occurrence within the study area. It was concluded however, that the proposal would be unlikely to have a significant impact on these species. As a precaution, it was recommended that a survey should be undertaken of a suitable habitat for the Cumberland Plain Snail, to determine whether this species was present.

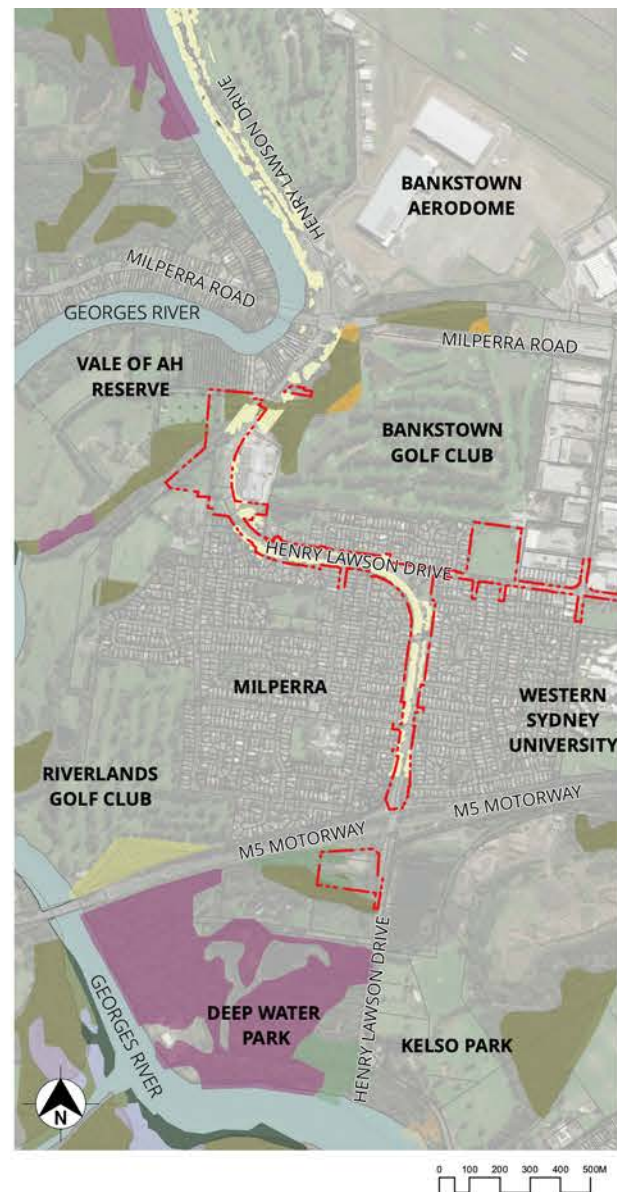


Figure 2-5: Vegetation communities

2 Existing environment

2.7 Access and circulation

Pedestrian and cyclist access

The site consists of a mixture of existing footpaths and existing shared user paths inclusive of cyclist paths. Henry Lawson Drive for the most part has no formal kerbs, which is consistent with the peri-urban character of the area while most local streets do have kerbs.

Informal pedestrian access is also possible from two wide grass drainage channels:

- Raleigh Reserve
- Gordon Parker Reserve.

There is one drainage line that also abuts the study area, which is fenced off for use as a pedestrian thoroughfare:

- Edge of Gordon Parker Reserve up to Auld Avenue Bullecourt Avenue to the north east is an important connection for priority pathways to Henry Lawson Drive and linking to facilities within the City of Canterbury Bankstown LGA, including Western Sydney University.

There are two gate and fenced accessed private properties within the Henry Lawson Drive site area. These are shown in [Figure 2-6](#).

Public transport

The community profile suggests a relatively high level of reliance on the private motor vehicle.

Milperra does not have a Railway Station. The two closest railway stations are Revesby, located about six kilometres to the east of the study area and Panania, located about four kilometres to the south east of the study area. Buses service the northern and eastern extents of the study area including:

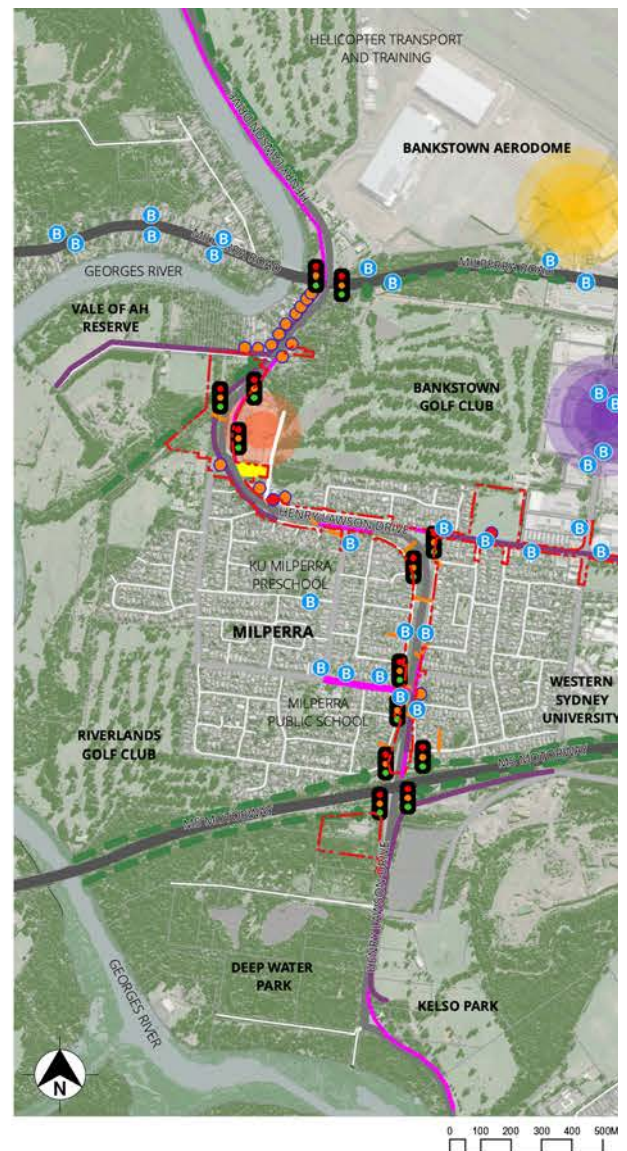
- Route 922 – East Hills to Bankstown via Milperra
- Route S5 –Milperra to Padstow via Panania

Existing bus stops within the proposal area would be retained or relocated.

Vehicular access

The key signalised intersections within the study area are:

- Bullecourt Avenue– signalised T-intersection, with dual left-turn lanes from Henry Lawson Drive, eastbound, into Bullecourt Avenue.
- Henry Lawson Drive and Keys Parade– signalised intersection.
- M5 Motorway – signalised intersection catering for all movements. Note: M5 is outside of this proposal scope.
- Pozieres Avenue - signalised T-intersection, with right and left turn lanes eastbound and westbound into Henry Lawson Drive.



LEGEND

EXISTING FEATURES

- PROPOSAL BOUNDARY
- ARTERIAL ROAD
- SUB-ARTERIAL ROAD
- COLLECTOR ROAD
- LOCAL ROAD
- PRIVATE PROPERTY ACCESS TRACK
- WATER COURSE/BODY
- UNDEVELOPED LAND

LOCAL CONTEXT

- COMMERCIAL HUB
- BUSINESS PARK
- STRATEGIC CENTRE

ACCESS AND CIRCULATION

- EXISTING FOOTPATH
- EXISTING SHARED USER PATH
- PEDESTRIAN EASEMENTS
- GREEN GRID CONNECTION
- PRIVATE PROPERTY DRIVEWAY ACCESS
- UNAUTHORISED PROPERTY ACCESS POINTS
- TRAFFIC SIGNAL
- EXISTING BUS STOP

Figure 2-6: Access and circulation

2 Existing environment

Future green infrastructure network

The Georges River north has been identified as having potential to become part of the Sydney Green Grid, as part of the south west district which would in years to come become a cohesive green infrastructure network across greater Sydney.

There is great opportunity in utilising Georges River as a key regional open space active transport corridor with surrounding large parkland's that greatly influence urban density. Opportunities should be encouraged to enhance existing wetlands and improve recreational facilities.

Future public transport

The NSW Government's Sydney Metro Authority has committed to deliver an integrated transport system for the Western Parkland City, as envisaged in the *Future Transport Strategy 2056*.

Western Sydney Airport and Western Sydney Employment areas form a gateway for transport within the study area. There is an opportunity to integrate open space, combining environmental and economic objectives with the needs of residents and workers. Potential newly established regional open space connections and local open space offer opportunities to increase the economic benefits associated with improving the connectivity of the proposal area.

Considerations for the proposal

- Existing ecological, hydrological and recreational value of the study area
- Regional potential to connect to other green grid projects
- Connect local government area and district boundaries
- Proximity to upcoming and urban development
- Proposals that overlap or provide important connections to NSW Department of Planning Priority precincts
- Create active transport links connecting key destinations, cultural facilities, recreation opportunities and heritage items. .



Plate 2-5: Existing bus shelter on HLD



Plate 2-6: Existing bus shelter on HLD & motorway proximity



Plate 2-7: Existing road shared cycle path



Plate 2-8: Existing shared user path & footpath

2 Existing environment

2.8 Heritage

Aboriginal cultural heritage

The report provided by Kelleher Nightingale Consulting (2020) recounts Bidjigal, Gahbrogal and Gweagal people within the vicinity of the study area, with several camps present along the Georges River including Salt Pan Creek. It is noted that the history of Aboriginal people living on the Cumberland Plain in the late 18th and early 19th centuries is heavily reliant on a sample number of contemporary accounts which had generally be written by European military officers or wealthier individuals.

Henry Lawson Drive Stage 1B is situated within the Cumberland plain, consisting of sedimentary rocks of the Wianamatta Group and Hawkesbury Sandstone deposited during the Triassic. The Wianamatta group consists of Ashfield shale, Minchinbury sandstone and Bringelly shale. The major tributaries for the Georges River are Prospect Creek and Salt Pan Creek which meander north and east along the boundary between the Cumberland Plain to the steep slopes of the Woronora Plateau to the south. Floodplains are present along the eastern bank of the Georges River and Prospect Creek, western slopes and spur lines of a northwest running ridge in the north. These areas are generally found to have greater archaeological potential than flatter areas of topography. Kelleher Nightingale Consulting (2020) notes however, due to the risk of flooding this has negatively impacted the preservation of subsurface archaeological deposits and surrounding elevated landforms.

Kelleher Nightingale Consulting (2020) refer to previous archaeological investigations within the region, noting areas with proximity to permanent water sources to be more likely to contain high-density Aboriginal sites. The water sources would have created ideal conditions for a wide variety of vegetation and associated fauna (and in later years for the practice of agriculture) as food sources. Any likely artefacts would be scattered or isolated, including shell and fish refuse dumped into estuaries after consumption from canoes, spear tips or barbs and fishhooks that were lost during fishing, fish traps, culturally modified trees used for lookouts and potential archaeological deposits.

Preservations of Aboriginal archaeological sites have been found to be highly influenced by geology, soil landscapes, fluvial activity and ground surface disturbance from intent and practice of agricultural farming. It has been concluded however, that the recurrence of flooding over the years would have removed or buried any potential artefacts. The assessment notes the exception of one isolated artefact (referred to as Site 5) located outside the proposal area, but within the stage 1A area.

Non-Aboriginal cultural heritage

The draft Statement of Heritage Impact (Aurecon 2022) has supported the identification of the Local Environmental Plan (LEP) for Milperra as a (former) soldier settlement. The report states the former soldier settlement area falls largely within the road corridor and in the nearby areas that have experienced high levels of disturbance since early construction and residential development in the 1930s, 1960s and again in the 1970s, stating moderate potential in retrieving and impacting significant historical subsurface archaeology due to the high disturbance of 70-90 years. The subdivision of the settlement contained five streets:

- Bullecourt Avenue
- Fleurbaix Avenue
- Amiens Avenue
- Pozieres Avenue
- Ashford Avenue

Ashford Avenue being named after the incumbent minister for lands.

The importance of the (former) Australian soldier settlement has been confirmed by the Statement Heritage Impact (Aurecon 2022), summarising the main schemes instituted during WWI as a response to rewarding returning soldiers. Justification of the settlement was for rural developments to be imperative to urban growth and the greatness of Australia. Successful soldiers receiving the allotments were eligible to receive additional financial assistance to help with clearing, fencing, drainage, water supply, erection of buildings and purchase of stock, seeds and any other implements needed.

The original settlement fabric was based within the confinement of the 650-acre grant of land made to George Johnston Junior in August 1819 with 50 allotments built and purposed for poultry farming. The failure of the settlement was due to the lack of training, capital, minimal area required for farming practice and accurate climatic conditions applicable to site. By 1929 only two thirds of the original settlers remained working their land and by WWII at least half had relocated. Milperra has transitioned from a rural character of the former settlement footprint into a WWII style suburbia, still predominate today.

The Milperra 'soldier tree', comprising a commemorative plaque affixed to a wooden post next to a planted tree, is not listed under the State Heritage list. The Draft Statement of Heritage Impact (Aurecon 2022) recognises it as having high value at a local level for its historic, aesthetic and associative social importance to the local community. The tree is positioned in a road verge between Henry Lawson Drive and Ingram Avenue, Milperra, is confirmed by the Arborist report (Tree Survey Pty Ltd 2022) to be a mature Camphor laurel non-native species which is a weed species in Australia, although commonly planted within local and urban areas.

2 Existing environment

This tree has been noted however to be in poor condition and marked to be removed in the 80% Arborist report (Tree No.92) for Henry Lawson Drive Stage 1B. Planted beside the tree is a small metallic plaque screwed to a wooden post which is severely degraded from poor drainage. The draft Statement of Heritage Impact has recommended that a re-planting strategy should take place to symbolise the tree's former location, along with the existing plaque which would be reinstated and refurbished.

It has been noted within the Statement of Heritage Impact report that all local street signage is to be retained and relocated once the project is completed to ensure the original character of the former soldier settlement is retained. It is noted that the Milperra suburb road sign should be retained and relocated to a similar sight line point along Henry Lawson Drive. It is also noted that for the next stage of the proposal, a historical archaeologist is to be engaged to provide a historical archaeological assessment for subsurface archaeological potential in the Milperra Soldier settlement footprint.

- (Plate 2-9 on page 17) A commemorative plaque and planted tree (*Cinnamomum camphora*) in honour of Mr. J Morrison, unveiled by his son Mr. J Morrison on 17th September 1988
- (Plate 2-10 on page 17) A sign marks a location of a former Milperra soldier settlement
- (Plate 2-11 on page 17) Residential streets running adjoining and parallel to HLD are named after the subdivision of the soldier settlements.

Considerations for the proposal

- Consult with CoCB with regards to integration of indigenous themes into urban design
- Consult with CoCB on the preferred conservation of the natural environment and the landscape treatments in these areas
- Ensure commemorative plaques are protected and preserved in existing locations or reinstated in a suitable location if works require that they are moved.

Refer to [Table 8-3 on page 87](#).



Plate 2-9: Commemorative plaque and planted tree in honour of Mr. J Morrison, an early settler of Milperra



Plate 2-10: Milperra soldier settlement (former) est 1917 sign

The sign is located at the intersection of Amiens Avenue and HLD



Plate 2-11: Streets named after early soldier settlers.

2 Existing environment



Plate 2-12: Bullecourt Avenue intersection



Plate 2-13: Raleigh Road intersection



Plate 2-14: M5 intersection on approach to the proposal



Plate 2-15: Amiens Avenue intersection



Plate 2-16: Pozieres Avenue intersection



Plate 2-17: Keysor Place intersection



Plate 2-18: Fleurbaix Avenue intersection

2 Existing environment

2.9 Climate

Bureau of Meteorology data from the Bankstown Airport weather station (located slightly North East of the study area) shows the total mean annual rainfall is 868 millimetres (mm), with the highest mean monthly rainfall falling in the months of February and March (107 & 105.1mm respectively).

The mean maximum annual temperature of 23.4 degrees Celsius (C), with the warmest months being December to February (about 28° C) and the coldest months of June and July (about 17.5°C).

Greening our City Grants

The City of Canterbury Bankstown was awarded \$479,00 in 2020 a Greening our City Grant for street tree planting and urban canopy renewal, stream 1 cooler suburbs. In 2021 the council were awarded another \$479,00 for the urban heat response canopy growth program in Greening our City Grant. The grants imply the priority to increase tree canopy, green cover and encourage tree planting throughout Sydney.

Heat is retained through hard concrete surfaces used for footpaths, roads and buildings which is contributing to the ever increasing urban heat island effect within cities. By increasing the urban tree canopy this provides shade and shelter and also act as biodiversity corridors. Provision of tree canopies can reduce surface temperatures by up to 15 degrees on a hot day.

The City of Canterbury Bankstown LGA provides 10,000 native plants every year for free to schools and community members within the area to encourage greening of properties. The community is encouraged to support and participate in National tree day, held each year in June, with the planting over 1,000 native plants in local bushland and parks.

Considerations for the proposal

- Install dense planting to minimise the heat island effect from the road corridor.
- Increase green cover on both sides of the road corridor to protect pedestrian areas from heat
- Retain as much as possible existing tree canopy on site to contribute to the urban tree canopy.
- Preference for planted ground covers where possible
- Reinforcing and supplement existing tree cover would be important for shared use environments.



Plate 2-19: Existing shaded footpath with mature allee on



Plate 2-20: Existing southbound setback shaded from trees on east road corridor



Plate 2-21: Existing Gordon Parker Reserve trees helping to reduce heat from the road corridor



Plate 2-22: Existing shaded road corridor with mature tree avenue on southern side of Bullecourt Avenue

2 Existing environment

2.10 Bushfire prone land

Limited areas within the proposal area are designated bush fire prone land, which means that for the time being the land is classified as an area that can support a bush fire or is likely to be subject to bush fire attack, as designated on a bush fire prone land map (BFPL). The BFPL map has been prepared in accordance with this guide and certified by the Commissioner of the NSW RFS under section 146(2) of the Environmental Planning and Assessment Act 1979.

Figure 2-7 illustrates the existing vegetation within the study area is classified into the following categories based on vegetation types and potential risk:

Vegetation Category 1

This category is considered to be the highest risk for bush fire. It is represented as red on the bush fire prone land map and would be given a 100m buffer. This vegetation category has the highest combustibility and likelihood of forming fully developed fires including heavy ember production.

Vegetation Category 2

This category is considered to be a lower bush fire risk and would be given a 30 metre buffer. This vegetation category has lower combustibility and/or limited potential fire size due to the vegetation area shape and size, land geography and management practices.

Vegetation Buffer

Once areas of vegetation have been defined and the appropriate bush fire vegetation categories have been applied, it would be necessary to apply the buffering criteria.

The method for the determination of bush fire vegetation buffering is as follows:

- BFPV Category 1 – apply a 100 metre external buffer to each vegetation polygon.
- BFPV Category 2 – apply a 30 metre external buffer to each vegetation polygon.

Considerations for the proposal

- Plant species selection to include fire retardant plants where possible
- Observe guidelines for the set out of plants to ensure both the vertical and horizontal separation is maintainable
- The separation between canopy and shrub clusters would to be retained so as to reduce the potential for fire to spread
- Allow the required maintenance access to bushfire prone land within the study area
- Create necessary breaks in the continuity of vegetation and ensure buffer areas are maintained to prevent a potential link between existing BFPL areas.

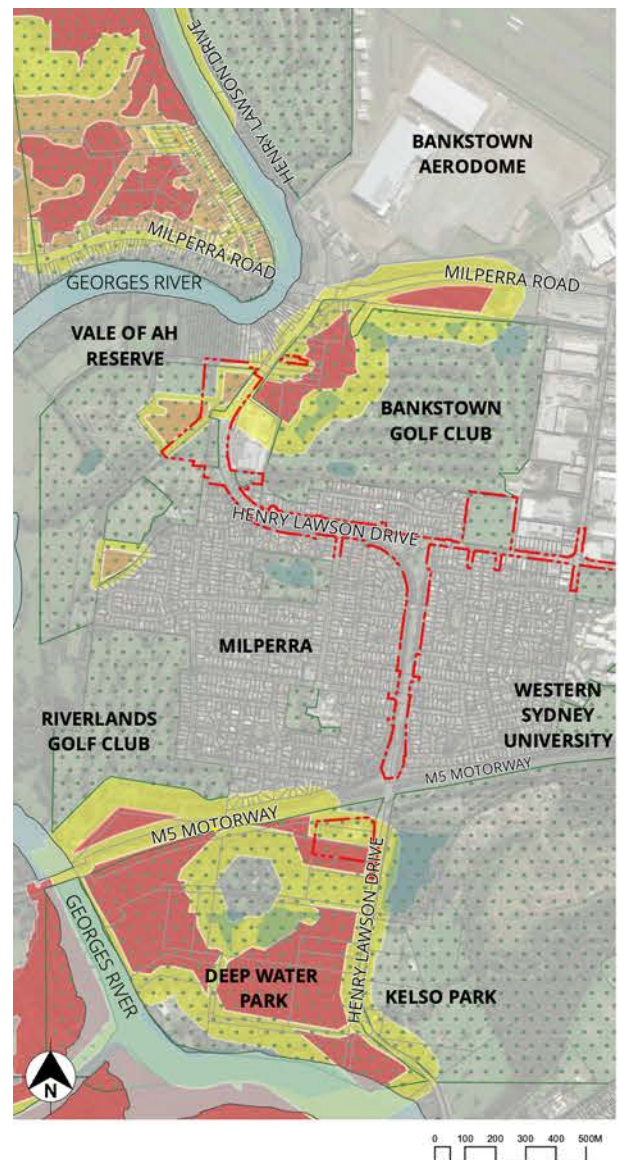


Figure 2-7: Bushfire Prone Land



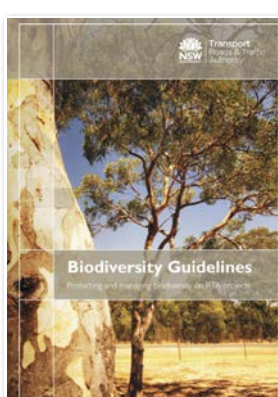
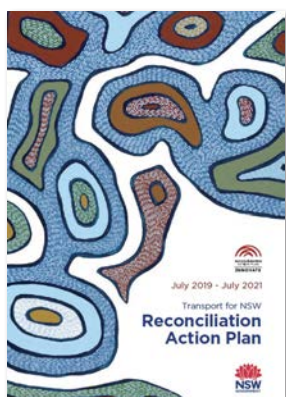
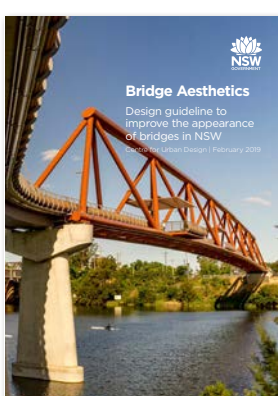
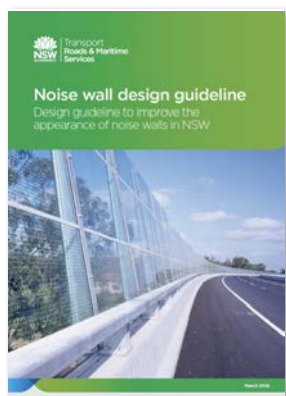
Mature tallwood trees in formal Avenue planting adjoining to Henry Lawson Drive, facing north

3 Urban design vision

3.1 Chapter overview

This chapter presents the urban design strategy for the proposal. It is summarised in an overarching urban design vision, complemented by an explanation of the experience of travelling along the Henry Lawson Drive Upgrade would be.

