



THE NORTHERN ROAD/ BRINGELLY ROAD GRADE SEPARATED INTERCHANGE **URBAN DESIGN REPORT AND LANDSCAPE CHARACTER AND VISUAL IMPACT ASSESSMENT**

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Prepared for:



Transport
Roads & Maritime
Services



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1. INTRODUCTION

1.1 Overview

Roads and Maritime Services (Roads and Maritime) is proposing a new grade separated interchange at The Northern Road and Bringelly Road, Bringelly (referred to as 'the proposal' for the purposes of this report). The proposal is located within the Western Sydney Priority Growth Area (formerly known as the South West Growth Centre), about 45 km south-west of the Sydney central business district and 12 km west of Liverpool (refer to Figure 1.1).

The proposal would tie into The Northern Road Upgrade Stage 2A (Peter Brock Drive to Belmore Road) to the south, The Northern Road Upgrade Stage 2C (Thames Road to Mersey Road) to the north, and the Bringelly Road Upgrade Stage 2 (King Street to The Northern Road) to the east.

This report has been prepared by Spackman Mossop Michaels (SMM) as part of the environmental assessment of the project and should be read in conjunction with the GHD report which describes the Urban and Landscape Design (ULD) component of The Northern Road/Bringelly Road Grade Separated Interchange (refer to Chapter 9 - Appendices).

Roads and Maritime is the proponent of the proposal, and an environmental assessment in the form of a review of environmental factors (REF) is being prepared by GHD in accordance with the requirements of Part 5 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act).

This report assesses and documents the potential landscape and visual impacts of the proposal.

1.2 Proposal Outline

The grade separated interchange, which would involve The Northern Road passing under Bringelly Road, would be located about 300 m east of the existing intersection of The Northern Road, Bringelly Road and Greendale Road. The proposal also involves modifications to the existing intersection. The key features of the proposal are shown in Figure 1.1 and include:

- Widening and upgrading about 400 m of Bringelly Road, between Kelvin Park Drive and Greendale Road, to provide:
 - Two 3.5 m wide traffic lanes in each direction between Kelvin Park Drive and The Northern Road/Bringelly Road interchange, with wide central medians to allow for a future third traffic lane in each direction
 - Two 3.5 m wide traffic lanes in each direction on the western side of the interchange, transitioning to one lane in each direction to tie in to the existing intersection and Greendale Road
 - Two metre wide shoulders in each direction
- Constructing a new section of The Northern Road, to the east of the existing alignment, between about 200 m south of Robinson Road and the southern abutment of the bridge over Thompsons Creek. The new section, which would pass beneath Bringelly Road, would be about one kilometre long and about 50 m wide (including embankments), and would include:
 - Two 3.5 m wide traffic lanes in each direction
 - Four metre wide shoulders connecting to the on and off ramps of the interchange, allowing for the future provision of bus lanes