Urban design strategies for the proposal have been derived from Commonwealth, State and local government policies as well as contextual analysis in [Section 2 on page 8](#). These strategies guide the proposal and address the key areas of landscape and visual quality; design of the upgrade and its structures; cultural values and connectivity.



3.2 Urban design vision

Henry Lawson Drive is an important north-south transport corridor that provides connections to the Western Sydney Employment Area and the proposed Western Sydney Aerotropolis. Upgrading the transport corridor could have an important role in the economic and population growth of Western Sydney over the next 20 years.

The upgrade recognises the remaining existing landscape structure, strongly defined by the suburb of Milperra in the north, and the north to south river catchment of the Georges River. The upgrade builds upon this existing character, reinforcing the landscape context and celebrating it with new landscape treatments.

High quality, integrated design along the upgrade would reflect this context, punctuating the journey a variety of visual and physical elements to provide legibility for the local and wider regional community.

Plate 3-1: Urban design guideline documents Transport for NSW

3 Urban design vision

3.3 Proposal specific urban design strategies

In order to ensure that both corridor wide and state wide expectations for the Stage 1B Henry Lawson Drive Upgrade are met, a set of proposal specific urban design strategies have been adapted from the urban design principles contained in the Beyond the Pavement guidelines document from Transport for NSW(2020).

These are listed below in **Table 3-1**, and are based on an understanding of the unique existing landscape and urban values of the study area and the issues that affect, or are affected by, the proposal. These strategies would continue to be used to guide the on-going development of the proposal in future stages.

Table 3-1: Urban Design Strategies

Principles	Strategies
1. Contributing to urban structure, urban quality, and the economy Objective 1 — Sense of place	1.1 Increase opportunities for public transport accessibility through provision of bus stops, SUP's, and additional travel lanes 1.2 Integrate appropriate signage and wayfinding within the project to highlight the importance of place 1.3 Revitalise existing infrastructure to be retained such as pedestrian crossings and SUP's. 1.4 Highlight unique and important attributes, features, or elements within the area, including existing infrastructure and vegetation 1.5 Design in response to environmental assets along the road corridor, including existing vegetative communities, habitats, and riparian corridors that contribute to a unique sense of place 1.6 Consider the interface of the proposal and attempt to improve site edge conditions within road boundary, sensitively addressing social, cultural, functional, and physical aspects of the project
2. Fitting with the built fabric Integration	2.1 Minimise extensions of the road infrastructure to align with the existing road footprint, as much as possible 2.2 Mitigate noise wherever possible, such as screening through mature planting 2.3 Avoid conflicting visual stimuli uncharacteristic to the project area 2.4 Consider the interface of edge treatments with adjoining properties and open space 2.5 Ensure road boundary is respectfully in response to local character.
3. Connecting modes and communities and promoting active transport Connectivity and wayfinding	3.1 Maintain local vehicular, pedestrian, cyclist, and accessible routes for residents locally and for outer suburbs commuting between the intersections of Henry Lawson Drive with the Hume Highway, Villawood, and the M5 Southwestern motorway, Milperra 3.2 Provide accessibility and crossing thoroughfares for pedestrians where possible 3.3 Consult with community to provide appropriate and suitable solutions to increasing and existing demands on shared user paths 3.4 Integrate inter-modal infrastructure and signage where possible, avoiding clutter and obstructions for the user/s.
4. Fitting with the landform Natural environment, environmental sustainability	4.1 Protect potentially fragmented endangered existing ecological communities 4.2 Select endemic plant species that are in accordance with bush fire protection principles set out by NSW RFS 4.3 Increase and protect street tree canopy cover to enhance and strengthen green corridor connection opportunities and ensure shade coverage 4.4 Appropriate selection of vegetation in coordination with hardscape to minimise visual bulk and allow a human-scale experience 4.5 Restore remnant bushland and existing catchment affecting the edge conditions of Henry Lawson Drive

3 Urban design vision

Principles	Strategies
5. Contributing to green infrastructure and responding to natural systems Environmental sustainability	5.1 Realign and re-frame storm water infrastructure from grey to green, allowing excess run-off to be filtered before entering surrounding soils 5.2 Integrate blue and green infrastructure elements with the Georges River catchment 5.3 Use water sensitive urban design elements throughout the site where necessary 5.4 Obtain and construct using local resources where possible within the site precinct 5.5 Responsive design to current and future infringing climatic conditions unique to the location of the proposed project 5.6 Use natural characteristics of existing vegetation to stimulate planting designs within the road corridor 5.7 Highlight environmental and physical characteristics unique to the project area within the design.
6. Connecting to Country and Incorporating heritage and cultural contexts	6.1 Proposed road to be designed responsively to any surrounding historic and cultural landscape of both Aboriginal and European value 6.2 Utilise rest stops along carriageways as opportunities for signage informing local community and visitors with the importance of place 6.3 Consider the vulnerability of improvements to existing roads such as widening and straightening in removing established roadside trees and the removal of original walling or fencing 6.4 Mitigate cutting into historic curtilage or any heritage place of value by sensitively approaching the design 6.5 Re-use existing heritage elements such as existing signage and infrastructure where possible 6.6 Integrate endemic plant species in accordance to with existing Indigenous vegetation and in conjunction with European planting design 6.7 Ensure and recognise any bridge structures to be assessed as part of the Transport asset management strategy to protect bridges of heritage value 6.8 Maintain accessible routes for residents and commuters through local vehicular, pedestrian, cyclist access 6.9 Respectfully seek consultation with local Indigenous people and community to provide strategic and informative design solution 6.10 Collaborate with Indigenous artists and local community if opportunities arise within the project 6.11 Acknowledge the importance of heritage as an attribute to the existing and proposed road environment and surrounding waterway environment 6.12 Appropriate use and location of wayfinding signs to minimise visual impact to any heritage elements. Ensuring elements are simple, complementary, and compatible to the site.

3 Urban design vision

3.4 Opportunities and constraints

Figure 3-1 on page 26 illustrates the potential opportunities and constraints across the study area, identified throughout the concept phase of the proposal and incorporated into the development of the urban design concept. The opportunities are:

- 01 Preserve and strengthen existing remnant roadside tree stands
- 02 Maintain clear sight lines to long range vistas
- 03 Introduce robust planting mixes between the residential areas and the road corridor to provide visual separation and screening
- 04 Introduce vegetation mixes to help create an attractive shared user path (SUP) environment that caters for persons of all abilities
- 05 Provide direct, continuous and well-lit pedestrian and bicycle routes
- 06 Tree placement to supplement existing vegetation to be retained, strengthening the current visual barrier and screening to adjacent residential properties
- 07 Median planting to reinforce a well vegetated road corridor
- 08 Opportunity to stagger the alignment of the SUP to maximise the retention of existing vegetation and also provide opportunity to shade SUP users from the western sun
 - SUP to incorporate a light tint of oxide to minimise 'bright' appearance
 - SUP to incorporate lighting to define pedestrian portals and respond to CoCB CPTED guidelines
- 09 Opportunity to link with existing SUP and to connect with future Priority pathway future upgrades.

Constraints as follows:

- 01 Preserving heritage items/ curtilage areas
- 02 Widening of road resulting in removal of existing trees
- 03 Proposed trees may clash with utilities

Note - For further landscape character analysis refer to the mitigation measures outlined in [section 8 on page 84](#) of this report.

3 Urban design vision

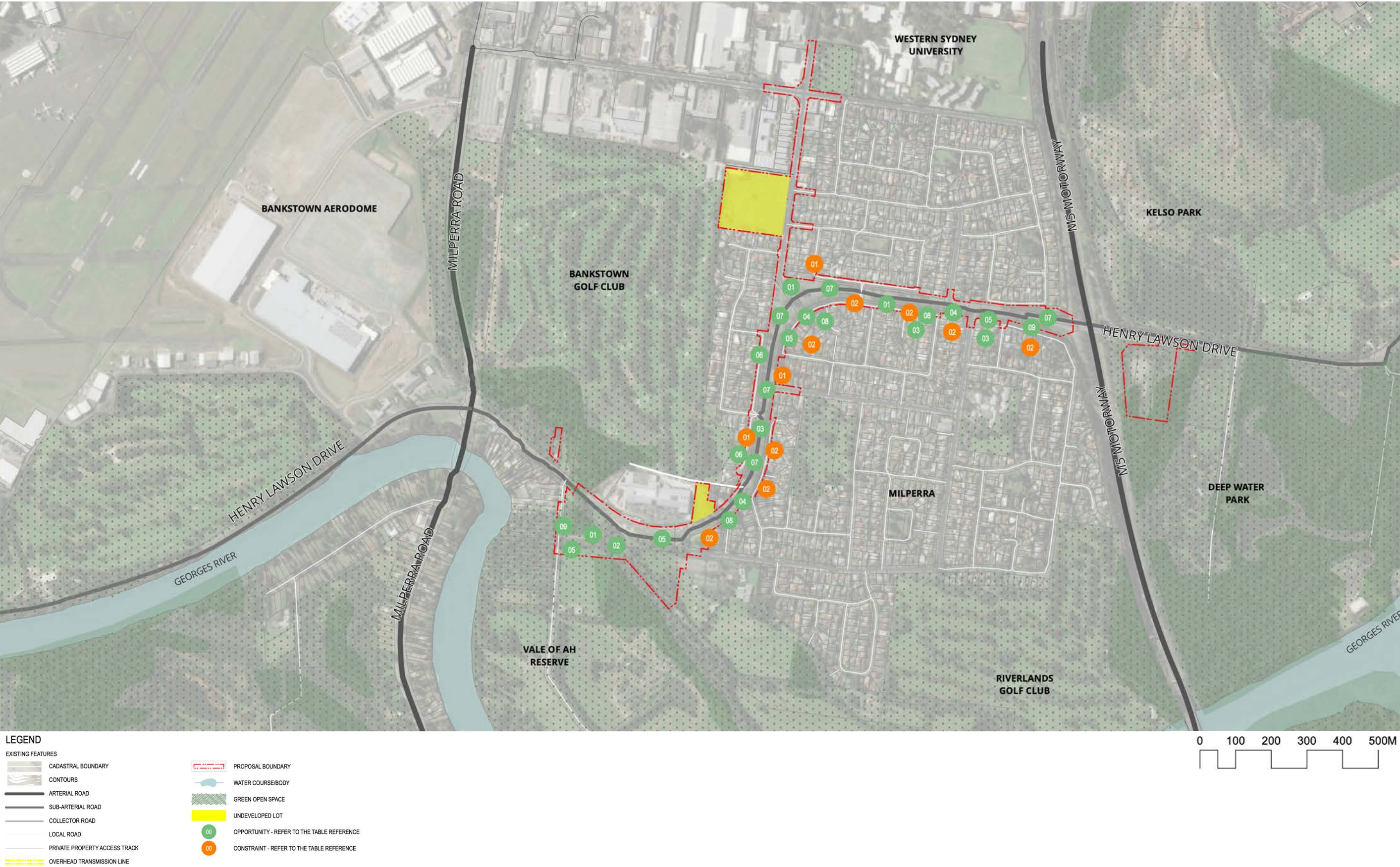


Figure 3-1: Opportunities & Constraints

4 Urban design concept

4.1 Chapter overview

This chapter describes and illustrates the design approach that responds to the urban design vision for the proposal.

Designed elements that were considered in order to achieve the urban design objectives include:

- Road design elements
- Structures
- Earthworks
- Drainage and water quality
- Road furniture
- Landscape treatments.

Road design elements

Shared user path

A typically 3.0 m wide SUP would be positioned within the northbound setback for the extent of the proposal area. The SUP would meander away from the road where possible, particularly where space permits or to avoid existing vegetation.

Where existing pathways are retained, SUP widths may be transitioned to meet retained pathways.

All SUP alignments are designed to enhance pedestrian and cyclist connectivity in the local region and to create a comfortable journey that is protected, shaded for active commuters and passive recreational activity within the community.

Design approach

- Design pedestrian and cycle connections based on *CoCB CPTED* principles to ensure pedestrian and cyclist safety
- The SUP would be finished in coloured concrete (charcoal integral oxide)
- SUP would tie in with existing sections of SUP at the northern and southern ends of the proposal
- The alignment of the SUP would maximise the opportunity for a wide area of planting at the BOK to provide better separation between users and passing vehicles and to help vegetation thrive
- Regular 'breakout' spaces and stopping points along the SUP would be included to provide respite, shade and a place to pause and meet
- A mulch only strip would be installed at the edge of the SUP to ensure no plant overhangs onto the path to reduce the need for constant maintenance
- In locations where the SUP intersects with local street connections, the SUP would continue as standard concrete and street connections would be exposed aggregate.

Medians:

- Medians of less than 2 m wide, where pedestrian access is required, or within 25m from the end of the median nosing (where there are potential sight line issues) would have a concrete finish
- Medians between 2-3 m wide would have low shrub or grasses and groundcover planting
- Medians of approximately 4 m wide (or greater) would typically have larger features shrubs or frangible trees with an understorey of low groundcover planting
- There are currently no medians greater than 4m, where non-frangible trees can be introduced, in association with the provision of safety barriers.

Design approach

- Where medians are to be used for pedestrians/ cyclists storage they would have a concrete surface to maximise accessibility and safety
- Sight lines would always be carefully considered within the road corridor where planting is proposed to be installed within medians
- Low maintenance vegetation that can withstand the harsh climatic conditions of Western Sydney would be selected.

Structures

Bridges

There is one existing bridge at the northern end of the project area adjoining the Stage 1A works at the following location:

Northbound

- MC00 - CH 1720 - CH1750

The extent of new works is limited to extending this bridge to accommodate the widened carriageway to Henry Lawson Drive (HLD).

The design of this bridge is low level with the only visibility above the carriageway being the proposed safety barriers and lighting.

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Earthworks

Cut batters

Across the proposal there are only a small number of locations with cut batters and a gradient of 4H:1V is typical.

Design approach

- Rounding of the top edges of the batters would help to integrate the formation with the surrounding landscape.

Fill embankments

Across the proposal fill embankments are generally low with a typical maximum gradient of 4H:1V. The most extensive fill embankments are at the following locations:

Northbound

- MC00 - CH60 - CH190
- MC00 - CH1370 - CH1760

Drainage and water quality

Culverts

Currently the proposal includes one major and one minor culvert in association with Link road at the following location:

Northbound

- MC95 - CH20-CH60
- MC95 - CH160-CH180

Design approach

- Consider pedestrian access across the culverts especially at drainage channels
- Appropriate scour protection would be provided on both upstream and downstream ends of all structures where increased velocities have the potential to cause scour.

WSUD features

Swales have been designed at the northern extent of the proposal at the following locations:

Northbound

- MC00 - CH1050 - CH1150
- MC00 - CH1180 - CH1360
- MC91 - CH250 - CH80

Southbound

- MC91 - CH120 - CH20
- MC95 - CH80 - CH160

Design approach

- The approach to WSUD features is informed by TfNSW guidelines and in accordance with the CoCB WSUD Technical Guidelines
- Best-practice WSUD initiatives would be

implemented where feasible to increase the environmental performance of the proposal especially when they are linked to existing watercourses

- WSUD features would be used to enhance amenity, and improve re-vegetation and reduce urban heat.

The design of these swales will be developed at the detailed design stage of the project, but current concept design proposals are for the swales to be planted with appropriate native grasses.

Road furniture

Kerbside bus stops

Existing bus stops would be retained where possible.

- Existing kerbside bus stops to be relocated are at the following locations:
 - Henry Lawson Drive northbound at Polzies Avenue
 - Henry Lawson Drive northbound at Ganmain Crescent

Future bus shelters

Typical arrangements for the provision of future bus shelters at bus stops along the northbound carriageway, where the SUP would be present, and along the southbound carriageway, where the pedestrian path would be present have been considered for the Proposal. The SUP and footpath would be set back in these locations to allow sufficient space for bus shelters and associated facilities.

Design approach

- The SUP and footpath arrangement would be setback behind the bus shelter in order to reduce potential conflicts between all users
- Bus shelter style and configuration such as materiality and colour selections would be selected to reduce urban heat
- Additional colour and texture would be introduced through the plant selection at bus stop locations
- Ensure planting selection conforms to sight lines and clear zone requirements but provides as much shade as possible.

Safety barriers

W-beam crash safety barriers are currently proposed for within the proposal area. Existing w-beam crash safety barriers may be relocated to suit the new widened carriageway at the exit ramp from the M5 motorway. In all other locations new w-beam safety barriers would be installed.

Safety barriers may also be required where batters are steeper than 4H:1V or at culvert crossings to protect against headwalls. Currently the proposal of safety barriers are at the following locations:

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- MC00 - CH25- CH145 - Exit from M5
- MC00 - CH1720 - CH1750 - Bridge

Design approach

- Consider barrier selection and integration with other components of the SUP environment to improve amenity
- Where possible, dense shrub vegetation would be implemented to at least one side of barriers to soften the visual appearance
- Select plant species to ensure passive surveillance of pedestrians and cyclists is maintained from surrounding areas.

Pedestrian and cyclist fencing

Pedestrian and cyclist fencing would be provided where required, the appropriate locations will be reviewed at the detailed design stage to adhere to the design approach.

Design approach

- Fencing would be designed to achieve a quality urban design outcome for all users off the road corridor
- Fences would be installed as protection from hazards adjoining to SUP and footpath.
- Handrails would be required on culvert wing walls where fall heights exceed 1m and along SUP next to 2H:1V embankments
- Fences that require replacement especially those associated with private properties would be in a similar style to the existing fencing
- Where possible, vegetation would be implemented to at least one side of fencing to soften its visual appearance particularly when used in extensive linear extents along a road corridor
- Median fencing shall not obstruct the motorist's sight lines and distance requirements to users of pedestrian and cyclist facilities.

Signage

Road signage has been provided as part of the engineering works. The detailed positioning of some of these proposed signs would be coordinated at the detailed design stage of the proposal.

Design approach

- Consult with CoCB with regards to any LGA wide signage strategy
- Ensure an integrated engineering and urban design approach reduces the reliance on separate signage structures and minimizes visual clutter and obstructions.

Public art and interpretive signage

Public art and interpretive signage may be included within the proposal at the detailed design stage.

Design approach

- Consult with CoCB with regards to any LGA wide signage strategy
- Investigate any opportunities to incorporate public art with the site
- Investigate possible ways for the application of art installations on noise wall surfaces to be developed by TfNSW in consultation with Council and Community through the detailed design phase.

Lighting

Street lighting has been provided in the proposal. Proposed tree positions have been documented in association with light positions to avoid conflict with new light poles and associated footings and to reduce any potential conflicts of future tree canopies with light distribution.

Design approach

- Lighting would be installed in accordance with the guidelines set out in the CoCB Public Domain Manual
- Road corridor lighting would shine on pedestrian pathways and any possible entrapment spaces to minimise clutter where possible
- Lighting in public places would be consistent in order to reduce the contrast between shadows and illuminated areas and not produce glare
- Lighting spillage onto neighbouring properties would be minimised as this can cause nuisance and reduce opportunities for natural surveillance.

Landscape treatments

Feature planting

Feature planting is designed to highlight particular areas within the corridor. It may be used to identify an individual feature, define a node within the landscape or announce an entire area or precinct.

Feature planting also contributes to an interesting linear driving experience and helps with legibility.

Design approach

- Feature understorey planting to proposed trees to increase the visual amenity of open space areas
- Structure planting using contrasting species to change the visual cues along the proposal area and contribute to the experience of the landscape along the journey
- Employ landscape sequencing techniques to improve user perception effectively promote distinctive character precincts and activity nodes along a corridor
- Install trees in setback areas to help minimise the

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visual scale of the road infrastructure, mitigate urban heat and enhance the amenity of both the road corridor and adjoining areas

- Replacement and supplementary tree planting for existing trees to removed or retained, to reinstate or reinforce existing tree canopies that are an integral component of the existing character of the road and current buffer to nearby residential properties.
- In bushfire prone areas of the proposal area, feature planting is likely to include tall canopy trees with low shrub, grass and ground cover species. In these locations emphasis on colour and foliage textures would be important
- Lateral views from the road corridor across to the Blue Mountains would be accented and maintained.

Medians

Planting in median areas may include plant species arranged in bands or blocks with different species layered vertically. Marker shrub planting is currently proposed to produce visual stimuli to the ends of median plantings.

Plant species would also be selected for colour and textural qualities and may also utilise water sensitive urban design principles.

Design approach

- Where medians are greater than 2m wide, grasses and groundcover planting or low shrubs are proposed and positioned to provide further greening of the corridor
- For medians 3-4m wide or greater, taller shrubs or frangible trees with an understorey of grasses and groundcover plants is proposed
- Low maintenance vegetation would be selected that has been proven to withstand the typically hot and dry climatic conditions of Western Sydney
- Sight lines would always be carefully considered within the road corridor and a low height planting mix is proposed for such areas
- Planting within the median would always avoid existing underground utilities and above ground power lines.

Replacement Tree Planting

Based on an Arborist's investigation and report (*Arboricultural Assessment & Tree Protection Plan*, Tree Survey November 2022, with supplement March 2023) a substantial number of existing trees are currently proposed for removal. Further investigations at the detailed design stage may however reduce the number of trees to be removed. A large number of these trees to be removed currently make up the mature tree character of the existing landscape next to Henry Lawson Drive.

The concept design proposals incorporate a large number of replacement tree planting, which is preferred by Transport for NSW (TfNSW) to be of 45L size.

It is proposed that any feature non-native species of tree planting are potentially installed at a semi-mature size of 75-200L size to provide a more immediate impact and to compensate for the slower growing rate of non-native species.

Pocket & linear Parks

Pocket & linear parks are proposed at suitable locations where space is available, particularly at the southern end of the proposal area to Henry Lawson Drive and also to the Raleigh Road closed off road and the Basin retention area.

The design of these areas is proposed to be developed during the detailed design stage to help offset the widening of the road with positive benefits to the local community and nearby housing.

Consideration should be given to developing these proposals to include additional features such as furniture (such as a shelter, picnic benches and seating) and potentially low level lighting. All proposals would however be subject to consultation with Canterbury Bankstown Council.

Lay down/ site compound areas

Design approach

- Planting would aim to reinstate and reinforce the existing environment prior to use during the construction of the upgrade.

WSUD planting

Planting in WSUD features is designed to support the local ecology and biodiversity, minimise negative impacts on natural water cycles and integrate water into the landscape to enhance visual, social, cultural and ecological values.

Design approach

- Support the local ecology and biodiversity and contribute to the maintenance of existing natural hydrological processes
- Appropriate aquatic (macrophyte and sedge plants) within natural creek channels would be selected to ensure the construction impacts of the proposal are minimised
- Species would be selected to accommodate drought and flood conditions, ensuring greater resilience and adaptability
- Planting would enhance biodiversity through developing habitat corridors and linkages to creek systems

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4.2 Plant species

Species selection is to be in accordance with TfNSW *Landscape Design Guideline* and in consultation with CoCB.