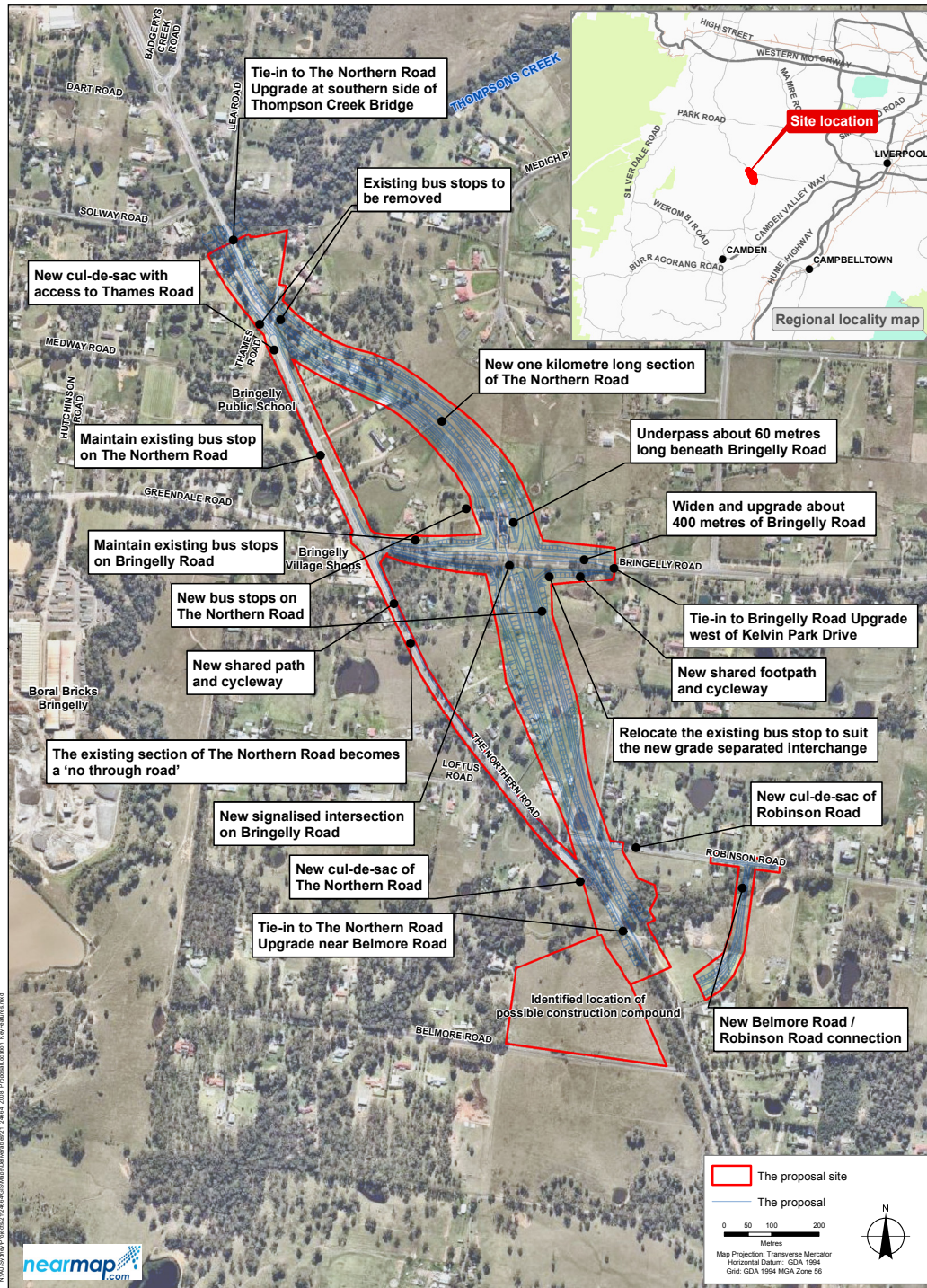


Figure 1-1: Proposal location and key features

- ▢ An underpass about 60 m long beneath the upgraded section of Bringelly Road
 - ▢ 2.5 m wide shoulders along The Northern Road under the interchange for a length of about one kilometre
 - ▢ A wide central median to allow construction of a future third traffic lane in each direction
- Providing a new signalised intersection on Bringelly Road over The Northern Road, with turning movements provided in all directions
- Providing dual right turn movements in all directions to and from The Northern Road and Bringelly Road, and dedicated left turn lanes in all directions
- Providing bus service facilities by:
 - ▢ Retaining the bus stops on the existing The Northern Road
 - ▢ Relocating bus stops on Bringelly Road to suit the interchange
 - ▢ Providing two new bus stops on The Northern Road northbound and southbound interchange on ramps
 - ▢ Providing a bus only lane for buses travelling north and south along The Northern Road at the traffic lights on Bringelly Road
- Providing three metre wide shared paths for pedestrians and cyclists
- Providing a new road connection between Robinson Road and The Northern Road via an extension of the realigned Belmore Road intersection, and building a cul-de-sac at the western end of Robinson Road
- Converting the existing section of The Northern Road (to the west of the new section) to a 'no through road', by providing cul-de-sacs at both the northern (at Thames Road) and southern ends (near Robinson Road).

It is anticipated that construction of the proposal would commence in late 2016 / early 2017 and would be open to traffic by the end of 2019.

1.3 Scope of this Assessment

The purpose of this report is to document the results of the assessment of the potential traffic and transport impacts of the operation and construction of the proposal. The report supports the REF for the proposal. The scope of assessment includes:

- Consideration of short, medium and long term planning strategies within the area in respect to land use, public transport, pedestrian, cyclists and other planned projects in the area
- Identification of the current and future travel patterns and volumes on roads within the study area
- Evaluation of the proposal in terms of intersection and network performance in relation to the desired design criteria under future traffic conditions

- Appraisal of the proposed bus priority options as part of the proposal on potential travel time improvement for public transport
- Provision of construction impact assessment.