As a part of the **Greening Our City** initiative the City of Canterbury Bankstown LGA has created an online catalogue database. The catalogue provides the opportunity to specify plant species based on available suitability, use and purpose and lastly the zone in which the site resides.

The following zones are:

- Zone 1 - Cumberland Shale Plains Woodland
- Zone 2 - Rainforest
- Zone 3 - Castlereagh Ironbark Forest
- Zone 4 - Sydney Turpentine - Ironbark Forest
- Zone 5 - Coastal Sandstone Heath-Mallee
- Zone 6 - Sandstone Slopes
- Zone 7 - Wetlands; and
- Zone 8 - Swamp Forests

The following planting palette has been selected largely in accordance with the City of Canterbury Bankstown LGA **Native Plant Selector Guide**. According to the LGA the study area is situated within the zones:

- Zone 1 - Cumberland Shale Plains Woodland
- Zone 3 - Castlereagh Ironbark Forest
- Zone 8 - Swamp Forests .

Additional species have been added to these **Native Plant Selector species**, based on the following criteria:

- Replacement tree planting to include species existing on site
- Exotic species to be incorporated to provide a deciduous element to planting
- Cultivar and general landscape species that are 'tried & tested' on other road proposal projects
- Species that are more commercially available.

Species would include low maintenance and drought tolerant plants in order to reduce maintenance requirements. The species and their location and function are outlined in [Table 4-1 on page 32 to Table 4-16 on page 37](#).

Design approach

- Planting to incorporate both native and exotic plants to provide large amounts of shade in summer but also allow sunlight in winter
- Screening plant species would most likely be native to reinforce endemic planting communities of the areas
- At intersections and activity nodes along the SUP, there is an opportunity to provide a variety of plant species rather than using solely native grasses. This method help provide accent and vary the experience of the journey along the road corridor.

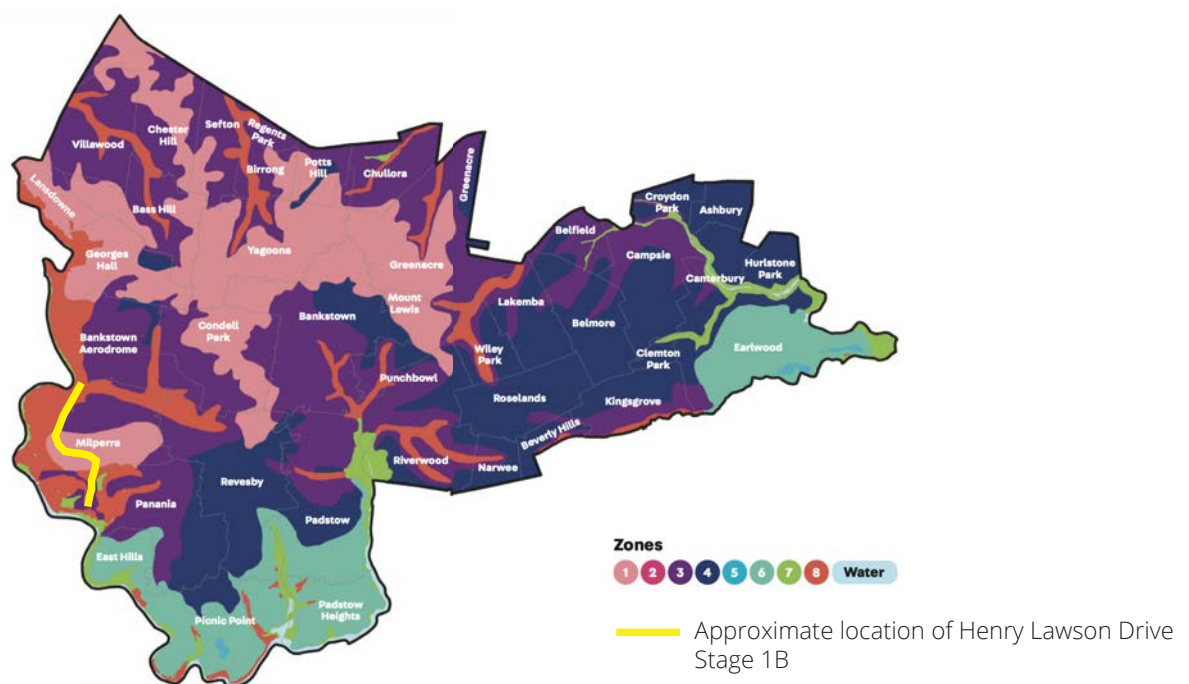


Plate 4-1: Your Native Garden Guide CoCB (Plant Community Map)

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Table 4-1: TM1 Feature tree planting

Feature tree planting would be used to define intersections or important elements along the road corridor.

Plant Species	Common Name	Height	Spread
<i>Angophora bakeri</i>	Narrow leaf apple	10m	10m
<i>Eleocarpus reticulatus</i>	Blueberry ash	10m	4m
<i>Glochidion ferdinandi</i>	Cheese tree	8m	5m
<i>Melaleuca linariifolia</i>	Narrow-leaved paperbark	10m	7m
<i>Syncarpia glomulifera</i>	Turpentine tree	40m	10m
<i>Waterhousia floribunda</i> 'Green Avenue'	Weeping lily pilly	15m	9m



Angophora bakeri



Eleocarpus reticulatus



Glochidion ferdinandi



Melaleuca linariifolia



Syncarpia glomulifera

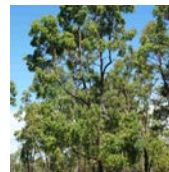


Waterhousia floribunda

Table 4-2: TM2 Native trees

Native tree planting would be used in stands along edge of road. To supplement existing planting

Plant Species	Common Name	Height	Spread
<i>Angophora floribunda</i>	Rough-barked apple	20m	10m
<i>Banksia integrifolia</i>	Coast banksia	8m	4m
<i>Eucalyptus moluccana</i>	Grey box	25m	10m
<i>Melaleuca decora</i>	White feather honeymyrtle	7m	8m
<i>Melaleuca linariifolia</i>	Narrow-leaved paperbark	8m	4m



Angophora floribunda



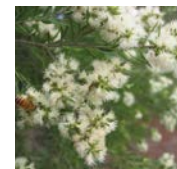
Banksia integrifolia



Eucalyptus moluccana



Melaleuca decora



Melaleuca linariifolia

Table 4-3: TM3 Riparian tree planting

Tree mix would be used at low lying points along the corridor for example near culverts, drainage channels and creek areas

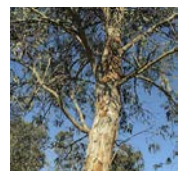
Plant Species	Common Name	Height	Spread
<i>Allocasuarina littoralis</i>	Black She Oak	15m	7m
<i>Angophora bakeri</i>	Narrow-leaved apple	10m	10m
<i>Eucalyptus longifolia</i>	Woollybutt	20m	10m
<i>Glochidion ferdinandi</i>	Cheese tree	8m	5m
<i>Melaleuca linearifolia</i>	Narrow-leaved paperpark	10m	4m
<i>Casuarina glauca</i>	Swamp she-oak	12m	8m



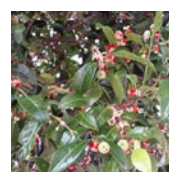
Allocasuarina littoralis



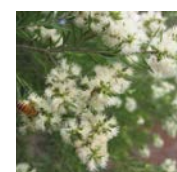
Angophora bakeri



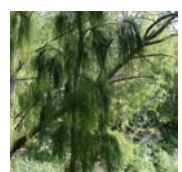
Eucalyptus longifolia



Glochidion ferdinandi



Melaleuca linearifolia



Casuarina glauca

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Table 4-4: TM4 Frangible screening shrubs

Mix would be used in medians wider than 4m

Plant Species	Common Name	Height	Spread
<i>Callistemon 'White Anzac'</i>	Bottlebrush	1.5m	3m
<i>Doryanthes excelsa</i>	Gynea lily	4m	3m
<i>Kunzea ambigua</i>	Tick bush	5m	3m
<i>Leptospermum squarrosum</i>	Peach blossom tea-tree	3m	2m
<i>Melaleuca nodosa</i>	Prickly-leaved paperbark	4m	1.5m



Callistemon 'white anzac'



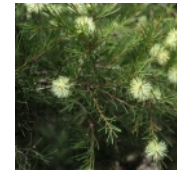
Doryanthes excelsa



Kunzea ambigua



Leptospermum squarrosum



Melaleuca nodosa

Table 4-5: TM5 Frangible tree mix

Tree mix would be used in medians wider than 4m with appropriate barriers.

Plant Species	Common Name	Height	Spread
<i>Bursaria spinosa</i>	Sweet bursaria	10m	3m
<i>Callistemon salignus</i>	Willow bottlebrush	10m	5m
<i>Melaleuca decora</i>	White feather honey myrtle	7m	8m
<i>Melaleuca nodosa</i>	Prickly-leaved paperbark	4m	1.5m
<i>Syzygium luehmannii</i>	Riberry	8m	4m



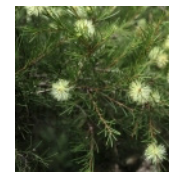
Bursaria spinosa



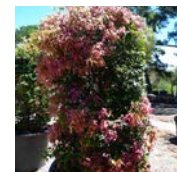
Callistemon salignus



Melaleuca decora



Melaleuca nodosa



Syzygium luehmannii

Table 4-6: TM6 Street trees

Tree mix would be used in stands along edge of road. Species have been selected that are commonly found within Cumberland plain woodland and coastal valley grassy woodlands plant type community combined with existing tree species to be removed

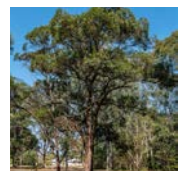
Plant Species	Common Name	Height	Spread
<i>Angophora floribunda</i>	Rough-barked apple	20m	10m
<i>Eucalyptus crebra</i>	Narrow-leaved ironbark	35m	15m
<i>Eucalyptus microcorys</i>	Tallowwood	40m	25m
<i>Eucalyptus punctata</i>	Grey gum	35m	15m
<i>Eucalyptus tereticornis</i>	Forest red gum	50m	20m



Angophora floribunda



Eucalyptus crebra



Eucalyptus microcorys



Eucalyptus punctata



Eucalyptus tereticornis

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Table 4-7: PM1 Feature shrubs & groundcovers

Planting mix would be used at entry points and to linear parkland areas

Plant Species	Common Name
<i>Callistemon 'Better John'</i>	Bottlebrush 'Better John'
<i>Clivia miniata</i>	Bush lily
<i>Hibbertia scandens</i>	Snake vine
<i>Philodendron 'Xanadu'</i>	Xanadu
<i>Poa labillardirei</i>	Tussock grass
<i>Scaevola albida 'White Carpet'</i>	White fan flower
<i>Westringia 'Mundi'</i>	Coastal rosemary



Callistemon 'Better John'



Clivia miniata



Hibbertia scandens



Philodendron 'Xanadu'



Poa labillardirei



Scaevola albida 'White Carpet'

Table 4-8: PM2 Native shrubs & groundcovers

Planting mix, including screening shrubs would be used adjacent to residential properties

Plant Species	Common Name
<i>Atriplex semibaccata</i>	Saltbush
<i>Dianella longifolia</i>	Pale flax lily
<i>Hardenbergia violacea</i>	Purple coral pea
<i>Hymenosporum flavum</i>	Native franjipani
<i>Myoporum parvifolium</i>	Dwarf native myrtle
<i>Melaleuca thymifolia</i>	Thyme honey-myrtle
<i>Syzygium 'Cascade'</i>	Lilly pilly



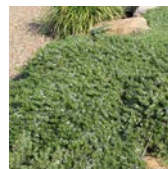
Atriplex semibaccata



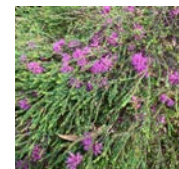
Hardenbergia violacea



Hymenosporum flavum



Myoporum parvifolium



Melaleuca thymifolia



Syzygium 'Cascade'

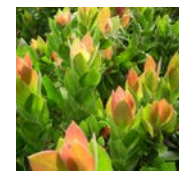
Table 4-9: PM3A Feature low shrubs, grasses & groundcovers in median

Planting mix is a feature planting low height mix for areas where there are sight line issues, particularly the ends of medians

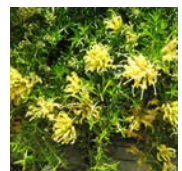
Plant Species	Common Name
<i>Dianella revoluta 'Little Rev'</i>	Blue flax-lily
<i>Callistemon hybrid 'Calkwr' PBR</i>	Red rover
<i>Grevillea juniperina</i>	Gold cluster grevillea
<i>Hibbertia scandens</i>	Guinea flower
<i>Hymenosporum flavum 'Lushious'</i>	Native franjipani
<i>Rosmarinus officinalis</i>	Rosemary



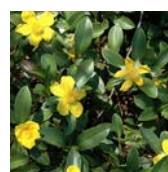
Dianella 'Little Rev'



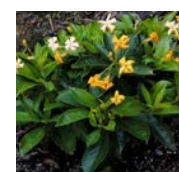
Callistemon hybrid



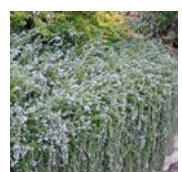
Grevillea juniperina



Hibbertia scandens



Hymenosporum flavum



Rosmarinus officinalis

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Table 4-10: PM4 Low shrubs, grasses & groundcovers in medians

Planting mix would be used in medians as an understorey to frangible trees

Plant Species	Common Name
<i>Callistemon citrinus</i> 'Endeavour'	Bottlebrush
<i>Callistemon</i> 'White Anzac'	Bottlebrush
<i>Dianella caerulea</i> 'Breeze'	Native flax
<i>Grevillea</i> 'Fireworks'	Grevillea
<i>Indigofera australis</i>	Australian indigo
<i>Leptospermum squarrosum</i>	Peach blossom tea-tree



Callistemon 'Endeavour'



Callistemon 'White Anzac'



Dianella caerulea 'Breeze'



Grevillea 'Fireworks'



Indigo australis



Leptospermum squarrosum

Table 4-11: PM5A Native shrubs, grasses & sedges in basins

Planting mix would be used in basins where periodic flooding

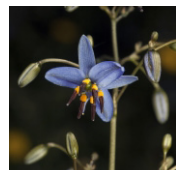
Plant Species	Common Name
<i>Atriplex semibaccata</i>	Saltbush
<i>Hibbertia scandens</i>	Guinea flower
<i>Dianella revoluta</i> 'Little Rev'	Blue flax-lily
<i>Lomandra longifolia</i> 'Tanika'	Tanika mat-rush
<i>Lomandra longifolia</i>	Mat-rush
<i>Scaevola albida</i> 'White Carpet'	White fan flower



Atriplex semibaccata



Hibbertia scandens



Dianella revoluta



Lomandra longifolia 'Tanika'



Lomandra longifolia



Scaevola albida 'White Carpet'

Table 4-12: PM3B Shrubs & grasses in median

Planting mix uses medium sized shrubs to help reduce headlight glare or to provide feature planting

Plant Species	Common Name
<i>Carex appressa</i>	Tall sedge
<i>Ficinia nodosa</i>	Knobby club-rush
<i>Gahnia sieberiana</i>	Red-fruit saw-sedge
<i>Lomandra hystrix</i> 'Katie Belles'	Mat rush
<i>Juncus usitatus</i>	Common rush
<i>Melaleuca nodosa</i>	Prickly-leaved paperbark



Carex appressa



Ficinia nodosa



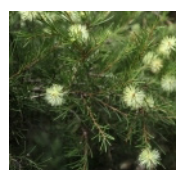
Gahnia sieberiana



Lomandra hystrix 'Katie Belles'



Juncus usitatus



Melaleuca nodosa

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Table 4-13: PM6 Creek line banks

Plant Species	Common Name
<i>Carex appressa</i>	Tall sedge
<i>Dianella revoluta</i>	Blue flax-lily
<i>Juncus usitatus</i>	Common rush
<i>Lomandra multiflora</i>	Many-flowered mat-rush
<i>Melaleuca nodosa</i>	Prickly-leaved paperbark
<i>Westringia fruticosa</i>	Coastal rosemary



Carex appressa



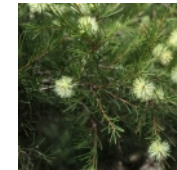
Dianella revoluta



Juncus usitatus



Lomandra multiflora



Melaleuca nodosa



Westringia fruticosa

Table 4-14: PM5B Native shrubs, grasses & sedges in swales

Planting mix would be used in vegetated swales with plants adapted to wet conditions

Plant Species	Common Name
<i>Carex appressa</i>	Tall sedge
<i>Dianella revoluta</i>	Blue flax-lily
<i>Callistemon citrinus</i>	Crimson bottlebrush
<i>Juncus usitatus</i>	Common rush
<i>Kunzea ambigua</i>	Tickbush
<i>Melaleuca nodosa</i>	Prickly-leaved paperbark



Carex appressa



Dianella revoluta



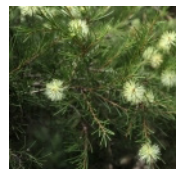
Callistemon citrinus



Juncus usitatus



Kunzea ambigua



Melaleuca nodosa

Table 4-15: PM7 Native grasses on embankments & batters

Plant Species	Common Name
<i>Carex appressa</i>	Tall sedge
<i>Cymbopogon refractus</i>	Barbed wire grass
<i>Dianella longifolia</i>	Pale flax lily
<i>Dianella revoluta</i>	Blue flax lily
<i>Lomandra multiflora</i>	Many -flowered mat-rush
<i>Paspalidium distans</i>	Shotgrass



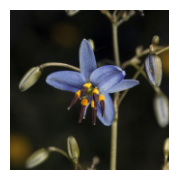
Carex appressa



Cymbopogon refractus



Dianella longifolia



Dianella revoluta



Lomandra multiflora



Paspalidium distans

4 Urban design concept

Table 4-16: PM8 Native grasses & groundcovers to verge

Plant Species	Common Name
<i>Dianella caerulea</i> 'Breeze'	Blue flax-lily
<i>Dianella revoluta</i> 'Little Rev'	Native flax
<i>Hibbertia scandens</i>	Snake vine
<i>Lomandra longifolia</i> 'Tanika'	Mat-rush
<i>Themeda australis</i>	Kangaroo grass
<i>Viola hederacea</i>	Native violet



Dianella caerulea 'Breeze'



Dianella revoluta 'Little Rev'



Hibbertia scandens



Lomandra longifolia 'Tanika'

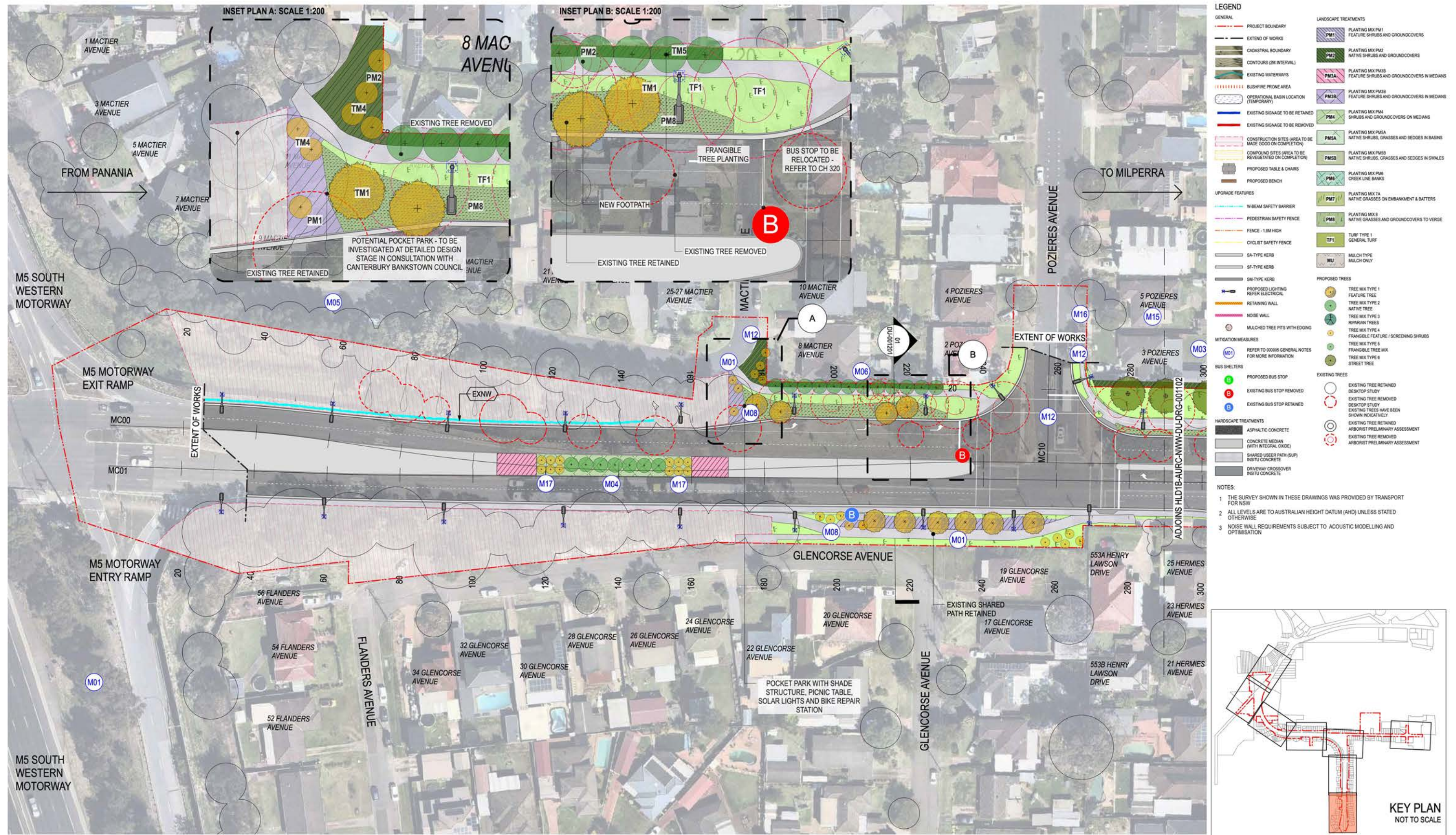


Themeda australis



Viola hederacea

4 Urban design concept plan 1



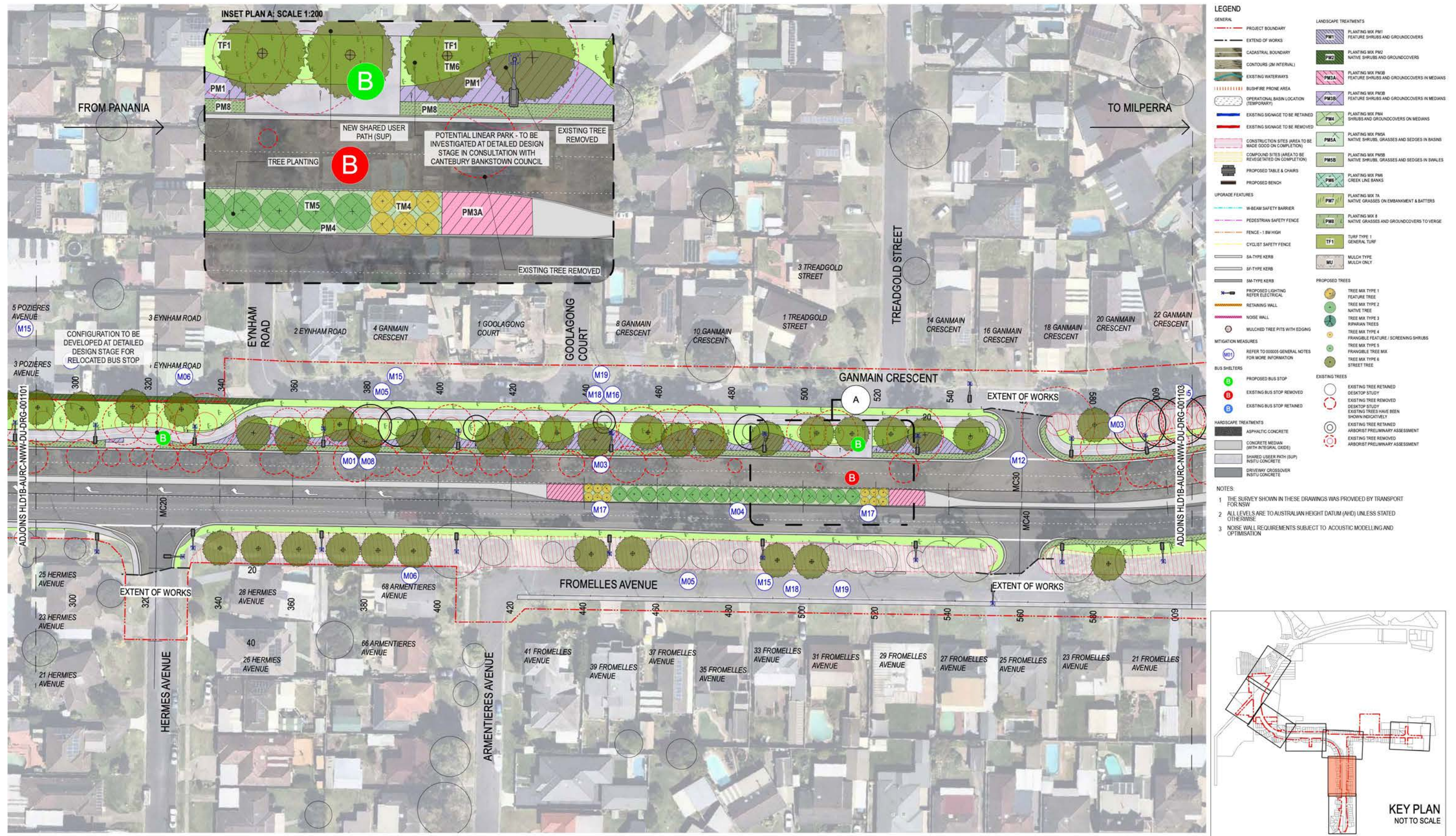
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Figure 4-1: Urban design plans (01-08)

4 Urban design concept plan 2



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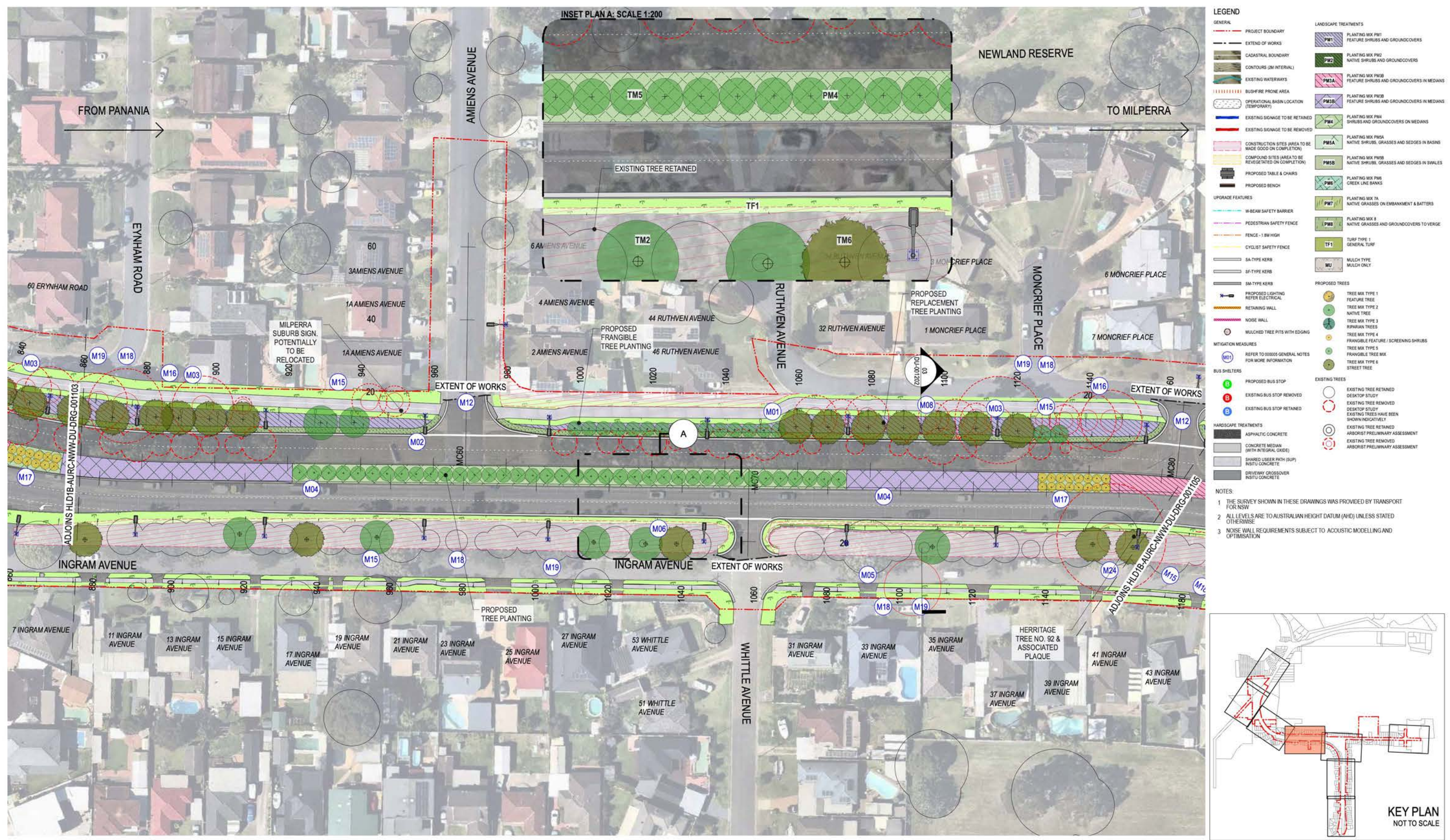


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4 Urban design concept plan 4



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4 Urban design concept plan 6



4 Urban design concept plan 7



LEGEND

GENERAL

- PROJECT BOUNDARY
- EXTENT OF WORKS
- CADASTRAL BOUNDARY
- CONTOURS (2M INTERVAL)
- EXISTING WATERWAYS
- BUSHFIRE PRONE AREA
- OPERATIONAL BASIN LOCATION (TEMPORARY)
- EXISTING SIGNAGE TO BE RETAINED
- EXISTING SIGNAGE TO BE REMOVED
- CONSTRUCTION SITES (AREA TO BE MADE GOOD ON COMPLETION)
- COMPOUND SITES (AREA TO BE REVEGETATED ON COMPLETION)
- PROPOSED TABLE & CHAIRS
- PROPOSED BENCH

UPGRADE FEATURES

- W-BEAM SAFETY BARRIER
- PEDESTRIAN SAFETY FENCE
- FENCE - 1.8M HIGH
- CYCLIST SAFETY FENCE
- SA-TYPE KERB
- SF-TYPE KERB
- SM-TYPE KERB
- PROPOSED LIGHTING REFER ELECTRICAL
- RETAINING WALL
- NOISE WALL
- MULCHED TREE PITS WITH EDGING

MITIGATION MEASURES

- REFER TO 000005 GENERAL NOTES FOR MORE INFORMATION

BUS SHELTERS

- PROPOSED BUS STOP
- EXISTING BUS STOP REMOVED
- EXISTING BUS STOP RETAINED

HARDSCAPE TREATMENTS

- ASPHALTIC CONCRETE
- CONCRETE MEDIAN (WITH INTEGRAL OXIDE)
- SHARED USER PATH (SUP) IN-SITU CONCRETE
- DRIVEWAY CROSSOVER IN-SITU CONCRETE

LANDSCAPE TREATMENTS

- PLANTING MIX PM1 FEATURE SHRUBS AND GROUNDCOVERS
- PLANTING MIX PM2 NATIVE SHRUBS AND GROUNDCOVERS
- PLANTING MIX PM3B FEATURE SHRUBS AND GROUNDCOVERS IN MEDIANS
- PLANTING MIX PM3B FEATURE SHRUBS AND GROUNDCOVERS IN MEDIANS
- PLANTING MIX PM4 SHRUBS AND GROUNDCOVERS ON MEDIANS
- PLANTING MIX PM5A NATIVE SHRUBS, GRASSES AND SEDGES IN BASINS
- PLANTING MIX PM5B NATIVE SHRUBS, GRASSES AND SEDGES IN SWALES
- PLANTING MIX PM6 CREEK LINE BANKS
- PLANTING MIX TA NATIVE GRASSES ON EMBANKMENT & BATTERS
- PLANTING MIX 8 NATIVE GRASSES AND GROUNDCOVERS TO VERGE
- TURF TYPE 1 GENERAL TURF
- MULCH TYPE MULCH ONLY

PROPOSED TREES

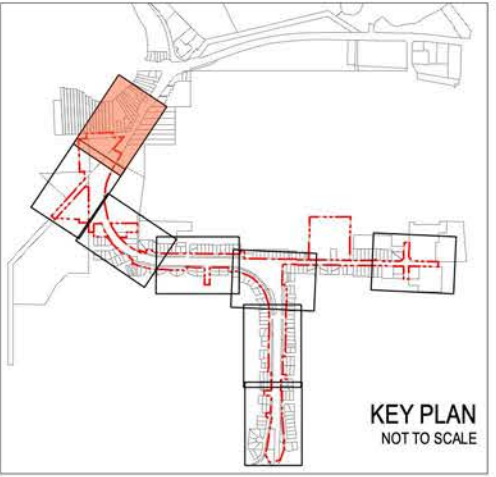
- TREE MIX TYPE 1 FEATURE TREE
- TREE MIX TYPE 2 NATIVE TREE
- TREE MIX TYPE 3 RIPARIAN TREES
- TREE MIX TYPE 4 FRANGIBLE FEATURE / SCREENING SHRUBS
- TREE MIX TYPE 5 FRANGIBLE TREE MIX
- TREE MIX TYPE 6 STREET TREE

EXISTING TREES

- EXISTING TREE RETAINED DESKTOP STUDY
- EXISTING TREE REMOVED DESKTOP STUDY
- EXISTING TREES HAVE BEEN SHOWN INDICATIVELY
- EXISTING TREE RETAINED ARBORIST PRELIMINARY ASSESSMENT
- EXISTING TREE REMOVED ARBORIST PRELIMINARY ASSESSMENT

NOTES:

- THE SURVEY SHOWN IN THESE DRAWINGS WAS PROVIDED BY TRANSPORT FOR NSW
- ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM (AHD) UNLESS STATED OTHERWISE
- NOISE WALL REQUIREMENTS SUBJECT TO ACOUSTIC MODELLING AND OPTIMISATION



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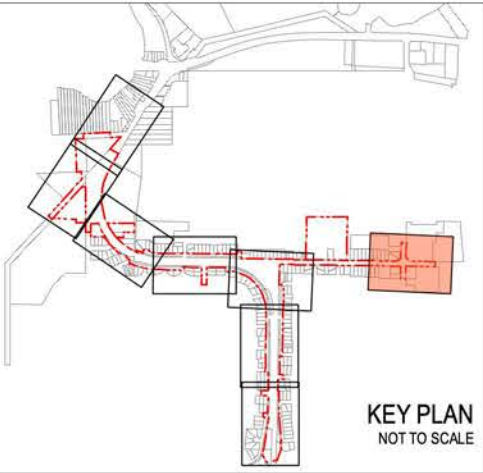
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4 Urban design concept plan 8



LEGEND	
GENERAL	
	PROJECT BOUNDARY
	EXTENT OF WORKS
	CADASTRAL BOUNDARY
	CONTOURS (2M INTERVAL)
	EXISTING WATERWAYS
	BUSHFIRE PRONE AREA
	OPERATIONAL BASIN LOCATION (TEMPORARY)
	EXISTING SIGNAGE TO BE RETAINED
	EXISTING SIGNAGE TO BE REMOVED
	CONSTRUCTION SITES (AREA TO BE MADE GOOD ON COMPLETION)
	COMPOUND SITES (AREA TO BE REVEGETATED ON COMPLETION)
	PROPOSED TABLE & CHAIRS
	PROPOSED BENCH
UPGRADE FEATURES	
	W-BEAM SAFETY BARRIER
	PEDESTRIAN SAFETY FENCE
	FENCE - 1.8M HIGH
	CYCLIST SAFETY FENCE
	SA-TYPE KERB
	SF-TYPE KERB
	SM-TYPE KERB
	PROPOSED LIGHTING REFER ELECTRICAL
	RETAINING WALL
	NOISE WALL
	MULCHED TREE PITS WITH EDGING
MITIGATION MEASURES	
	REFER TO 000005 GENERAL NOTES FOR MORE INFORMATION
BUS SHELTERS	
	PROPOSED BUS STOP
	EXISTING BUS STOP REMOVED
	EXISTING BUS STOP RETAINED
LANDSCAPE TREATMENTS	
	ASPHALTIC CONCRETE
	CONCRETE MEDIAN (WITH INTEGRAL OXIDE)
	SHARED USER PATH (SUP) IN-SITU CONCRETE
	DRIVEWAY CROSSOVER IN-SITU CONCRETE
LANDSCAPE TREATMENTS	
	PLANTING MIX PM1 FEATURE SHRUBS AND GROUNDCOVERS
	PLANTING MIX PM2 NATIVE SHRUBS AND GROUNDCOVERS
	PLANTING MIX PM3B FEATURE SHRUBS AND GROUNDCOVERS IN MEDIANS
	PLANTING MIX PM3B FEATURE SHRUBS AND GROUNDCOVERS IN MEDIANS
	PLANTING MIX PM4 SHRUBS AND GROUNDCOVERS ON MEDIANS
	PLANTING MIX PM5A NATIVE SHRUBS, GRASSES AND SEDGES IN BASINS
	PLANTING MIX PM5B NATIVE SHRUBS, GRASSES AND SEDGES IN SWALES
	PLANTING MIX PM6 CREEK LINE BANKS
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	TREE MIX TYPE 6 STREET TREE
EXISTING TREES	
	EXISTING TREE RETAINED
	EXISTING TREE REMOVED
	EXISTING TREES HAVE BEEN SHOWN INDICATIVELY
	EXISTING TREE RETAINED ARBORIST PRELIMINARY ASSESSMENT
	EXISTING TREE REMOVED ARBORIST PRELIMINARY ASSESSMENT

- NOTES:
- 1 THE SURVEY SHOWN IN THESE DRAWINGS WAS PROVIDED BY TRANSPORT FOR NSW
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 - 3 NOISE WALL REQUIREMENTS SUBJECT TO ACOUSTIC MODELLING AND OPTIMISATION

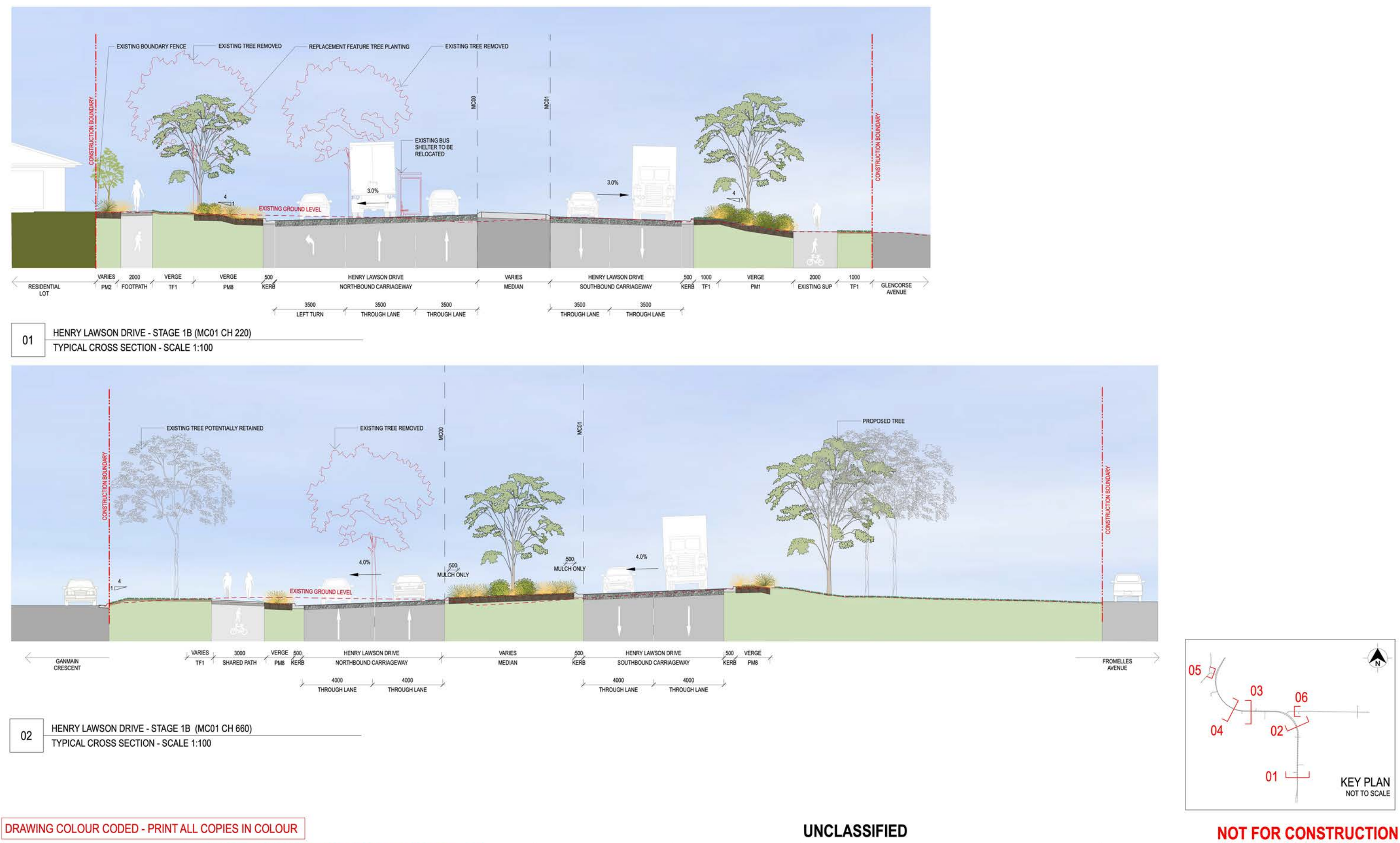


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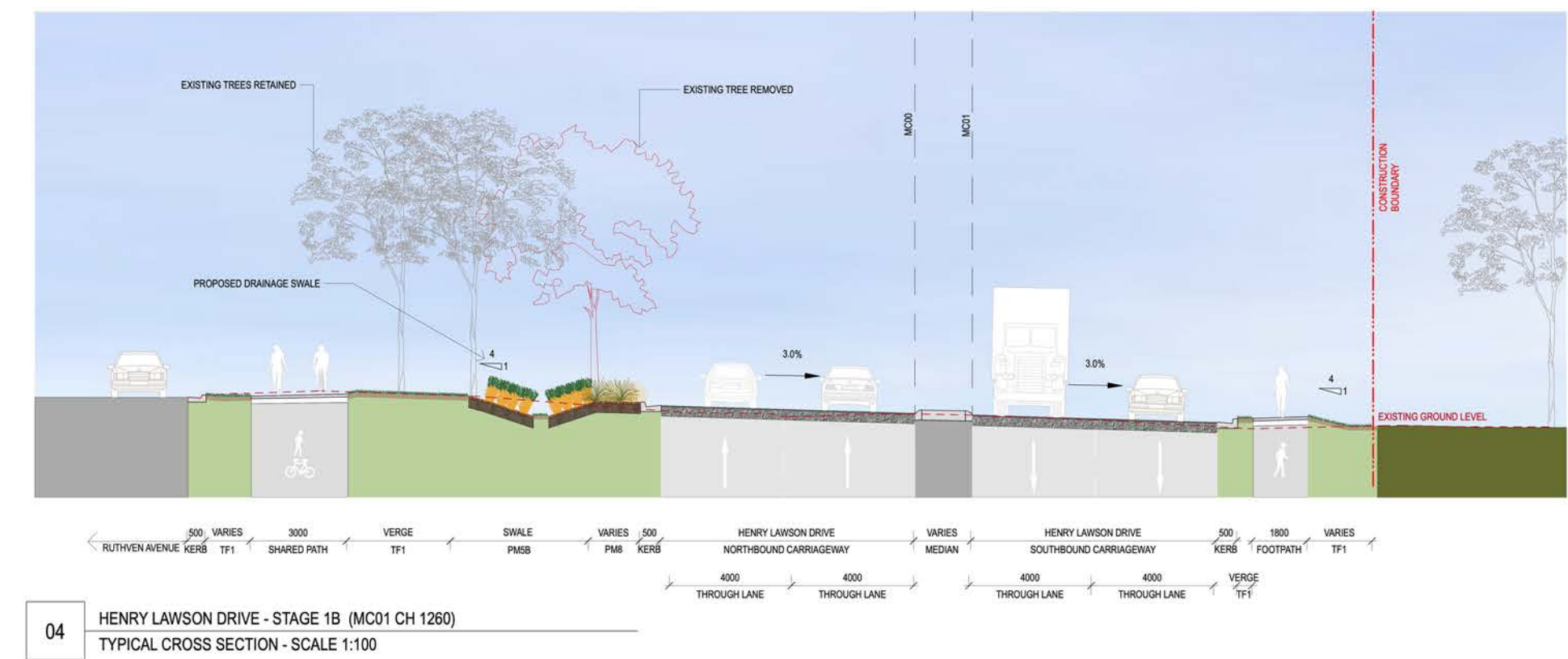
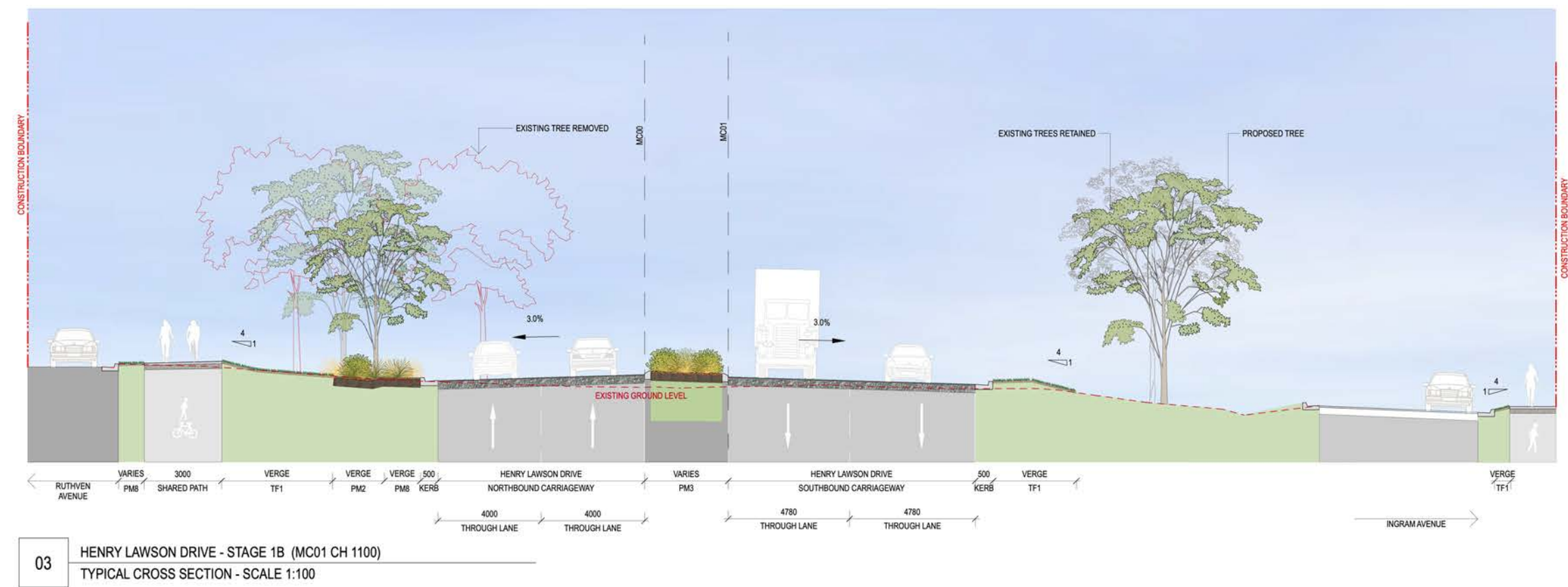
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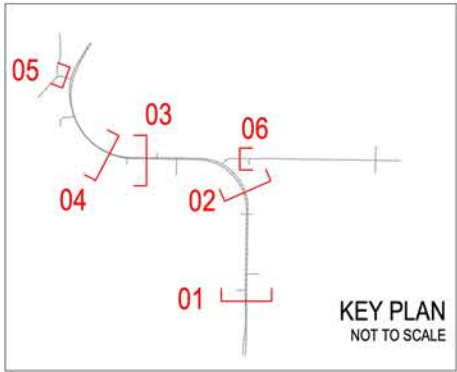