1.4 Report Structure

The report is comprised of the following sections:

- **Section 2 - Contextual Analysis:** is a discussion of the study area's key urban, environmental and cultural factors that would affect the design of the proposal
- **Section 3 - Landscape Character Analysis:** identifies landscape character zones along the length of the study area and provides a description of the attributes that make up each landscape character zone
- **Section 4 - Urban Design Strategy:** identifies and describes the urban design objectives and principles developed to guide the concept design for the project
- **Section 5 - Landscape Character Assessment:** determines the impact of the proposal on the aggregate of the built, natural and cultural aspects that make up an area and provide its unique sense of place
- **Section 6 - Visual Impact:** assesses the day to day visual effects of the proposal on people's views expressed in relation to a number of key viewpoints
- **Section 7 - Mitigation Strategy:** describes possible mitigation measures that will ensure the proposal fits sensitively within the existing qualities and characteristics of the adjacent areas
- **Section 8 - Conclusion:** presents a summary of the study findings and sets out the principal conclusions for the study.

1.5 Assessment Methodology

The method used to undertake this study follows the 'Guideline for Landscape Character and Visual Impact Assessment' (Roads and Maritime, 2013).

Landscape Character Assessment

The Guideline provides the following definition of landscape character:

'The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.'

In landscape character assessment, magnitude refers to the type of proposal and its compatibility with the existing landscape character. The scale of elements, as well as its location or setting, all have a bearing on the magnitude of the physical presence of the proposal.

Sensitivity refers to how sensitive the character of the setting is to the proposed change. A judgement has been made as to the quality of the landscape, its cultural and historical importance to the community, scenic quality, and overall composition of the place and its inhabitants.

Landscape character impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix in Figure 1-2.

		MAGNITUDE			
		High	Moderate	Low	Negligible
SENSITIVITY	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

Figure 1-2: Impact Assessment Grading Matrix

Visual Impact Assessment

The potential visual impact of the proposal is assessed in relation to a number of key viewpoints. Locations and directions of chosen viewpoints are representative of the range of viewpoints both within the visual catchment of the proposal.

Magnitude of change to existing views refers to the nature and scale of the proposal, and the extent and proximity of the view to it. Magnitude represents the contrast in scale, form and type of proposal to the location and context to which it is to be placed.

Sensitivity is the measure of the visual importance of the view and is dependent on the distance between viewer and the proposal, the category of viewer and the elements of the proposal that are visible.

Visual impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix in Figure 1-2.

The impact assessment grading matrix, adopted from *Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime 2013), shown in Figure 1-2, is used in both the landscape character and visual impact assessments. The matrix illustrates how magnitude and sensitivity ratings are combined to achieve an overall impact rating.

2. CONTEXTUAL ANALYSIS

This chapter provides a discussion of the study area's key urban, environmental and cultural factors that would affect the design of the proposal. The purpose of this background information is to understand the individual aspects that make up the landscape character of the study area and to identify broad scale urban design opportunities that may be applied to the project (Refer Figure 2-1).

Further detail can be obtained by reviewing the relevant specialist consultant reports.

2.1 Landform and Topography

In terms of topography, the landscape surrounding the proposed interchange alignment is considered to be typical of the Cumberland Plain, consisting of rolling hills and small valleys between the generally north south aligned ridge lines. Within this context there are a number of different landscape characters which provide visual interest when travelling.

In the study area The Northern Road has been constructed following the undulating topography of the local area, crossing over ridge lines while avoiding the steepest slopes. The degree of modification to the landscape, in terms of cut and fill embankments, is relatively low and this is helped by the relatively narrow footprint of the existing carriageway which consists of only one lane in each direction, with occasional deceleration or turning lanes and gravel breakdown shoulders.

Bringelly Road runs in an east west direction and rises and falls gently with the undulating topography. This combined with the two lane carriageway means there are no cut and fill embankments.

2.2 Hydrology and Drainage

There are three creeks and tributaries located in the vicinity of the proposed interchange alignment, all of which form part of the wider Hawkesbury-Nepean Catchment.

Crossing The Northern Road north of Bringelly Road is Thompsons Creek and to the south is Lowes Creek while South Creek crosses Bringelly Road to the east of the proposed interchange alignment.