4 Urban design concept sections 2



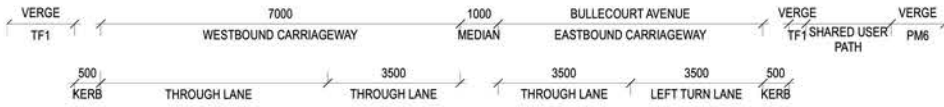
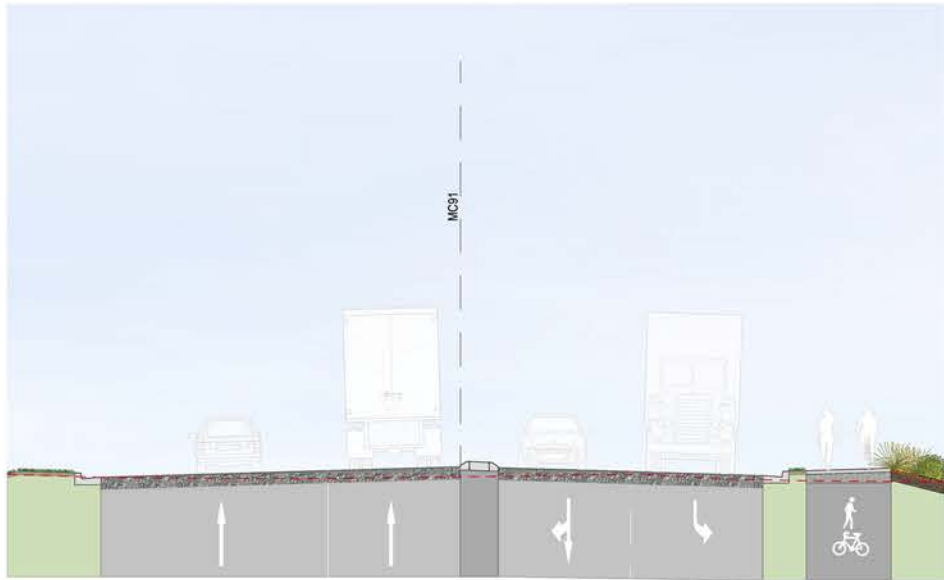
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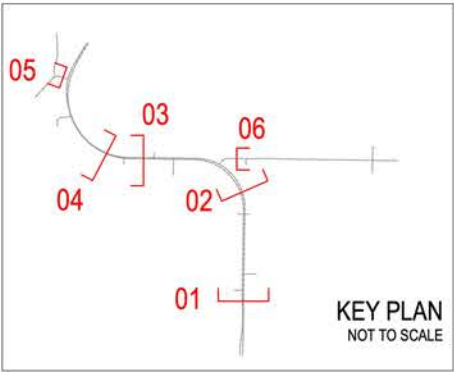
05 05 KEYS PARADE - STAGE 1B (MC91 CH 40)
TYPICAL CROSS SECTION - SCALE 1:100



06 BULLECOURT AVENUE - STAGE 1B (MC50 CH 60)
TYPICAL CROSS SECTION - SCALE 1:100

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Georges River tributary near Keys Parade

5 Landscape character impact assessment

5.1 Chapter overview

To enable the assessment of impacts from the proposal on the surrounding landscape, the study area has been classified into distinct character areas or landscape character zones (LCZ). These zones are defined as having a distinct, recognisable and consistent pattern of elements, be it natural (soil, vegetation, landform) and/ or human built form, distinguishing one zone as different from another.

5.2 Methodology

TfNSW, Guideline for landscape character and visual impact assessment, *Environmental impact assessment practice note EIA-N04* provides the following definition of landscape character:

Landscape character is the aggregate of built, natural and cultural aspects that make up an area and provide its unique sense of place. Landscape in this context is taken to include all aspects of a tract of land - the built, planted and natural topographical and ecological features.

In applying this definition to the specific conditions within the study area and the features of the proposal, the landscape character assessment also considers how the Proposal would be used and how it would function as a part of the region. The assessment has considered both existing landscape character and desired future character (where relevant).

Landscape character zones

To enable the assessment of impacts on the landscape character of each assessment zone, key landscape elements including landform, hydrology, vegetation, land use and built form were identified during site visits.

Two primary factors are used to determine impacts:

- **sensitivity** of the character within the zone
- **magnitude** of the proposal in that zone.

Refer to **Figure 5-1 on page 52** for landscape character zone identification.

Sensitivity

The degree to which a particular landscape type can absorb and accommodate change arising from a proposal. Sensitivity refers to how sensitive the character of the setting is to the proposed change, which may also include the sensitivity of regular users and viewers of the zone. For example a pristine natural environment would be more likely to be sensitive to change than an industrial area.

It considers the perceived cultural, natural and heritage values of the visual environment and the elements within it.

Magnitude

Magnitude is a study of the bulk scale and form. It reflects the degree of physical change between the proposal and the landscape setting. In the case where future development is already approved, for example rezoning, this context is used in the assessment. Consideration is given to existing built form in the landscape and how closely the proposal matches this in bulk, scale and form. This is categorised as follows:

- The proposal would be the dominant feature in the landscape and would affect and change its character
- The proposal would form a readily visible and new feature in the landscape that changes its character
- The proposal would constitute a minor feature in the landscape with minor changes.

Refer to **Figure 5-1 on page 52** for landscape character zone identification.

Table 5-1: Landscape character impact rating matrix Source: TfNSW EIA-N04

		Magnitude			
Sensitivity		High	Moderate	Low	Negligible
	High	High	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

5 Landscape character impact assessment

5.3 Character zones

Four character zones were identified during desktop studies and confirmed during the site visit where they were recorded and photographed. Each is represented below in **Plate 5-1** to **Plate 5-4** and include:

- LCZ 1: Residential estate
- LCZ 2: Light commercial
- LCZ 3: Existing road corridor
- LCZ 4: Open space corridor

Each character zone across the study area is summarised in **Table 5-2 on page 53** in the following pages in terms of the existing physical attributes as well as proposal elements, which are likely to impact the zone.



Plate 5-1: Residential estate



Plate 5-2: Light commercial

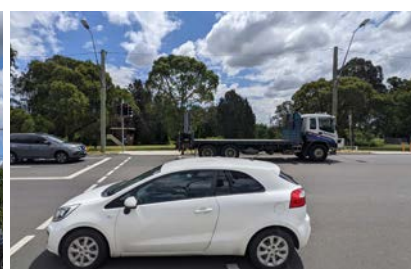


Plate 5-3: Existing road corridor



Plate 5-4: Open space corridor

5 Landscape character impact assessment

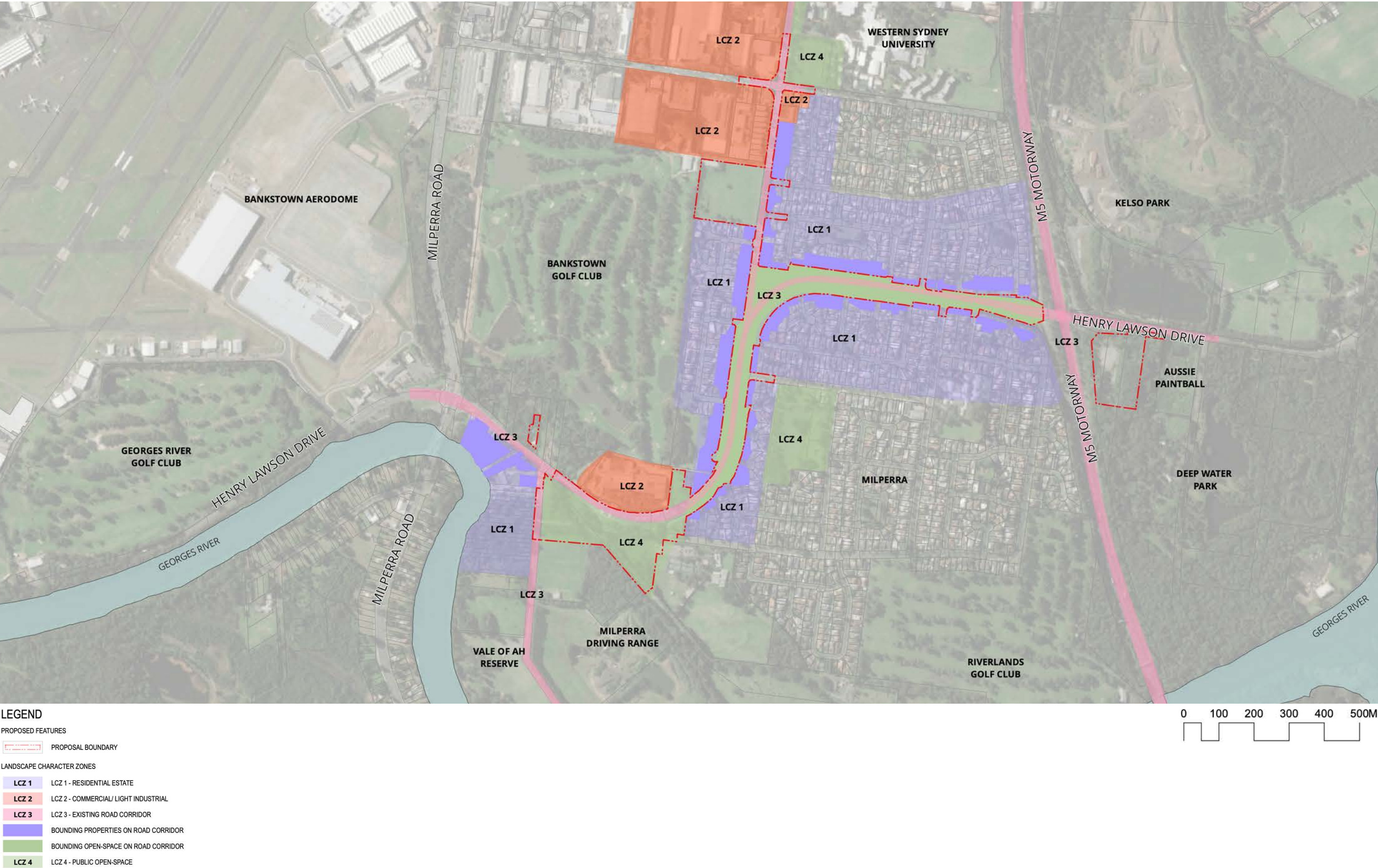


Figure 5-1: Landscape character zones

5 Landscape character impact assessment

Table 5-2: Landscape character zones summary

LCZ	Summary of landscape setting	Proposal elements causing change
1 Residential estate	<p>Milperra is comprised predominantly of low-density residential estates. This residential zone extends from Raleigh Road in the North to Pozieres Avenue in the South.</p> <p>The visual fabric of Henry Lawson Drive contains wide tree lined verges which separate the bounding properties of the existing road corridor. These verges are used for passive recreation and connect other surrounding open spaces within the suburb. The bounding properties of the existing road corridor have been excluded from landscape character zone 1 (LCZ1) and instead have been assessed within landscape character zone 3 (LCZ3) 'existing road corridor'.</p> <p>Bullecourt Avenue has been included in the Henry Lawson Drive stage 1B upgrade. The Avenue contains mainly detached low-density residential estate. There is a small section of the Avenue where the verge is lined with mature street trees separating the road from the fenced vacant lot (part of the Bankstown Golf Club).</p>	<p>The proposal would include:</p> <ul style="list-style-type: none"> – A new shared user path (SUP) along the eastern side of Henry Lawson Drive that includes drainage and a water quality basin at the corner of HLD & Bullecourt Avenue – An upgrade of Henry Lawson Drive to a four-lane divided road and minor earth work adjustments – Removal of existing established street trees – New road furniture including signage and lighting
2 Commercial/ light industrial	<p>The zone is defined by a mix of commercial premises and at the northern end of the proposal area it extends approximately 100m along the eastern side of the proposal north from Raleigh Road. Commercial signage structures as well as the Flower Power building facade are prominent visual elements in this character area. Vegetation through this zone is completely exotic introduced species.</p> <p>There is a small industrial estate to the eastern end of Bullecourt Avenue, together with 2 small collections of local shops forming the 'Ashford Village' next to the Ashford Avenue roundabout and the adjoining 'Milperra Shopping Village'.</p> <p>The only mature vegetation to note are the established street trees along a small section of Bullecourt Avenue.</p>	<p>The proposal would include:</p> <ul style="list-style-type: none"> – An upgrade to the existing signalised intersection at Keys Parade – Accommodation of amended turning movements to the Ashford Avenue / Bullecourt Avenue roundabout.
3 Existing road corridor	<p>Henry Lawson Drive existing road corridor is considered as a State arterial road asset for commuters. It is a two-lane undivided road carriageway with a posted speed limit of 60 kilometres per hour, running primarily in a north-south direction.</p> <p>Within the existing road corridor there is bounding open space containing wide areas of turf and scattered stands of large, established mature trees and include plants contained within and belonging to the bounding properties on the road corridor of residential estates.</p> <p>These bounding properties on the road corridor consist of 1-2 storey residential single dwellings estates and contain a front garden, fencing, driveway, and garage aside wide turfed verges. These bounding properties have been included in the assessment of LCV3.</p>	<p>The proposal would include:</p> <ul style="list-style-type: none"> – An upgrade of Henry Lawson Drive to a four-lane divided road with a central median with minor earth work adjustments, new traffic control facilities including electronic traffic signage – Changes to intersections with Henry Lawson Drive including Keys Parade, Amiens Avenue, Bullecourt Avenue, Hermes Avenue and Pozieres Avenue – Reinstatement of existing bus stops and provision for future bus stops – New road furniture including signage and lighting – New shared user path
4 Public Open Space Corridor	<p>This zone is predominantly comprised of turfed areas associated with the open space corridor of the Georges River and established native trees. The following three main reserves bound Henry Lawson Drive and Bullecourt Avenue</p> <ul style="list-style-type: none"> • Raleigh Reserve (Henry Lawson Drive northbound) • Gordon Parker Reserve (Henry Lawson Drive northbound) • Milperra Reserve (Bullecourt Avenue eastbound) <p>Each of the listed reserves is within proximity to the proposal area. Open space areas bounding the existing road corridor consisting of mown grass understory and established mature trees have been included within the assessment of LCZ3 and excluded from the LCV4 assessment</p>	<p>The proposal would include:</p> <ul style="list-style-type: none"> – An upgrade of Henry Lawson Drive to a four-lane divided road and minor earth work adjustments – Construction of the new Auld Avenue to Keys Parade link road and connection with Raleigh Road. – Drainage and flooding infrastructure including swales and culverts

5 Landscape character impact assessment

LCZ 1: Residential estate

Existing landscape character

This zone is comprised of the residential suburb of Milperra. This zone has a generally flat landform, that is characterised by modestly-scaled detached, post-war brick dwellings typically built c.1970s. Most are separated from their street frontages and neighbouring properties by leafy private gardens some with tall shade trees and established gardens. There has recently been an increase in modern two-storey duplex style homes being developed throughout the estate.

The vegetation of this zone is consistent with the suburban nature of the area and comprises of a mix of exotic trees, shrubs and turf as well as some native tree and shrub species.

Interspersed throughout the estate are pockets of open space, passive recreation areas and some formal sports facilities. A number of primary and secondary educational institutions are dotted across the estate.

Refer to [Plate 5-5 on page 54](#) to [Plate 5-8 on page 56](#) for existing character images.

Landscape character changes

The Stage 1B upgrade poses minimal changes to the landscape within the residential estates. This is due mainly to the restriction of the impact being only on the bounding residential properties and SUP, through the noticeable visual widening of Henry Lawson Drive.

It is important to note that these bounding residential properties are excluded from this assessment (instead included under LCV3). The residential estate in this assessment refers only to remaining properties beyond the bounding properties.

Landscape character impact assessment

The impact of the infrastructure is expected to reduce over time as vegetation establishes and matures.

The impact on landscape character is summarised in [Table 5-3 on page 55](#).



Plate 5-5: Typical residential homes found on Ingram Avenue, Milperra

5 Landscape character impact assessment



Plate 5-6: View of typical setback of residential homes from Henry Lawson Drive, Milperra



Plate 5-7: View of a typical residential dwelling in Milperra, located on Ingram Avenue

Table 5-3: LCZ 1 'Residential estate' impact rating summary

Sensitivity	Magnitude	Impact
<p>High</p> <ul style="list-style-type: none"> The character of this zone is predominantly residential which is bordered by wide turf open space verges and an existing mature street tree canopy cover. The open space areas and street trees contribute to the character and amenity of the area. This zone can accommodate some change but due to its character, it is described as having a high sensitivity. <p>Note: This assessment excludes the bounding properties, which are assessed under LCV3</p>	<p>Low</p> <ul style="list-style-type: none"> The proposal plans to increase the width of existing arterial roads within the suburb Milperra, the magnitude is considered to be limited to a low level of level of change. The magnitude of impact would be low due to the minimal level of change to the landscape setting for the residential estates as this character zone is located beyond the front-line properties, which are assessed under the existing road corridor (LCV3). 	Moderate
<p>Summary</p> <p>The expected impact on this zone has been rated low. The proposal would have most impact on the properties bounding the road corridor, but these properties are excluded and have been assessed under the existing road corridor (LCV3), since they are an integral part of the road corridor character.</p>		

5 Landscape character impact assessment

LCZ 2: Commercial / Light Industrial

Existing landscape character

This zone contains two varieties of commercial or light industrial premises located within the study area.

Opposite Keys Parade is a light commercial precinct that relies on patrons moving through and within the zone in their vehicles or parking on site in car park areas.

The frontages comprise a mix of mown grass and manicured garden beds with clipped shrubs. Individual mature trees are located within the setback with others scattered across the turf area surrounding the commercial centre. There is a large grey/charcoal precast retaining wall and tall signage structures as well as a black palisade fence.

Along Bullecourt Avenue on the eastbound to Henry Lawson Drive the building typology becomes more light industrial & commercial on the approach to the Ashford Avenue roundabout. The zone comprises a small industrial estate and two small collections of shops. There is a combination of dedicated off-street car parking and on-street parking is line marked for the both sides of this western end of Bullecourt Avenue. Vegetation comprises grass verges and street trees.

Refer to [Plate 5-8 on page 56](#) to [Plate 5-10 on page 57](#) for existing character images.

Landscape character changes

Changes to the landscape setting at Keys Parade would be confined to the western frontage of this zone

and the addition of an intersection to accommodate the additional Keys Parade Road with associated traffic islands, median and signage. The landscape modifications would include the removal of existing vegetation within the existing creek area and associated landform changes and the minor loss of the existing mown grass understorey to the edge of the eastern section of the Raleigh Road Reserve.

For Bullecourt Avenue, proposed works within this zone are now limited to the Ashford Avenue roundabout. The re-alignment of the northern kerblines to the Ashford Avenue roundabout would have a minor effect on the smaller secondary area of light commercial (LCZ2). The impact on the landscape setting would be the new footpaths and reduced set-back of the corner properties.

Landscape character impact assessment

For these commercial or light industrial zones, It appears that the magnitude of impact on the vegetation is low. The magnitude of impact on other landscape features and the landscape character as a whole would be also be low, owing largely to the fact that the proposal is an upgrade of an existing road within the road reserve and that the landscape character zone has a limited number of aesthetically prominent features bounding this zone.

The impact on landscape character is summarised in [Table 5-4 on page 57](#).