Generally, all of these watercourses are quite degraded and have been adversely affected by domestic livestock, urban expansion and farming. Lowes Creek is a permanent creek line with a continuous tree canopy and is identified as having moderate ecological value (UBM Ecological Consultants, 2008). The watercourses, except for Thompsons Creek north of the proposal, are not considered flood prone (Sydney Region Growth Centres Development Control Map - South West Growth Centre (Edition 2).

2.3 Vegetation

The vegetation surrounding the proposed interchange alignment generally consists of existing native vegetation which is highly modified as a result of past and current land uses, particularly land clearing. Trees within the road corridor are predominantly located close to the existing carriageway, with remaining corridor areas having been cleared to a significant degree for utilities easements.

The most significant stands of trees occur along the creek crossings and on existing embankments, particularly south of Bringelly Road. Vegetation is largely isolated and does not form larger vegetation corridors and accordingly tend to retain limited ecological value as wildlife links. They do however make a significant visual contribution to the scale and character of the road corridor. The remainder of the proposed corridor contains a mix of grassed and cleared areas, the central section dominated by crop and grazing land.

2.4 Land Use

Currently the area surrounding Lowes Creek, to the south of the proposed interchange alignment, consists of agricultural fields and associated dams. From here, north to Mersey Road, the land use changes to mainly small rural residential lots. Commercial activity is centred on the existing Bringelly Road/The Northern Road intersection, which includes the Bringelly Village shops. Bringelly Public School is located north of Greendale Road on the western side.

In the future the proposal will be located within the South West Priority Growth Area (formerly known as the South West Growth Centre), about 45 km south-west of the Sydney central business district and 12 km west of Liverpool (Refer GHD Urban and Landscape Design (ULD) component of The Northern Road/Bringelly Road Grade Separated Interchange report).

2.5 Cultural And Scenic Values

Defining the experience of the drive along The Northern Road are a number of factors which combine to give the road a unique character and therefore represent a set of values associated with the journey. These values derive from the visual and ecological characteristics of the road corridor and surrounding landscape, and a number of (mainly European) historical references and landmark experiences that shape the motorist's experience along the route.

Overall, the visual character of The Northern Road corridor is characterised by a mix of rural/ agricultural and remnant indigenous landscapes. Existing native vegetation is a major feature of the journey and provides a visually pleasant driving experience with opening and closing views that extend to the Blue Mountains. Much of the motorist's experience when travelling along The Northern Road relies on the 'borrowed' landscape outside the road corridor. This includes the substantial stands of trees (both outside and within the road corridor) and the varying rural landscape including the large dams located on a number of properties.

For much of its length, The Northern Road currently consists of a two lane road (one for each direction) which in its current configuration, curving horizontal and rolling vertical alignment and adjoining land uses, creates a distinct 'country road' character. This is also true of the journey along Bringelly Road.

2.6 Parks and Open Space

Bringelly Recreation Reserve is located about 300 m to the west of the intersection of The Northern Road and Bringelly Road on Greendale Road. The reserve is 6.2 ha and incorporates a number of different park amenities including barbecues, toilets and floodlights, as well as open space areas and a variety of organised sports facilities.

At a broader scale, the Western Sydney Parklands (WSP) is a major regional park, linking the new communities being planned in the North West and South West Growth Centres. The Parklands provide valuable regional open space for these growing communities and for the rest of Western Sydney. The Parklands stretch for 27 km from Blacktown to Liverpool along Eastern Creek and the hills of Hoxton Park.

Other significant parks and open spaces located in the wider region include Bents Basin State Conservation Area to the west, the Scenic Hills district to the south-east and Mount Annan Botanic Gardens and William Howe Regional Park to the south.

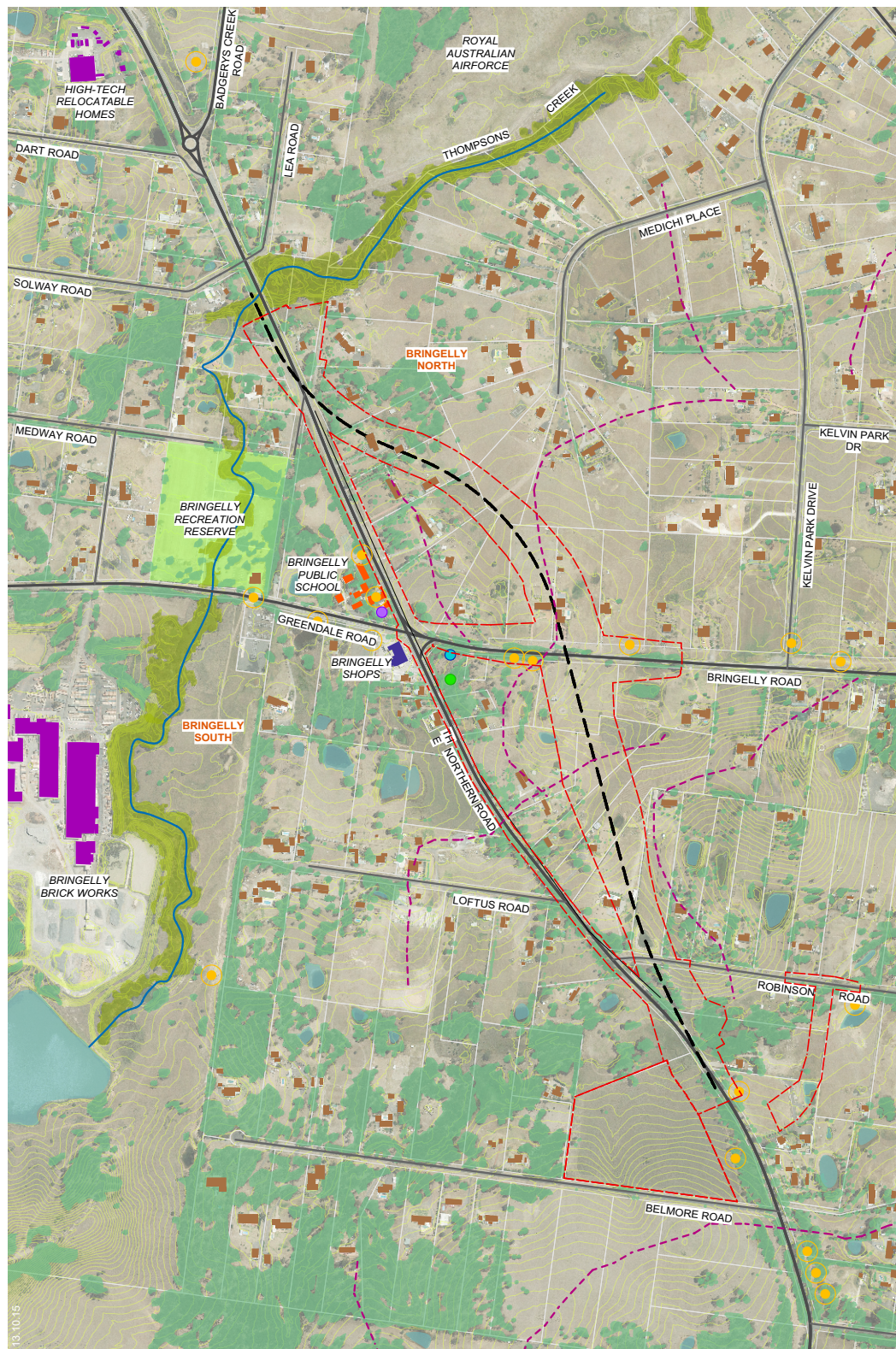

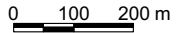










Figure 2-1: Landscape context plan

LEGEND

- | | | | |
|--|--|--|---|
|  SITE WORKS BOUNDARY |  CREEK VEGETATION |  BRINGELLY PUBLIC SCHOOL |  ABORIGINAL HERITAGE SITES |
|  INTERCHANGE ALIGNMENT (50% CONCEPT DESIGN) |  RESERVE/RECREATION |  LIGHT INDUSTRIAL/INDUSTRIAL | |
|  HIGHWAY/ROADS |  1M CONTOURS |  SHOPPING CENTRE | |
|  STREETS |  CADASTRAL BOUNDARIES |  HERITAGE COTTAGE | |
|  WATERWAYS/WATERBODIES |  RIDGELINES |  FORMER WESLEYAN CHURCH HERITAGE SITE | |
|  VEGETATION |  PRIVATE DWELLINGS |  HERITAGE SCHOOL | |

2.7 Pedestrian and Cycle Facilities

The majority of both The Northern Road and Bringelly Road lack footpaths however there is a stretch of concrete path that runs on the western side of The Northern Road starting 175 m south of the Bringelly Village shops north past the Bringelly Public School for 155 m. Both roads lack formal cycle facilities, however The Northern Road does have some provision for cyclists on the road shoulders.