Plate 5-8: Existing entry signage and structures for the associated light commercial zone

5 Landscape character impact assessment

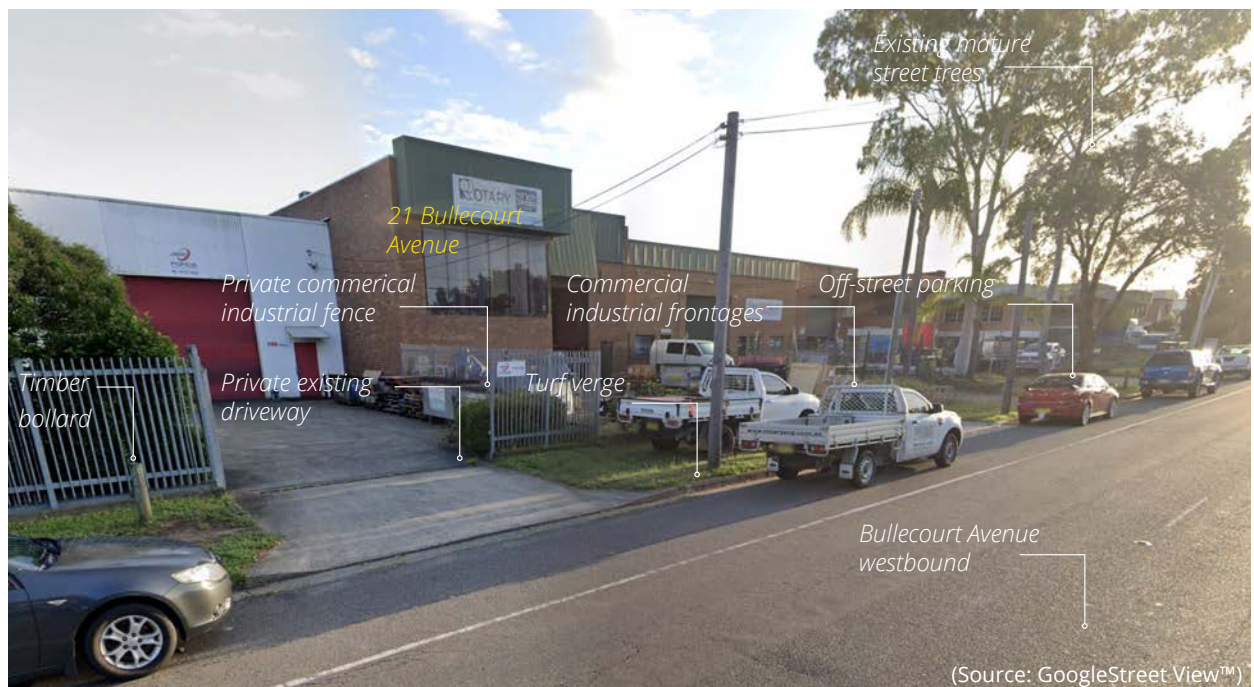


Plate 5-9: Existing light commercial industrial frontages on Bullecourt Avenue, Milperra facing west



Plate 5-10: Ashford Avenue roundabout from Bullecourt Avenue, looking North

Table 5-4: LCZ 2 'Light commercial' impact rating summary

Sensitivity	Magnitude	Impact
<p>Low</p> <ul style="list-style-type: none"> The light commercial precinct on HLD comprises a few large scale commercial premises, whilst the precinct on Bullecourt Avenue is made up of smaller scale light industrial and commercial premises. Both of these landscape characters have few sensitive receptors and a high ability to absorb change, resulting in a rating of low sensitivity to change. 	<p>Low</p> <ul style="list-style-type: none"> The impacts would be confined to the frontages of the light commercial areas and likely to be low. The physical setting and appearance of the light commercial precincts would not be substantially impacted 	<p>Low</p>
<p>Summary</p> <p>Overall, a Low impact would be expected on this character zone, limited to perimeter boundaries.</p>		

5 Landscape character impact assessment

LCZ 3: Existing road corridor

Existing landscape character

This zone is heavily defined by the existing tree Avenue planting both within the road and some within bounding properties on the road corridor (bounding properties are included within this character zone) The bounding open-space wide turf verges on the road corridor which separate residential areas, recreational and light commercial zones are included in this landscape character zone setting. The zone has a gently undulating landform, at risk to overflow from storm water with currently very little road infrastructure to compensate.

Henry Lawson Drive is approximately 10-15m wide comprising of predominantly asphalt shoulders, no kerbs, mown turf, mature native street tree planting. Southbound there is occasional areas of resident planting and shrub/ screening vegetation running along the corridor with it's eastern edge bordered by the rear fences. Along the road corridor there are only four properties with driveway access from HLD, three being located near Raleigh Road and one at Pozieres Avenue. Bullecourt Avenue has an approximately 8-10m wide road carriageway and is characteristically more aligned to the generic residential street; consisting of a pedestrian path, mown turf verges, sporadic street tree planting, kerbs, private driveways and vegetated fenced residential properties.

Residential dwellings in Milperra aid in framing the eastern and western side of the corridor and much

of the motorist's experience relies on this 'borrowed' landscape outside the road corridor which largely comprises the opens space turf verges and mature street tree planting next to the road. Refer to [Plate 5-11 on page 58](#) to [Plate 5-16 on page 61](#) for existing character images.

Landscape character changes

Changes to this landscape setting would include an increase in the scale of the road in the creation of two new travel lanes, placement of medians as well as an increase in the concentration of the associated infrastructure elements.

Landscape character impact assessment

Although the proposal is an upgrade of existing roads, the scale of the upgrade comprising intersection upgrades, the creation of additional travel lanes, medians and substantial vegetation clearing would result in a high impact on motorists and pedestrians.

The Bullecourt Avenue works would be limited to the intersection with HLD and amended turning movements to the Ashford Avenue roundabout.

The impact on landscape character is summarised in [Table 5-5 on page 59](#).



5 Landscape character impact assessment



Plate 5-12: Existing road corridor on Henry Lawson Drive facing North



Plate 5-13: Existing road corridor on Bullecourt Avenue, Milperra facing west

Table 5-5: LCZ 3 'Existing road corridor' impact rating summary

Sensitivity	Magnitude-	Impact
Moderate	High	High - Moderate
<div><div></div><div>The upgrade to this existing character zone would be consistent with the existing use and character, however, the scale of the proposal results in this zone recorded as a Moderate sensitivity to change.</div></div>	<div><div></div><div>The existing character is currently lacking road infrastructure such as medians. The proposal widens the existing lanes, increasing the bulk and scale of the road. The removal of a large number of existing mature street trees also highly impacts the character. There is little impact to Bullecourt Ave.</div></div>	
Summary		

The landscape character impact would be High-Moderate due to the proposal upgrade increasing the scale of the existing arterial roads in combination with the removal of a high number of existing trees, which are currently an important element of the road corridor experience.

5 Landscape character impact assessment

LCZ 4: Open Space Corridor

Existing landscape character

The open space corridor zone comprises mainly of parklands, reserves and recreational facilities. Most of these larger open spaces fall in the eastern and northern end of study area, aligning to the natural topography and drainage associated with Georges River catchment. There are also a number of small linear open space areas near to the road corridor characterised by wide turf verges and mature street trees, these are however excluded from this character zone and included in the Existing Road Corridor (LCV3).

Whilst the Georges River meanders north and south along the western edge of the study area, its too distant from the open space corridor to impact its character. There is however a small creek and remnant stand of existing vegetation that would be directly impacted by the northern end of the proposal close to Gordon Parker Reserve. An SUP currently passes between this creekside vegetation (with existing bridge) and a stand of mature tree planting that borders the Gordon Parker Reserve sports fields.

Refer to [Plate 5-14 on page 60](#) to [Plate 5-16 on page 61](#) for existing character images (and [Figure 7-18 on page 81](#) for Visual Impact to Gordon Parker Reserve).

Landscape character changes

The most noticeable changes to this landscape setting would be to the eastern boundary of the northern zone where the proposal comprises a completely new road alignment. This portion of the proposal links Auld Avenue to HLD and Raleigh Road in the form of a new two lane carriageway road (widening at the intersection

with HLD), with associated road batters, roundabout structure, traffic islands at the intersection with HLD and a new drainage basin at the edge of Auld Avenue at the northern end of the proposal area adjoining the Stage 1A works area.

This new road alignment would substantially impact the existing character of the area adjoining both Gordon Parker & Raleigh Reserves. At the eastern edge of the Gordon Parker Reserve, the new road would be constructed next to the existing SUP and existing mature trees, slicing through the existing creek area and remnant vegetation that is currently transversed by a pedestrian bridge that would be demolished under the proposal.

In addition, each of the linear open space areas near to the road corridor would be impacted by the removal of existing mature street planting.

Landscape character impact assessment

The impact on the landscape character of Gordon Parker Reserve is high given that the new road cuts through the current open space area, creating a new embankment to the existing creek, with associated loss of vegetation and pedestrian bridge access.

The impacts are also considered high on Raleigh Reserve and the other linear open space areas based on the substantial number of existing mature trees requiring removal (based on preliminary Arborist report).

The impact on landscape character is summarised in [Table 5-6 on page 61](#).



Plate 5-14: Gordon Parker Reserve, Auld Avenue, Milperra

5 Landscape character impact assessment



Plate 5-15: Raleigh Reserve, northbound on Henry Lawson Drive



Plate 5-16: Milperra Reserve, eastbound on Bullecourt Avenue

Table 5-6: LCZ 4 'Open space corridor' impact rating summary

Sensitivity	Magnitude	Impact
Moderate <ul style="list-style-type: none">– This character zone is comprised of a variety of open space areas, including some natural vegetation, assumed exotic or weed species. The bounding open spaces on the existing road corridor are excluded from this character zone assessment. The affected open space areas are limited to the three main open space reserves within proximity to the proposal area: Raleigh Reserve, Gordon Parker Reserve and Milperra Reserve.	Moderate <ul style="list-style-type: none">– The proposal is likely to have a minor character impact on two of the main areas of open space reserve: Raleigh Reserve and Milperra Reserve. It would however have a moderate to high impact on the Gordon Parker Reserve based on the proximity of the new road to the reserve, where the existing built form currently only comprises a SUP.– The overall impact to this character zone has been recorded as a moderate magnitude rating when considering the impact on all three reserves.	Moderate

Summary

Overall, a moderate impact rating has been recorded on this character zone. This is based on the exclusion of the bounding open space areas from this character zone and the impact being on only one of the three open space reserves.

5 Landscape character impact assessment

5.4 Summary of landscape character impact assessment

The proposal has been identified as containing mainly low-moderate impacts across all the four-character zones. Each zone has been scored low, moderate, or high for sensitivity and magnitude, with a cumulative overall impact rating. The landscape character assessment is summarised in [Table 5-7](#) below.

Henry Lawson Drive navigates a variety of landscape character zones, from low-density residential estates of Milperra to recently constructed light commercial areas in the north and pre-existing light commercial industrial areas to the east. The area also includes the existing road corridor and surrounding open space corridor. The upgrade is seeking to widen an existing critical arterial road within the suburb Milperra by removing vegetative edging to construct a new component of road through existing open space areas within the existing road corridor.

As a result, the proposal is shown to have the most impact on the edges of the existing road corridor zone, this is inclusive of the bounding open spaces and the bounding properties, which have been highlighted in the sensitivity assessment as high-moderate. A key factor influencing the impact on both this character zones is the removal of existing mature street trees that are an integral component of the existing road corridor character. These high-moderate impacts could be reduced in the urban design by utilising opportunities for new tree planting of reasonably mature size to improve the visual character with a replacement quicker establishment to replace tree canopy in the future.

Moderate impacts have been determined overall for the open space corridor and residential estate zones. Both zones are the most widely occurring zones and are moderately affected by the scale of the proposal and less more likely to absorb the changes resulting from the proposed upgrade.

The zone where low impact are is foreseen, generally relates to the zone where the land-use of the character zone of light commercial is relatively immune from the changes in road form such as the light commercial industrial areas.

Table 5-7: Landscape character impact rating summary

Landscape Character Zone		Sensitivity	Magnitude	Impact
1	Residential estate	High	Low	Moderate
2	Commercial / Light Industrial	Low	Low	Low
3	Existing road corridor	Moderate	High	High -Moderate
4	Open space corridor	Moderate	Moderate	Moderate



Henry Lawson Drive

6 Visibility of the proposal

6.1 Chapter overview

This chapter identifies the areas where the proposal would be visible, in order to determine representative viewpoints that cover a range of different land uses and viewers surrounding the proposal.

6.2 Visual envelope

A visual envelope is a theoretical assessment of visibility to or from the proposal. [Figure 6-1 on page 65](#) illustrates the visual envelope, which was generated manually during desktop analysis and verified in the field, taking in to account such factors as built structure, intervening vegetation and topography.

Viewpoints for assessment

[Table 6-1](#) lists viewpoints that have been selected to assess potential visual impacts including:

- Publicly accessible locations that are representative of residential properties and businesses
- Heritage items and precincts
- Public domain, including parks, footpaths, shared user paths and lookouts
- Popular destinations and tourist attractions
- Road user views from the existing road.

The locations and directions of selected viewpoints are representative of the range of locations both within and beyond the road corridor and are shown in [Figure 6-1 on page 65](#).

This list does not represent the entire number of receptors likely to be visually impacted by the proposal, but rather, represents the range of viewers potentially impacted by some part of the proposal across each LCZ. These viewpoints are assessed further in [Section 7 on page 68](#).

Table 6-1: Viewpoint summary

VP	Location	LCZ	Viewpoint visited	Distance to proposal	Artist's impression
Stage 1B					
1	Viewpoint 1 - Existing view from pedestrian island on Henry Lawson Drive next to commercial signage pillar	2/3/4	•	0m	N/A
2	Viewpoint 2 - Existing view from the corner of Borella Road and Henry Lawson Drive facing south west	1/3	•	0m	N/A
3	Viewpoint 3 - Existing view of Amiens Avenue and Henry Lawson Drive intersection facing south east	1/3	•	0m	N/A
4	Viewpoint 4 - Existing view looking north towards the Bullecourt Avenue and Henry Lawson Drive intersection	1/3	•	0m	N/A
5	Viewpoint 5 - Proposed view looking south towards Pozieres Avenue and Henry Lawson Drive intersection	1/3	•	0m	N/A
6	Viewpoint 6 - Keys Parade looking north towards Auld Avenue	3/4	•	0m	N/A

6 Visual impact assessment



Figure 6-1: Visual envelope mapping

6 Visual impact assessment



Figure 6-2: Viewpoint locations



Existing shared user path network at Keys Parade

7 Visual impact assessment

7.1 Chapter overview

This chapter assesses the visual impact at each of the selected viewpoints based on the established visual envelope.

7.2 Methodology

Impact assessments are based on a qualitative assessment of the sensitivity of the view and magnitude of the proposal potentially visible in that view. This enables the development of a mitigation strategy to address the impacts identified.

Sensitivity

Sensitivity is the measure of the 'extensiveness' of the perceived 'value' of the existing view. An assessment is made as to the quality of the landscape, its cultural and historical importance to the community, scenic value and overall composition of the place.

The following sensitivity parameters have been used as the basis for this assessment:

- The category of view such as residential, tourism or commercial and frequency at which the scene is viewed
- The elements of the proposal that are visible
- Importance of the view. Places with high social, recreational, and historical significance to local residents have higher sensitivity, as do areas of unique scenic quality
- Generally, views with the highest sensitivity include:
 - residential views that would be affected by the proposal and the context of this view i.e. kitchen window, balcony, bedroom, living room
 - public open space with a notable visual landscape, for example, lookouts or other scenic natural areas
 - views with high cultural and historical significance on the visual landscape

- Views with the lowest sensitivity are most likely to be:
 - Commercial areas with enclosed workplaces
 - Road user views where the road corridor signage take precedence – however it is important to provide a stimulating motorist experience, particularly for tourists.

Magnitude

The 'magnitude of visual change' describes the contrast or type of change resulting from the proposal or proposal, the extent of change and also the proximity of the viewer. Changes are categorised as follows:

- A high magnitude of change would result if the proposal is of a major scale and considered out of scale or uncharacteristic of the existing view, or if there is considerable modification to the existing built fabric or landscape
- A moderate magnitude of change would result if the proposal is prominent but not considered to be substantially different from the existing character
- A low magnitude of change would result if there is minimal alteration to the existing view and the proposal is of a scale and nature that is consistent with the existing landscape.

Table 7-1: Visual impact rating matrix, Source: TfNSW EIA-N04

Sensitivity	Magnitude			
		High	Moderate	Low
	High	High	High-Moderate	Moderate
	Moderate	High-Moderate	Moderate	Moderate-Low
	Low	Moderate	Moderate-Low	Low
	Negligible	Negligible	Negligible	Negligible

7 Visual impact assessment

Assessment tools

In order to assess the potential impacts of the proposal across the variable landscape features of the study area, it was necessary to investigate the potential visual impacts using different tools.

Views were assessed in conjunction with plans and site photography taken during the site visit.

TfNSW EIA-N04 defines the methodology that was used to assess the likely changes to landscape composition. Elements of the view include dominance of form, lines, colours and textures. The qualitative sensitivity of potential viewers was combined with objective measurement to form assessment conclusions.

Notated photographs

The proposed road design has been overlaid onto the site photographs, scaled and positioned so that they matched existing features.

Each photograph was then marked up to illustrate the proposed change as a result of the proposal. These broad illustrations portrayed a more flexible appearance allowing changes to occur throughout the development of the road design. Each .KMZ based image provides an approximation of the design in its setting rather than a fully resolved representation of the design and graphically present the following design elements:



- Approximate extent of road corridor
- Proposal boundary extent
- Extent of batters
- Approximate noise wall alignment
- Extent of existing vegetation
- Extent of vegetation to be removed

Figure 7-1: Legend for existing viewpoint site photograph analysis

7 Visual impact assessment

Viewpoint 1

Location and description

This viewpoint is located within the southbound travel lane of Henry Lawson Drive, north of the study area. The viewpoint is facing towards the entry signage of the existing light commercial precinct and is opposite Raleigh Reserve.

The major compositional elements within this view are the new entry signage of the commercial precinct and the pedestrian crossing. The light commercial precinct is comprised of manicured shrub planting and mown turf with a newly constructed pedestrian footpath. The boundary of the light commercial precinct is attained with kerbs and a turf verge.

Towards the southwest is Raleigh Reserve that is buffered by a guard rail. Beyond the guard rail is mown turf, existing mature street trees and a pedestrian path.

Visible elements of the proposal

At this location the road corridor would be widened to accommodate more travel lanes, turning lanes, a raised median, a road island. Included renewal and upgraded intersection signage and replacement of guard rails for buffering.

Affected viewers:

- Motorists
- Pedestrians and cyclists
- Commercial precinct users

Description of impacts

The proposal would be moderately visible at this location. The new road corridor would be largely following the existing road corridor to the east (southbound carriageway) and although it would be widened to the west (northbound carriageway), existing trees appear to be set back and clear of any impact from this widening.

In terms of sensitivity, there is already road furniture in the form of guard rails, but the widening would increase the prominence of the proposed infrastructure within the view.

The retention of existing vegetation as a backdrop, would reduce the impact on the experience of motorists and pedestrians using the road corridor.

The visual impact on these viewpoints is summarised in [Table 7-2 on page 71](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report.



Figure 7-2: Viewpoint 1 location map

7 Visual impact assessment



Figure 7-3: Viewpoint 1 - Existing view from HLD next to commercial signage pillar



Figure 7-4: Viewpoint 1 - Proposed view from HLD next to commercial signage pillar

Table 7-2: Visual impact summary viewpoint 1

Sensitivity	Magnitude	Impact
Moderate <ul style="list-style-type: none">The major compositional elements in the view are the light commercial precinct entry signage, Raleigh Reserve and the existing road corridor. Overall, the sensitivity of the view is considered moderate.	Moderate <ul style="list-style-type: none">There would be an increase in the scale of the road corridor as the existing road is widened to integrate more travelling lanes. The proposal would cut into the mown grass and vegetation on the edges of the existing Raleigh Reserve.	Moderate

7 Visual impact assessment

Viewpoint 2

Location and description

This viewpoint is located within the northbound travel lane of Henry Lawson Drive, in the north of the study area. The viewpoint is facing towards the southwest of the precinct with Ruthven Avenue at rear.

The major compositional elements within this view are the existing mature street trees and surrounding residential vegetation. On both carriageways within the road corridor there are asphalt shoulders, no kerbs and turf verges. The western edge of the road corridor has an existing SUP that meanders below the street tree canopy.

Along the eastern edge of the road corridor there is predominantly low rise residential estates with private driveways and fences adjoining the road corridor boundary.

Visible elements of the proposal

At this location the road corridor would be widened to accommodate more travel lanes, a raised median and an SUP.

Affected viewers:

- Motorists
- Pedestrians and cyclists
- Local residents

Description of impacts

The proposal would be highly visible at this location especially for existing residents on adjoining streets to the road corridor upgrade. The new road corridor would be following the existing road alignment but be widened to accommodate additional travel lanes. The existing verge consisting of mown turf, existing mature street trees and a pedestrian path would be removed opening up views.

Additional road furniture such as guard rails and a widened SUP would increase the prominence of the proposed infrastructure within the view.

Due to the loss of vegetation and increase in the scale of the road corridor, the road corridor character would be highly impacted and ultimately the experience of motorists and pedestrians using the road corridor.

The visual impact on these viewpoints is summarised in [Table 7-3 on page 73](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report.

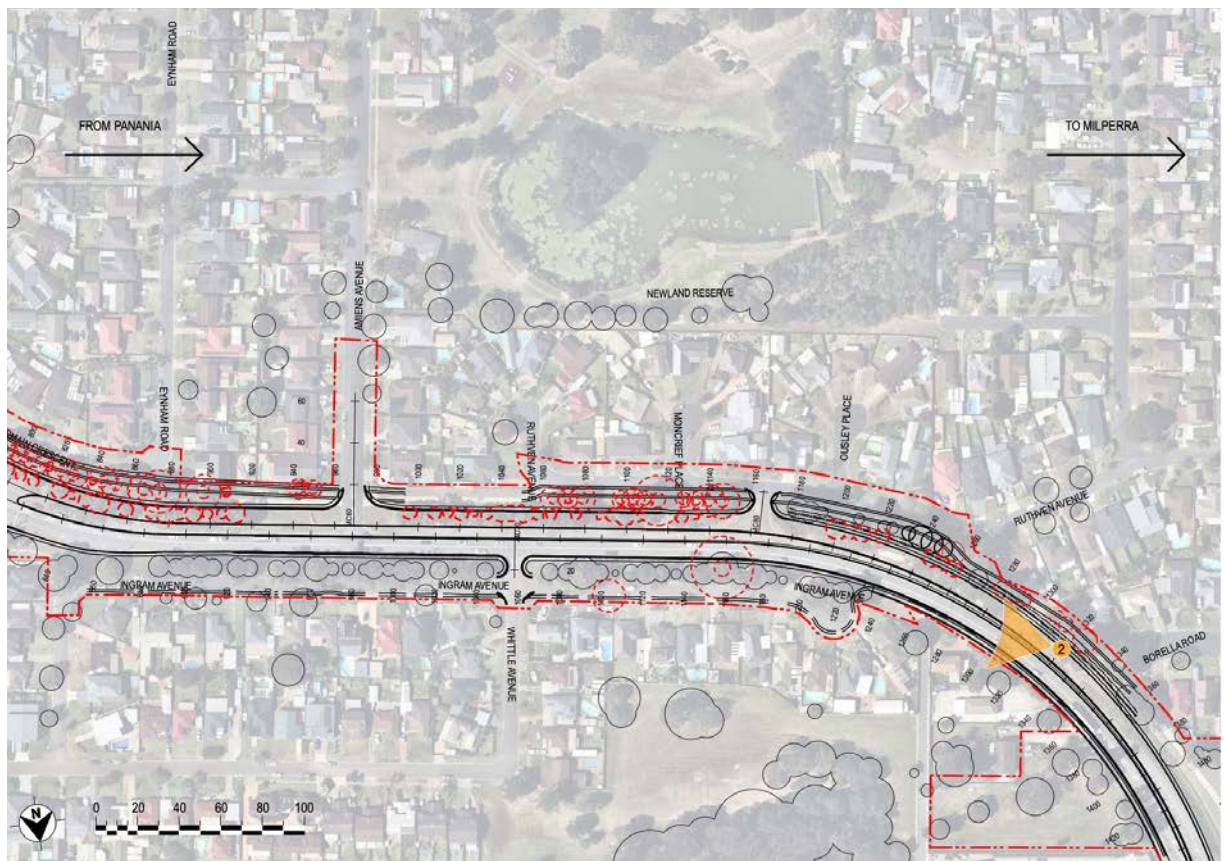


Figure 7-5: Viewpoint 2 location map

7 Visual impact assessment



Figure 7-6: Viewpoint 2 - Existing view from the corner of Borella Road and HLD facing south east



Figure 7-7: Viewpoint 2 - Proposed view from the corner of Borella Road and HLD facing south east

Table 7-3: Visual impact summary viewpoint 2

Sensitivity	Magnitude	Impact
High <ul style="list-style-type: none">The major compositional elements of the view are the mature trees fringing the bounding properties to the eastern edge of the existing road corridor and the wide, open grass verges with an existing dominant avenue of mature street trees fringing the western edge of the road corridor. The sensitivity of this view has been assessed as high due to the distinct character of the existing tree canopy and open grass verges impacting the experience of the commuter.	High <ul style="list-style-type: none">The increase in the width of the existing road corridor from 13m to approximately 30m to integrate more travelling lanes has impacted highly on this view. The existing mature street trees provide a quality of privacy through the developed canopy for the bounding properties on the existing road corridor. The magnitude has been assessed as high due to the impact of the view.	High

7 Visual impact assessment

Viewpoint 3

Location and description

This viewpoint is located within the southbound travel lane of Henry Lawson Drive, in the north of the study area. The viewpoint is facing towards the southwest of the precinct with Amiens Avenue to the east adjoining the northbound carriageway.