2.8 Road Network

The Northern Road is an important arterial road linking the Camden and Campbelltown areas, and the Southern Highlands and beyond with Windsor, Penrith and the Blue Mountains. Along with Bringelly Road and Camden Valley Way, it is one of the main routes linking the generally disconnected network of roads in the area with the major national routes of the M5 Motorway, F5 Freeway and the M7 Western Sydney Orbital. Currently, buses do not travel along The Northern Road, except for a small section at Harrington Park and from Bringelly Road to Badgerys Creek Road.

2.9 Public Transport

Existing public transport access is limited to a bus service that runs between Liverpool and Bringelly Road and then north along the Northern Road, terminating at Badgerys Creek Road.

2.10 Utilities

A number of utilities and services are located within the road corridor, particularly overhead power lines and telephone lines. On The Northern Road, services run along the eastern the edge of the road corridor and on the northern side of Bringelly Road and intermittently on the southern side. Typically, power lines also run along one side of most of the local roads.

2.11 Heritage

Aboriginal heritage

The land surrounding the upgrade is considered culturally important to the Aboriginal population of the Sydney region, including Dharawal, Darug and Gandangara speakers.

Due to it's the subtly undulating, vegetated terrain with relatively good access to fresh water, which provided an extensive resource base, it is thought that the Narellan Valley may have been part of a 'travel corridor' facilitating movement between the northern Cumberland Plain and the Illawarra (JMcDCHM 2007:21 after Haglund 1989).

Within the study area there are numerous sites along Bringelly Road and The Northern Road which were identified in the AHIMS extensive search results for Aboriginal heritage undertaken by *Artefact*, 2015 (Refer to Figure 2-1).

Non-aboriginal heritage

Within the study area there are two heritage items listed on the Liverpool or Camden Local Environment Plans (LEP) and these are as follows:

- Bringelly Public School, including the entire school property, is listed on the Liverpool LEP 2008. Located at the corner of Bringelly Road and The Northern Road, the school block fronts The Northern Road along its western side. The Bringelly Public School Group demonstrates the history of the initial foundation and development of formal education in the region
- Cottage 1186 is listed on the Camden LEP 2010 and is an example of one of the few recognisable Edwardian or Federation period homes to survive in good condition and relatively intact in Bringelly village.

One item of potential heritage significance has been identified within the vicinity of the study area on the Camden Development Control Plan 2011 (DCP) and is listed below:

- Bringelly Road/Greendale Road corridor. The current alignments of The Northern Road and Bringelly Road were in place prior to 1826, with the surrounding area opened to pastoral activities from that period onwards.

One item has been identified as a potential archeological site within the vicinity of the study area in the Liverpool LEP and is listed below:

- Bringelly Church, a Wesleyan/Methodist Church site at 991 Bringelly Road near The Northern Road existing intersection.

3. LANDSCAPE CHARACTER ANALYSIS

This chapter identifies landscape character zones along the length of the study area and provides a description of the attributes that make up each landscape character zone. The sensitivity of each landscape character zone is then assessed, and a rating provided in accordance with the Impact Assessment Grading Matrix (Figure 1-2).

The study area has been divided into three Landscape Character Zones (LCZ) as illustrated in Figure 3-1. The LCZs generally reflect the land use and rural character of the areas surrounding The Northern Road and Bringelly Road intersection.

The identification of the zones allows for a more detailed discussion of the character of each zone. Within The Northern Road corridor itself, a number of distinct areas have been identified which generally correlate with the character zones.

The three Landscape Character Zones areas include:

1. Bringelly Village shops
2. Bringelly Acreage
3. Thompsons Creek.

This chapter also discusses the sensitivity for each LCZ. Sensitivity refers to how sensitive the character of the setting is to the proposed change. A judgement has been made as to the quality of the landscape, its cultural and historical importance to the community, scenic quality, and overall composition of the place and its inhabitants. The following sensitivity judgements have been used as the basis for this assessment:

- Places with high social, recreational, and historical significance to local residents have higher sensitivity
- Generally, water and natural environments are more highly valued than modified areas, though views over rolling farmland are still highly valued
- Areas of unique scenic quality have higher sensitivity
- A pristine environment would have greater sensitivity with less ability to absorb new elements in the landscape than modified landscapes or those areas with contrast and variety of landscape types.

3.1 Landscape Character Zones

LCZ 1 - Bringelly Village shops

Existing landscape character

Located on the edge of the north western slopes of a low broad hill at the junction of The Northern Road and Bringelly Road is the Bringelly Village shops, which is classified as a Neighbourhood Centre. Residences, the Bringelly village shops and the Bringelly Public School comprise the small village centre and these typically have active frontages onto the main roads and are visually prominent on the western side of The Northern Road only. The character attributes of this zone are described below.

Built form and heritage

A two storey brick commercial/ retail shopping centre to the south of Bringelly Road is prominent to the west of The Northern Road. Three, single storey residential homes are located south-west of the intersection of The Northern Road and Bringelly Road are the single storey buildings associated with Bringelly Public School. Within this LCZ the Bringelly Public School, including the entire school property, is listed as a heritage item.

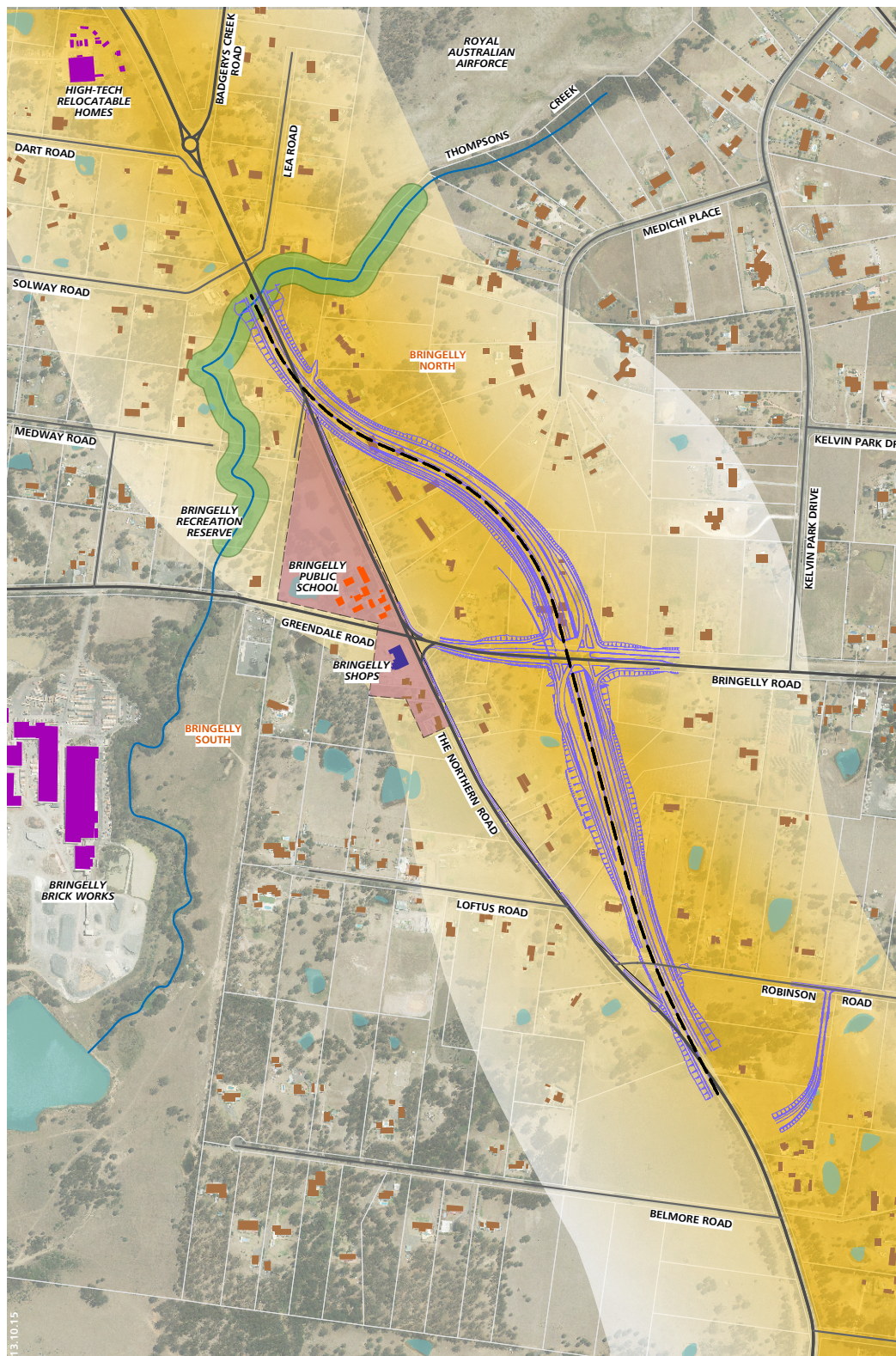


Figure 3-1: Landscape character plan

LEGEND		LANDSCAPE CHARACTER ZONES	
	INTERCHANGE ALIGNMENT (50% CONCEPT DESIGN)		BRINGELLY VILLAGE SHOPS LCZ
	HIGHWAY/ ROADS		BRINGELLY ACERAGE LCZ
	STREETS		THOMPSONS CREEK LCZ
	WATERWAYS/WATERBODIES		
	CADASTRAL BOUNDRIES		
	PRIVATE DWELLINGS		
	BRINGELLY PUBLIC SCHOOL		
	AGRICULTURAL/INDUSTRIAL		
	SHOPPING CENTRE		

Connectivity and access

Both The Northern Road and Bringelly Road, which run through the Bringelly Village shops, have formalised concrete kerbs at the edge of the road carriageway although there is a lack of provision for cyclists with no cycle lanes or shoulders. There is a formal footpath (about one metre wide) which runs along The Northern Road and services the Bringelly Village shops and Bringelly Public School.

Vegetation

There is some existing native vegetation south-east of the Bringelly Road intersection as well as some areas of planted trees, shrubs and turf areas that are associated with Bringelly Village shops and Bringelly Public School.

Key activity areas

Bringelly Village shops are the main activity generator in this zone and are accessed from driveways off The Northern Road and Greendale Road. During school terms, Bringelly Public School is also an activity generator, with the main school access via Greendale Road.

Spatial quality

This zone is reasonably open due to single storey buildings and low shrub and tree planting and the wide grassed verge to the east, north of Bringelly Road.

Infrastructure and utility

The main overhead power lines run east of The Northern Road with occasional diversions across The Northern Road to service Bringelly Village shops, residential properties and Bringelly Public School.

Due to the low key village character and its location at the intersection of Bringelly Road and The Northern Road, the zone will have moderate sensitivity.

LCZ 2 - Bringelly Acreage (north and south)**Existing landscape character**