The major compositional elements within this view are the existing turf verges, kerbs, guard rail on the western edge and existing mature street trees. There is a SUP that runs along the eastern edge of the road corridor adjoining the residential zone.

Visible elements of the proposal

At this location the road corridor would be widened to accommodate more travel lanes, a raised median and an SUP

Affected viewers:

- Motorists
- Pedestrians and cyclists
- Local residents on adjoining streets

Description of impacts

The proposal would be moderately visible at this location. The new road corridor would be following the existing road structure but would be widened to accommodate additional travel lanes. The existing verge on the eastern edge would be heavily altered to include a SUP and there would be a median across the entire intersection.

Additional road furniture such as guard rails and a widened SUP would increase the prominence of the proposed infrastructure within the view.

Due to the loss of vegetation and increase in the scale of the road corridor, the road corridor character is expected to be severely impacted and ultimately the experience of motorists and pedestrians using the road corridor.

The visual impact on these viewpoints is summarised in [Table 7-4 on page 75](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report.

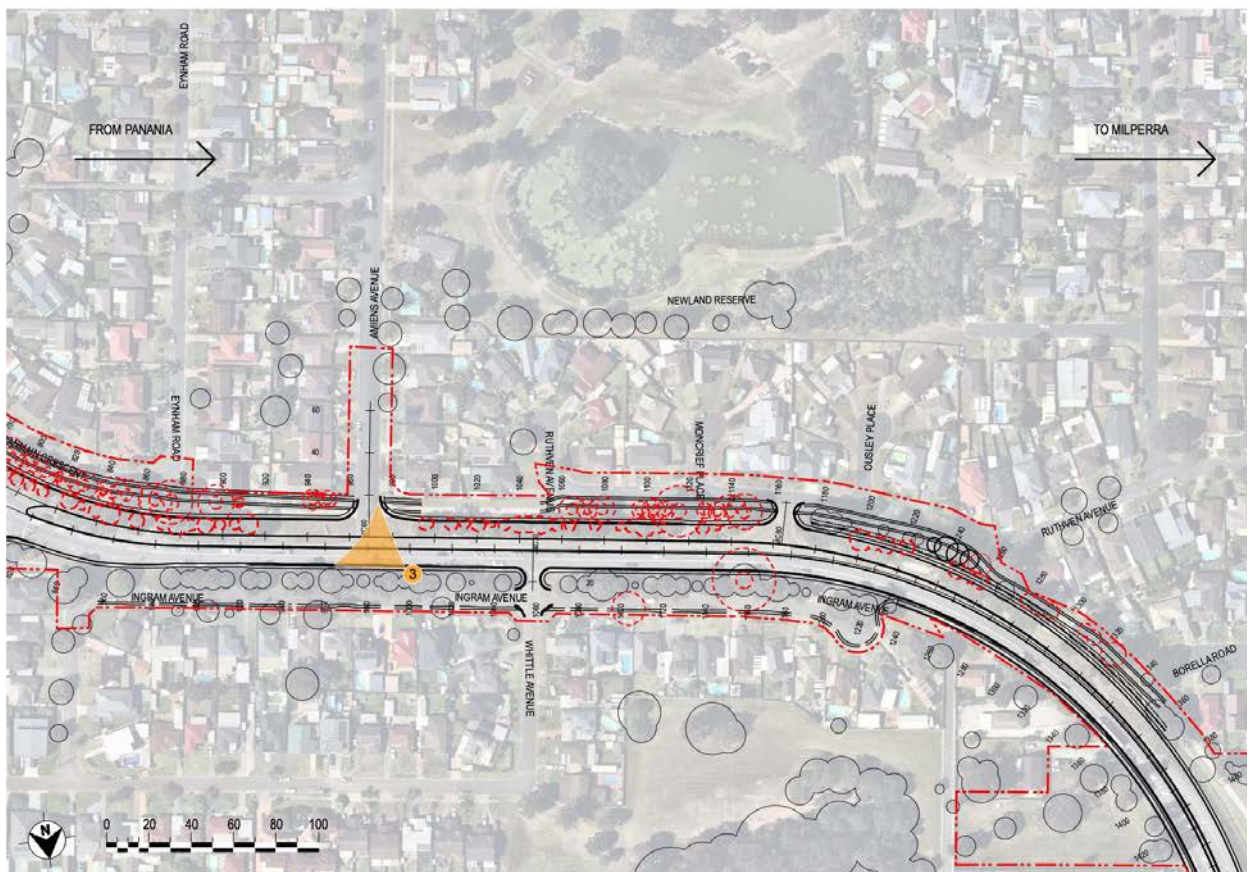


Figure 7-8: Viewpoint 3 location map

7 Visual impact assessment

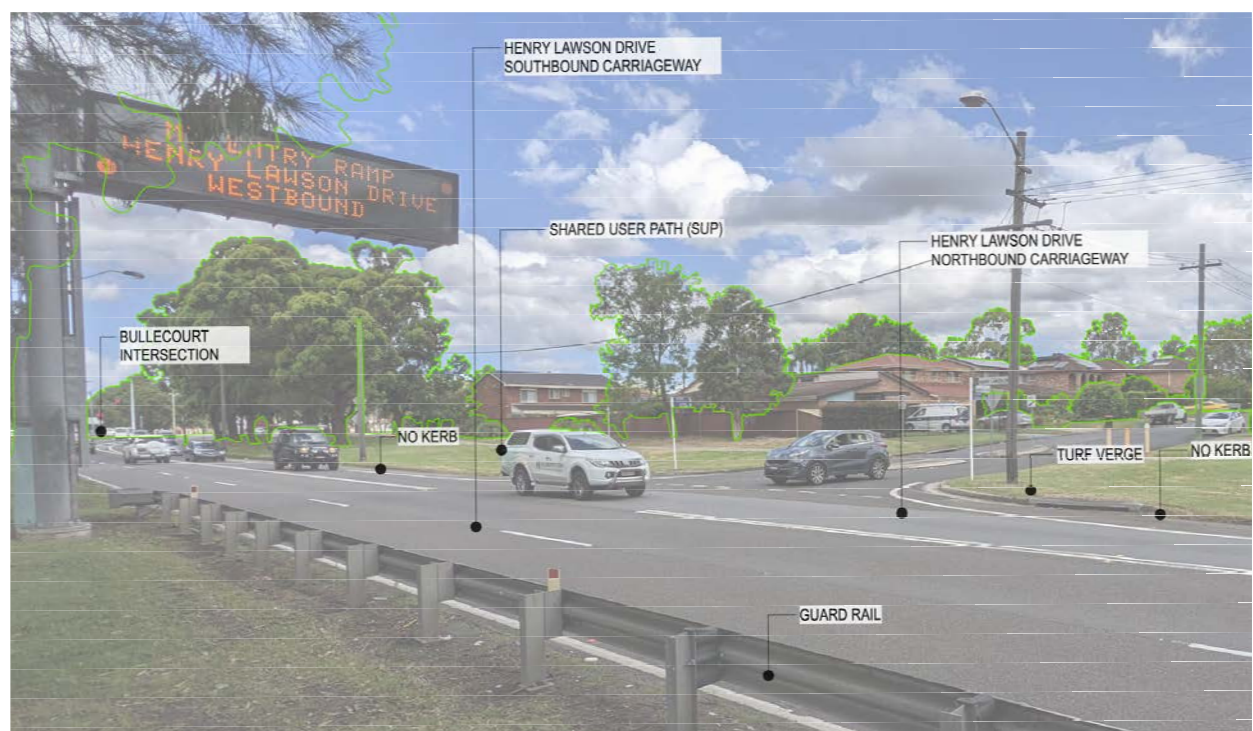


Figure 7-9: Viewpoint 3 - Existing view of Amiens Avenue and HLD intersection facing south east

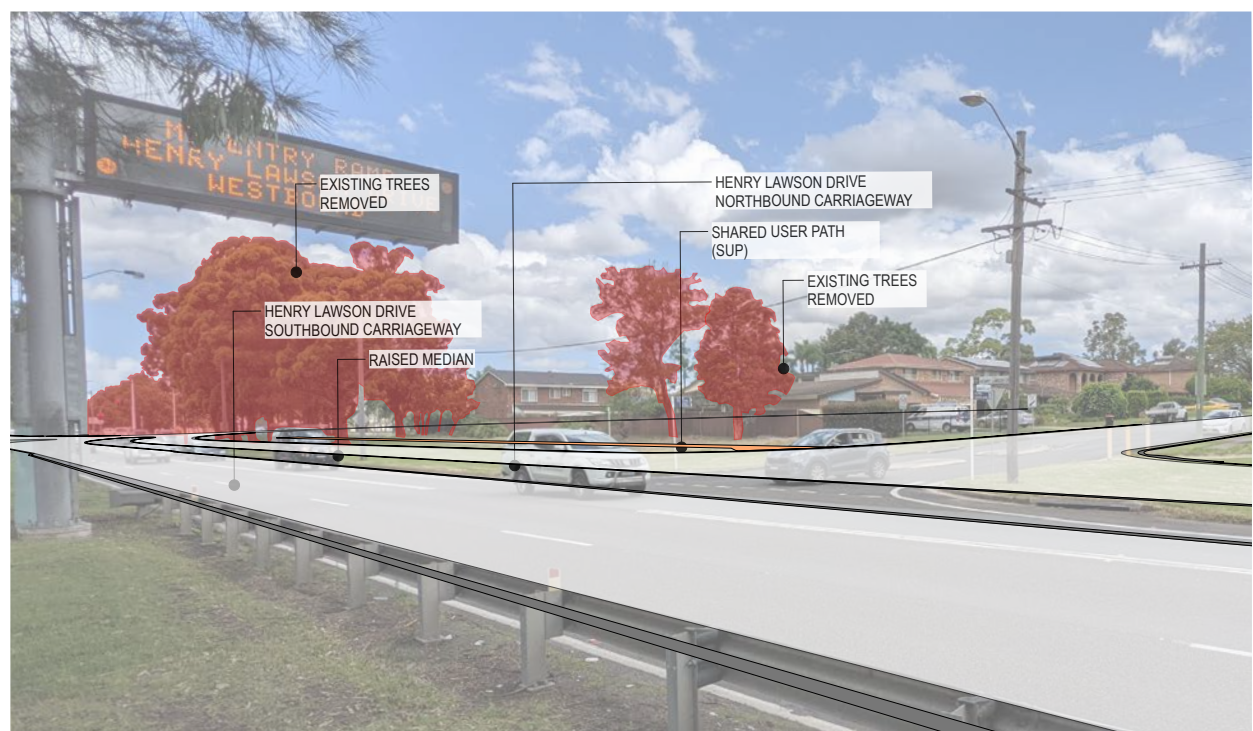


Figure 7-10: Viewpoint 3 - Existing view of Amiens Avenue and HLD intersection facing south east

Table 7-4: Visual impact summary viewpoint 3

Low	Moderate	Moderate to Low
<div><div></div><div>The major compositional elements in the view are the existing turf verges, existing mature street trees and SUP on the southern edge combined with the existing guard rail and existing carriageway on the northern edge. Overall, the sensitivity of the view is considered low due to the existing hardscape elements that dominate the view.</div></div>	<div><div></div><div>The magnitude of change is considered moderate. Although the road corridor is widened from two lanes to four lanes, the existing road takes up a large proportion of the existing view. The narrowing of the existing turf verge, removal of existing trees and the introduction of the raised medians are the major impacts on the view.</div></div>	

7 Visual impact assessment

Viewpoint 4

Location and description

This viewpoint is located within the northbound travel lane of Henry Lawson Drive, in the north of the study area. The viewpoint is facing toward Bullecourt Avenue intersection looking north of the precinct.

The major compositional elements within this view are the existing turf verges, the lack of kerbs and existing mature street trees.

Visible elements of the proposal

At this location the road corridor would be widened to accommodate more travel lanes, a raised median be allocated and an SUP be installed along the eastern edge of the corridor.

Affected viewers

- Motorists
- Pedestrians and cyclists
- Local residents on adjoining streets

Description of impacts

The proposal would be highly visible at this location. The new road corridor would be following the existing road structure but be widened to accommodate additional travel lanes. Within this section of the upgrade there is a larger scale of existing mature street trees which help

to define the character of the precinct. The tree canopy also provides privacy for adjoining residential estates facing the road corridor. The turf verges currently do not have any kerbs and there are no pedestrian paths or SUPs existing.

Bullecourt Avenue intersection would be widened for additional travel lanes and accessibility. A road island would be installed and a raised median along the northern end of the intersection..

Due to the loss of a large number of existing trees and increase in the scale of the road corridor, the road corridor character would be severely impacted and ultimately the experience of motorists and pedestrians using the road corridor, as well as residents.

The visual impact on these viewpoints is summarised in [Table 7-5 on page 77](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report.



Figure 7-11: Viewpoint 4 location map

7 Visual impact assessment



Figure 7-12: Viewpoint 4 - Existing view looking north towards Bullecourt Avenue and HLD intersection



Figure 7-13: Viewpoint 4 - Proposed view looking north towards Bullecourt Avenue and HLD intersection

Table 7-5: Visual impact summary viewpoint 4

Sensitivity	Magnitude	Impact
High	High	High
<div><div></div><div>The sensitivity of the view is considered high due to the surrounding existing mature street trees and wide turf verges on both the eastern and western edges of the existing road corridor. .</div></div>	<div><div></div><div>The magnitude of impact on this view is assessed as high. This is due to the increase in the scale of the road corridor with additional travel lanes and a raised median together with the removal of a mature street canopies that currently constitute a large proportion of the view.</div></div>	

7 Visual impact assessment

Viewpoint 5

Location and description

This viewpoint is located within the southbound travel lane of Henry Lawson Drive, south of the study area. The viewpoint is facing towards Pozieres Avenue intersection looking south of the precinct.

The major compositional elements within this view are the existing turf verges, pedestrian paths and shared user paths, a populated intersection, existing kerbs, existing mature street trees and residential estate frontages.

Visible elements of the proposal

At this location the road corridor would be widened to accommodate more travel lanes, a raised median would be allocated and an SUP would be installed along the eastern and western edges of the corridor. The existing bus stop would be relocated to within this visible area.

Affected viewers

- Motorists
- Pedestrians and cyclists
- Local residents on adjoining streets

Description of impacts

The proposal would be highly visible at this location. The new road corridor would be following the existing road alignment but would be widened to accommodate

additional travel lanes. Within this section of the upgrade there are large scale existing mature street trees which would be removed along the western edge of the corridor, severely impacting the existing character. The tree canopy also provides privacy for adjoining residential estates facing the road corridor. Existing turf verges and pedestrian paths or SUPs would be moderately impacted.

Due to the loss of vegetation and increase in the scale of the road corridor, the road corridor character would be severely impacted and ultimately the experience of motorists and pedestrians using the road corridor, together with residents.

The visual impact on these viewpoints is summarised in [Table 7-6 on page 79](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report.



Figure 7-14: Viewpoint 5 location map

7 Visual impact assessment



Figure 7-15: Viewpoint 5 - Existing view looking south towards Pozieres Avenue and HLD intersection

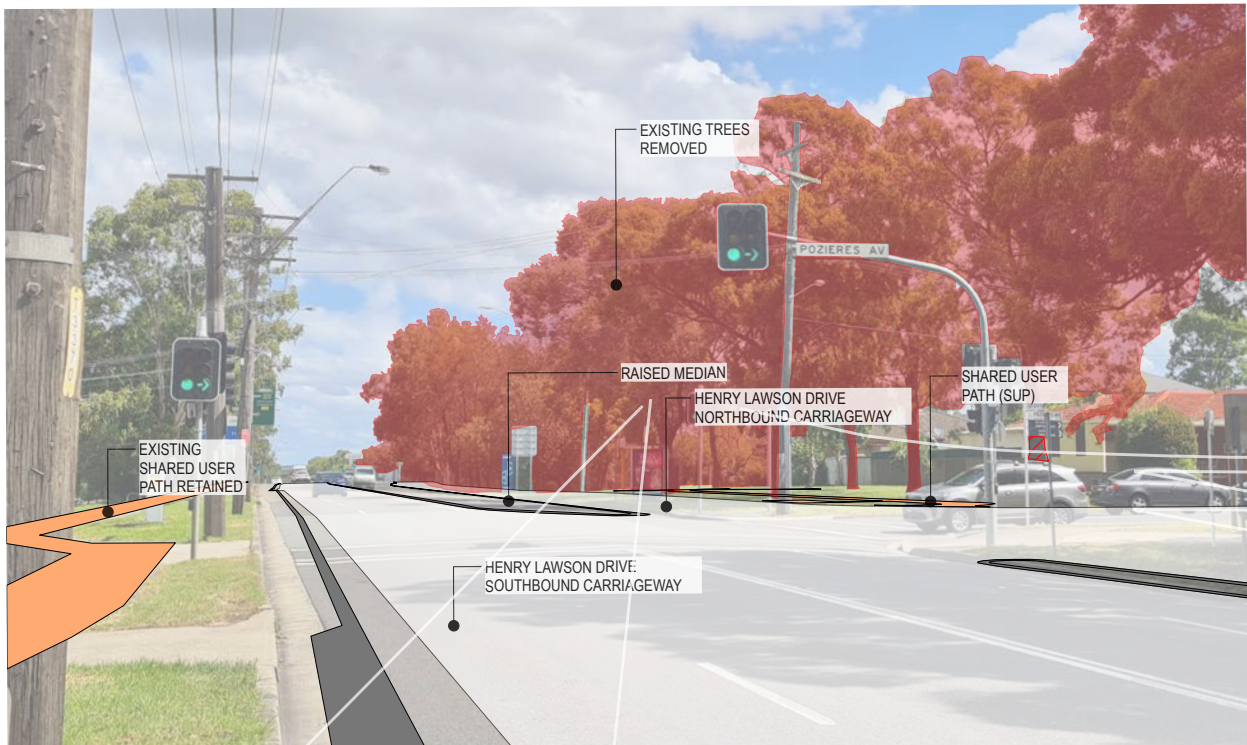


Figure 7-16: Viewpoint 5 - Proposed view looking south towards Pozieres Avenue and HLD intersection

Table 7-6: Visual impact summary viewpoint 5

Sensitivity	Magnitude	Impact
High	High	High
<div><div></div><div>The impact on the sensitivity of this view has been assessed as high. Along the northbound carriageway this view currently contains an existing bus stop, existing signage and a wide turf verge, however the existing mature trees dominate the view and provide a visual buffer to the bounding residential properties.</div></div>	<div><div></div><div>The magnitude of change on the view is considered high. This is based on the widening of the existing road to accommodate a raised median and also the accommodation of a SUP, leading to the removal of a large number of existing trees that currently screen the visibility of existing residential properties, increasing the magnitude of the impact.</div></div>	

7 Visual impact assessment

Viewpoint 6

Location and description

This viewpoint is located within the northbound travel lane of Keys Parade, at the northern end of the study area. The viewpoint is west of the link road intersection looking north along Keys Parade towards Auld Avenue. The major compositional elements within this view are the mature planted trees at the edge of Gordon Parker Reserve and the creek edge planting to the western side of the shared user path (SUP). The dominant compositional element is landscape as there is no existing infrastructure in the near vicinity of the view.

Visible elements of the proposal

At this location the new two lane road of Keys Parade would be fully visible, with associated road kerbs and potential barriers. The existing SUP would be retained.

Affected viewers

- Motorists
- Pedestrians and cyclists
- Recreation participants on adjoining open space areas

Description of impacts

The proposal would be highly visible at this location. The new road corridor would be constructed within

an area of current open space. Although the existing shared user path (SUP) would be retained in its current position, there would be a new two lane road constructed next to this with kerbs and potential barriers to the western side. Filling of the natural ground and the construction of new embankments to the western side of the existing creek would be required. The western edge of the existing creek vegetation would require removal, comprising at least one mature existing tree and associated scrub vegetation and native grasses to the existing embankment.

Existing pedestrian access would be restricted by the demolition of the existing bridge across the creek.

The existing row of mature trees have been assessed by the Arborist for retention under a preliminary report.

The impact is high to this viewpoint.

The visual impact on these viewpoints is summarised in [Table 7-7 on page 81](#). For mitigation measures relating to these views refer to [Section 8 on page 84](#) of this report

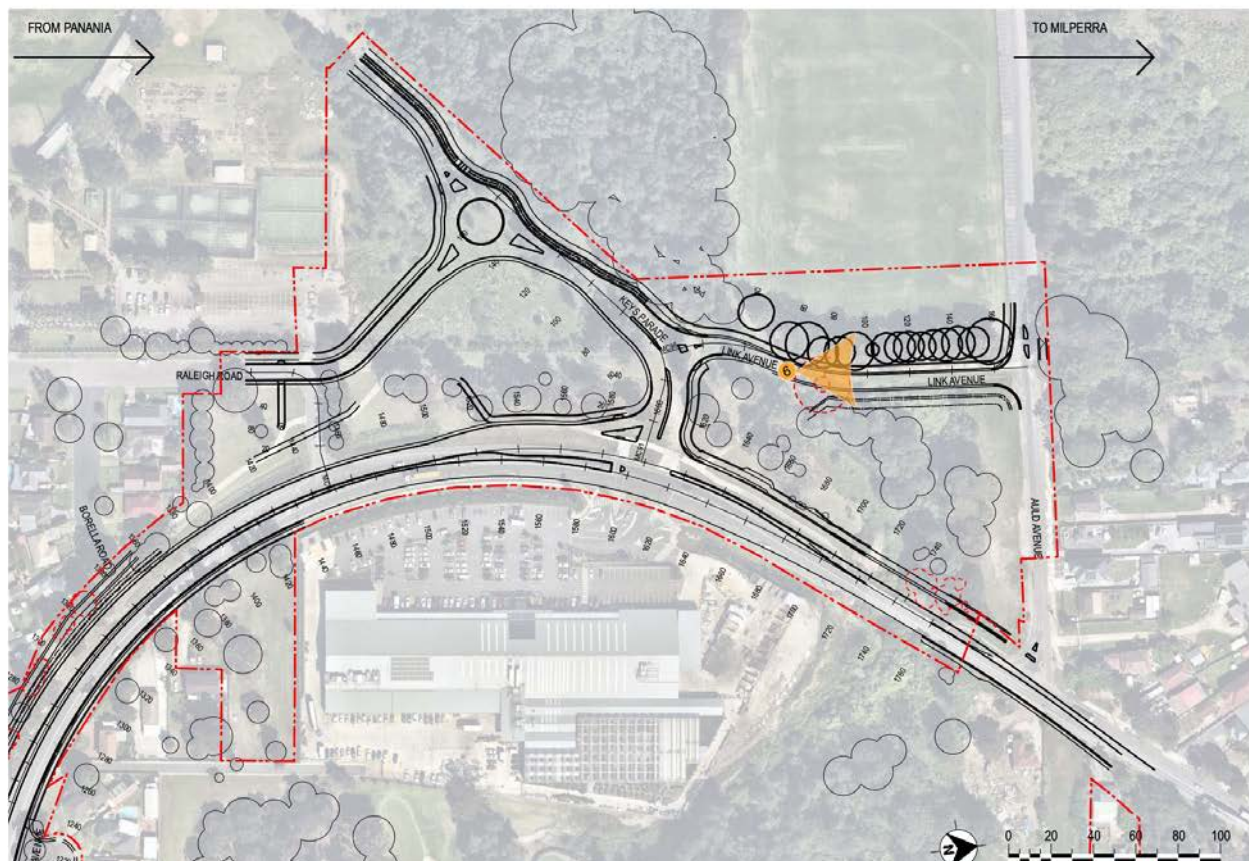


Figure 7-17: Viewpoint 6 location map

7 Visual impact assessment



Figure 7-18: Viewpoint 6 - Existing view looking north towards Auld Avenue

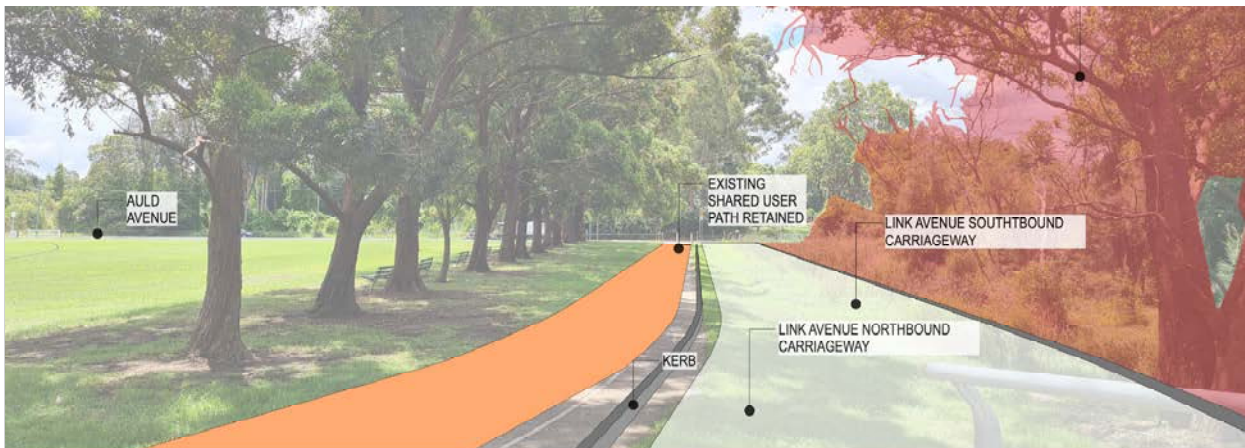


Figure 7-19: Viewpoint 6 -Proposed view Keys Parade looking north towards Auld Avenue

Table 7-7: Visual impact summary viewpoint 6

Sensitivity	Magnitude	Impact
High <ul style="list-style-type: none">The sensitivity of the view is considered high based on the current undisturbed character of this open space recreational area, with mature canopy trees and existing remnant creekside vegetation.	High <ul style="list-style-type: none">The new road corridor introduces vehicular traffic to an area currently only used by pedestrians & cyclists. The road structure would impact substantially on the current view and the associated modification of existing levels would result in the removal of existing vegetation. An existing footpath link and the current bridge access across the existing creek would be removed.	High

7 Visual impact assessment

7.3 Summary of visual impact assessment

The visual impact assessment has identified six viewpoints, from which visual impacts resulting from the proposal can be demonstrated. Generally the proposal is an upgrade of the existing road corridor to a four lane carriageway with two lanes in each direction and a central median. It also includes upgrades to a number of side roads and the addition of new signalised intersections.

The visual impact at viewpoints 1, 4, 5 & 6 is considered high. At viewpoint 6 the existing landscape of open space and vegetation dominate the view, which is currently devoid of any road infrastructure. Introducing a new road that would dominate the view and associated embankments that would impact on the existing vegetation would result in a high visual impact.

At viewpoints 2 & 5 the existing landscape and residential vegetation are the dominant or major elements in the view resulting in a high level of sensitivity to change. At this location the magnitude of the works would result in a degradation in the quality of the view caused by a substantial loss of vegetation and an increase in the dominance of road infrastructure.

Viewpoint 4 is located at the Bullecourt and HLD intersection, where both sensitivity and magnitude of change are also high. The existing mature street tree canopy currently dominates the visual character at this location, combined with the proximity of the changes including loss of screening vegetation and new raised median would result in a degradation of the view.

Viewpoints 1 & 3 would experience moderate or moderate to low impacts reflecting lower sensitivity as a result of the more highly modified existing environment including existing commercial infrastructure at viewpoint 1 that currently dominates the visual setting.

The visual impact of the proposal across the proposal is summarised in [Table 7-8](#) below. For mitigation measures refer to [Section 8 on page 84](#) of this report.

Table 7-8: Viewpoint assessment summary

VP	Location	Sensitivity	Magnitude	Impact
Stage 1B				
1	Existing view from HLD next to commercial signage pillar	Moderate	Moderate	Moderate
2	Existing view from the corner of Borella Road and HLD facing south west	High	High	High
3	Existing view of Amiens Avenue and HLD intersection facing south east	Low	Moderate	Moderate-Low
4	Existing view looking north towards Bullecourt Avenue and HLD intersection	High	High	High
5	Existing view looking south towards Pozieres Avenue and HLD intersection	High	High	High
6	Proposed view Keys Parade looking north towards Auld Avenue	High	High	High



Henry Lawson Drive Avenue planting

8 Mitigation strategy

8.1 Chapter overview

This section provides a summary of the mitigation measures that have been included as part of the concept design for the proposal. These mitigation measures have been developed in order to address the impacts identified in the visual analysis section of the report and would continue to be considered during the detailed design and construction phases of the proposal.

8.2 Mitigation incorporated in the concept design

The landscape and urban concept design responds to the overall proposal objectives and is underpinned by a set of specific landscape and urban design strategies, which are set out in [Section 4 on page 27](#).

Mitigation measures are illustrated in detail in the Urban Design Concept Plans (01-08) [Figure 4-1 on page 38](#) and a summary of these measures is listed below in [Table 8-1](#).

Table 8-1: Mitigation measures incorporated into the Concept Design

Mitigation #	Description of mitigation	Reason
Contributing to urban structure, urban quality, and the economy		
M16	Provide a continuous shared user pathway (SUP) to the western side of Henry Lawson Drive (HLD) to improve pedestrian & cyclist connectivity and safety	To encourage visitation within the precinct area (potentially boosting the economy) by improving transport & community needs
M02	Ensure the existing Milperra soldier's settlement suburb sign is relocated to an appropriate new location within a sensitively designed new setting	Important existing Heritage signage to be upgraded and reinstalled in locations accessible to pedestrians and vehicles.
M03	Plant trees at regular intervals to reinstate the existing characteristic avenue treatment parallel to HLD	To retain and enhance existing the unique Boulevard character to surrounding residential properties adjoining the upgraded arterial road corridor
M01	Where appropriate, plant feature trees, shrubs and ground cover planting to provide visual interest and a sense of place	To enhance the existing character of the precinct through visual stimuli and introduce visual markers for areas of new infrastructure
M24	Incorporate potential 'pocket' and 'linear parks' through opportunities to design open space areas adjacent to the road corridor, incorporating basin retention areas	To increase recreation accessibility and provide additional opportunities for walking, cycling and seating and shade
M04	Introduce varied plant species combinations, with height variations along the length of the road corridor through median planting	Selection of appropriate plant species, which are arranged with consideration of residential private properties to reduce visual impact and headlight glare
Fitting with the built fabric		
M07	Restore lay down areas of the proposal disturbed by major work with appropriate native vegetation	To minimise the impact of upgrade to the original road footprint, particularly the residential estates adjoining edges of the corridor
M08	New planting areas are varied in selection of species, types, scales as well as density of spacing	Appropriate selection of planting along the road corridor provides more aesthetic experience for commuters and residents and helps to minimise the visual impact of the new works
M10	Ensure that landscape treatments adhere to the guidelines for designated bush fire prone land adjacent to link road with non-continuous tree canopies	To secure safe and suitable vegetative species to the landscape context for surrounding residents and commuters.
M06	Plant species have been selected to screen and soften hard elements within the corridor	Provision of planting along the road corridor provides a more aesthetic experience for passers by and residents and helps to reduce the visual impact of new works
M17	Adhere to design guidelines and interlace visual stimuli in the form of 'marker' median shrub planting to enhance the local context character unique to project area	To secure safe transit modes along the new road corridor that will not be distracting, offensive or obtrusive, but provide visual interest

8 Mitigation strategy

Table 8-2: Mitigation measures incorporated into the Concept Design

Mitigation #	Description of mitigation	Reason
Connecting modes and communities and promoting active transport		
M11	Consolidate signage structures	Reduce confusion for pedestrians, cyclists, motorists, and public transport users. Eliminating clutter and obtrusions, improving road user and pedestrian safety
M12	Ensure the SUP design contributes to the existing network and linear identity through appropriate connectivity with existing footpaths and roads	To provide appropriate and future usable paths for residents and future commuters
M13	Ensure planting complies to sight lines and clear zone requirements with the use of a low height planting mix at intersections	Reducing visual planting height and obstructions improves road user safety
Fitting with the landform		
M18	Replace and retain mature street trees along existing road corridor to maintain existing tree canopy cover	Provision of shade for residents and commuters within the road corridor as well as a visually stimulating experience for the user/s
M19	Selection of mature heights of proposed tree species to suit scale of existing retained trees	To strengthen and replicate tree existing canopy heights and maintain the current human scale at tree maturity
M05	Minimise the removal of existing roadside remnant vegetation such as the creek area adjacent to Link Road and existing trees adjacent to the basin retention area	To sustain existing character of the surrounding suburb. Retaining plant species along the road corridor would help to reinforce the diverse landscape character within the surrounding areas
Contributing to green infrastructure and responding to natural systems		
M14	Ensure robust and long life planting and materiality selections for the longevity of life for the design.	An appropriate planting palette can provide lower maintenance and require less intervention
M15	Replace and supplement existing trees to provide urban cooling through shading of trees and UHI considerate materials	WSUD features implemented in accordance with principles set out in the CoCB Biodiversity Strategy to enhance pedestrian/ cyclist environments in response to current and future climatic conditions
M20	Restore natural characteristics in road corridor landscape design	To enhance local character of the project area and maintain within site context
Connecting to Country and Incorporating heritage and cultural contexts		
M09	Reinforce the different landscape character areas through the selection of appropriate species	Varied planting areas would contribute to distinguish separate zones along the journey experience allowing opportunities to inform commuters and residents
M21	Provide appropriate location of wayfinding and signage along upgraded road corridor	To minimise visual impact to any heritage elements and utilise opportunities for rest stops
M22	Integrate predominantly endemic plant species along road corridor, including adjacent to remnant creek area at Link Road	Strengthening any pre-existing remnant vegetation communities within the project area, enhancing a sense of place
M23	Construct around existing historic curtilage or any heritage place of value	To reduce the risk of cutting into historic curtilage and impact negatively to existing sensitive conditions and setting
M25	Replace existing 'Soldier tree' in a suitable alternative location and relocate the original commemorative plaque	To reinstate any locally important items within the project area identified as having some Heritage significance

8 Mitigation measures



LEGEND

EXISTING FEATURES

PROPOSAL BOUNDARY

MITIGATION MEASURES

M01

WHERE APPROPRIATE, PLANT FEATURE TREES, SHRUBS AND GROUND COVER PLANTING TO PROVIDE VISUAL INTEREST AND A SENSE OF PLACE TO ENHANCE THE EXISTING CHARACTER OF THE PRECINCT THROUGH VISUAL STIMULI AND INTRODUCE VISUAL MARKERS FOR AREAS OF NEW INFRASTRUCTURE

M02

ENSURE THE EXISTING MILPERRA SOLDIER'S SETTLEMENT SUBURB SIGN IS RELOCATED TO AN APPROPRIATE NEW LOCATION WITHIN A SENSITIVELY DESIGNED NEW SETTING

M03

IMPORTANT EXISTING SIGNAGE TO BE UPGRADED AND REINSTALLED IN LOCATIONS ACCESSIBLE TO PEDESTRIANS AND VEHICLES

M04

PLANT TREES AT REGULAR INTERVALS TO REINSTATE THE EXISTING CHARACTERISTIC AVENUE TREATMENT PARALLEL TO HLD TO RETAIN AND ENHANCE EXISTING UNIQUE THE UPGRADED ARTERIAL ROAD CORRIDOR

M05

INTRODUCE VARIED PLANT SPECIES COMBINATIONS, WITH HEIGHT VARIATIONS ALONG THE LENGTH OF THE ROAD CORRIDOR THROUGH MEDIAN PLANTING

M06

SELECTION OF APPROPRIATE PLANT SPECIES, WHICH ARE ARRANGED WITH CONSIDERATION OF RESIDENTIAL PRIVATE PROPERTIES TO REDUCE VISUAL IMPACT AND HEADLIGHT GLARE

M07

MINIMISE THE REMOVAL OF EXISTING ROADSIDE REMNANT VEGETATION SUCH AS THE CREEK AREA

M08

ADJACENT TO LINK ROAD AND EXISTING TREES ADJACENT TO THE BASIN RETENTION AREA TO SUSTAIN EXISTING CHARACTER OF THE SURROUNDING SUBURB

M09

RETAINING PLANT SPECIES ALONG THE ROAD CORRIDOR WOULD HELP TO REINFORCE THE DIVERSE LANDSCAPE CHARACTER WITHIN THE SURROUNDING AREAS

M10

PLANT SPECIES HAVE BEEN SELECTED TO SCREEN AND SOFTEN HARD ELEMENTS WITHIN THE CORRIDOR

M11

PROVISION OF PLANTING ALONG THE ROAD CORRIDOR PROVIDES A MORE AESTHETIC EXPERIENCE FOR PASSERS BY AND RESIDENTS AND HELPS TO REDUCE THE VISUAL IMPACT OF NEW WORKS

M12

NEW PLANTING AREAS ARE VARIED IN SELECTION OF SPECIES, TYPES, SCALES AS WELL AS DENSITY OF SPACING

M13

APPROPRIATE SELECTION OF PLANTING ALONG THE ROAD CORRIDOR PROVIDES MORE AESTHETIC EXPERIENCE FOR COMMUTERS AND RESIDENTS AND HELPS TO MINIMISE THE VISUAL IMPACT OF THE NEW WORKS

M14

ENSURE THAT LANDSCAPE TREATMENTS ADHERE TO THE GUIDELINES FOR DESIGNATED BUSH FIRE PRONE LAND ADJACENT TO LINK ROAD WITH NON-CONTINUOUS TREE CANOPIES

M15

TO SECURE SAFE AND SUITABLE VEGETATIVE SPECIES TO THE LANDSCAPE CONTEXT FOR SURROUNDING RESIDENTS AND COMMUTERS

M16

ENSURE THE SUP DESIGN CONTRIBUTES TO THE EXISTING NETWORK AND LINEAR IDENTITY THROUGH APPROPRIATE CONNECTIVITY WITH EXISTING FOOTPATHS AND ROADS TO PROVIDE APPROPRIATE AND FUTURE USABLE PATHS FOR RESIDENTS AND FUTURE COMMUTERS

M17

ENSURE PLANTING COMPLIES TO SIGHT LINES AND CLEAR ZONE REQUIREMENTS WITH THE USE OF A LOW HEIGHT PLANTING MIX AT INTERSECTIONS

M18

REDUCING VISUAL PLANTING HEIGHT AND OBSTRUCTIONS IMPROVES ROAD USER SAFETY

M19

REPLACE AND SUPPLEMENT EXISTING TREES TO PROVIDE URBAN COOLING THROUGH SHADING OF TREES AND UHI CONSIDERATE MATERIALS

M20

WSUD FEATURES IMPLEMENTED IN ACCORDANCE WITH PRINCIPLES SET OUT IN THE CoCB BIODIVERSITY STRATEGY TO ENHANCE PEDESTRIAN/CYCLIST ENVIRONMENTS IN RESPONSE TO CURRENT AND FUTURE CLIMATIC CONDITION

M21

PROVIDE A CONTINUOUS SUP TO THE WESTERN SIDE OF HLD TO IMPROVE PEDESTRIAN & CYCLIST CONNECTIVITY AND SAFETY TO ENCOURAGE VISITATION WITHIN THE PRECINCT AREA (POTENTIALLY BOOSTING THE ECONOMY) BY IMPROVING TRANSPORT & COMMUNITY NEEDS

M22

REPLACE AND RETAIN MATURE STREET TREES ALONG EXISTING ROAD CORRIDOR TO MAINTAIN EXISTING TREE CANOPY COVER

M23

PROVISION OF SHADE FOR RESIDENTS AND COMMUTERS WITHIN THE ROAD CORRIDOR AS WELL AS A VISUALLY STIMULATING EXPERIENCE FOR THE USER'S

M24

INTEGRATE PREDOMINANTLY ENDEMIC PLANT SPECIES ALONG ROAD CORRIDOR, INCLUDING ADJACENT TO REMNANT CREEK AREA AT LINK ROAD STRENGTHENING ANY PRE-EXISTING REMNANT VEGETATION COMMUNITIES WITHIN THE PROJECT AREA, ENHANCING A SENSE OF PLACE

M25

REPLACE EXISTING 'SOLDIER TREE' IN A SUITABLE ALTERNATIVE LOCATION AND RELOCATE THE ORIGINAL COMMEMORATIVE PLAQUE TO REINSTATE ANY LOCALLY IMPORTANT ITEMS WITHIN THE PROJECT AREA IDENTIFIED AS HAVING SOME HERITAGE SIGNIFICANCE

0

100

200

300

400

500M

Figure 8-1: Mitigation measures

8 Mitigation strategy

8.3 Mitigation to be incorporated in detailed design

Table 8-3 below lists recommendations and issues to be considered during the detailed design phase.

Table 8-3: Detailed design recommendations

Design element	Detailed design stage recommendation/ comment
Road design:	
– SUP & Footpaths	– Review connectivity to existing pathways
Earthworks	
– Cut batters	– Minimise the extent of cut to retain as much existing vegetation as possible, particularly at the southern end of the proposal boundary.
– Fill embankments	– Minimise the extent of fill / disturbance to the existing creek side remnant vegetation near Auld Avenue through the detailed design of the new Keys Parade section of road.
Drainage & Water Quality	
– WSUD features	– Use of best practice WSUD initiatives for the swale designs to the northern section of the proposal area
Road Furniture	
– Fences & Barriers	– Review design of any barriers such as to the existing bridge near to Auld Avenue, to be investigated at the detailed design stage
– Signage	– Consolidate signage structures to minimise visual clutter & obstructions – Ensure retention of soldier settlement heritage signage where possible or relocate
– Lighting	– Ensure lighting is coordinated with tree planting both above & below ground to avoid clashes and any future maintenance requirements – Investigate the use of low-level solar lighting for pocket and linear park areas
Landscape Treatments	
– Replacement street tree planting	– Where appropriate, planting of semi-mature tree stock to reduce the visual impact of tree removal, provide more immediate benefits in reducing the heat island effect and increase survival rates given their stability and development. Additional benefits from reduced establishment and maintenance requirements
– Feature planting	– Use of curvilinear bands of planting to provide visual interest to linear park areas – Feature plants to be employed to mark entry points or intersections within medians and verge planting
– Median planting	– Medians greater than 2m to include frangible shrubs positioned to provide further greening of the corridor and potential screening of headlight glare – Frangible tree planting within medians of 4m or greater, where required suitable barrier protection to be investigated during detailed design
– Riparian planting	– Species selection to be based on species found on site and low canopy trees
– Screen planting	– Screen planting where appropriate to strengthen the visual barrier between the road corridor and residential areas
– Linear & Pocket parks	– Consult with CoCB on the detailed design of these all proposed linear & pocket parks
Heritage Items	
– Indigenous themes	– Consult with CoCB on integration of indigenous themes
– Conservation of the natural environment	– Consult with CoCB on the preferred conservation of the natural environment
– Commemorative plaques	– Ensure commemorative plaques are protected and preserved in existing locations or reinstated in alternative suitable locations



View looking south towards the M5 Entry Ramp

9 Summary of Urban Design findings

Overview

Following an analysis of landscape context, the development of objectives, principles, strategies and mitigation measures, an assessment of landscape character and visual impact has been undertaken in accordance with TfNSW guidelines.

The results of this assessment have been incorporated into the concept urban design drawings and are to be further refined during detailed design.

The landscape character and visual impact assessment of the proposal represents a qualitative assessment based on the landscape character zones and selected representative viewpoints, which have been determined based on an investigation of landscape and cultural context as well as an analysis of land use, vegetation, topography and scenic values. This analysis then proposes a series of mitigation measures that are to be utilised to address the proposal impacts to landscape character.

Findings

Although a busy arterial road in its existing form, the proposal would see the upgrade of the road to a dual carriageway, with an accompanying substantial increase in road-related infrastructure. This related infrastructure includes pavement, earthworks, retaining walls, fences and barriers, drainage facilities including swales, basins and culverts. The proposal also includes the removal of a substantial number of existing trees, which would result in the loss of the avenue type road corridor and the separating buffer between the road infrastructure and residential areas, together with a degradation to the associated open space areas.

In addition to the magnitude of physical change, many viewpoint locations, which are representative of views that are experienced by local residents, workers, tourists and road users would exhibit varying degrees of visual impacts, as would the identified character zones.

Given these potential impacts, a series of measures have been developed, which must be implemented in order to mitigate these outcomes. These measures include planting and re-vegetation including the planting of a substantial number of trees, the design and specification of high quality finishes in accordance with beyond the pavement guidelines, integration of earthworks forms and other measures that aim to minimise impacts of the proposal.



scape DESIGN