This LCZ is typically defined as a rural area which has been divided into five acre lots with a low density of residential buildings spread out across gently undulating land. The zone stretches north of Thompsons Creek through to Lowes Creek in the south of the study area and is classified as primary production/small lots which enables intensive agriculture, home-based child care facilities and home occupations. The character attributes of this zone are described below.

Built form and heritage

Across the character zone is a mix of built form and land use. Most of the zone has been divided into five acre lots most with one main single storey residential building surrounded by a number of other small farm buildings scattered across the surrounding turfed area of the lot. There are occasional lots with established gardens as well as lots with farmland agriculture including fruit, vegetable and livestock production.

Within the study area there are numerous aboriginal heritage sites along Bringelly Road and The Northern Road.

In terms of non-aboriginal heritage items, Cottage 1186 has been identified as a heritage item and the Bringelly Church as a potential archeological site. Finally the Bringelly Road/Greendale Road corridor with its associated rural cultural landscape has been identified as having potential heritage significance ([Refer Figure 2-1](#)).

Public Domain

One public domain area is located within this zone, to the west of the Bringelly Public School which is the Bringelly Recreation Reserve. The 6.2 ha reserve incorporates a number of different park amenities including barbecues, toilets and floodlights, as well as open space areas and a variety of organised sports facilities.

Connectivity and access

The majority of both The Northern Road and Bringelly Road lack footpaths however there is a stretch of concrete path that runs on the western side of The Northern Road starting 175 m south of the Bringelly Village shops north past the Bringelly Public School for 155 m. Both roads lack formal cycle facilities, however The Northern Road does have some provision for cyclists on the road shoulders. Existing public transport is limited to a bus service that runs along Bringelly Road and north along The Northern Road.

Vegetation

Typically the five acre lots have exotic and native planting and large open grassed areas with some areas of existing native vegetation along the road edges. Some lots also consist of intensive food production or turf farms.

Key activity areas

The Bringelly Recreation Reserve would be considered a key activity area, particularly on weekends and week nights when organised sports take place.

Spatial quality

Typically, this character zone is defined by mid-distance views of gently undulating rural residential lands which are, in some locations, filtered or blocked by established roadside trees and shrubs.

Infrastructure and utility

Overhead power lines run throughout the zone sometimes on both sides of the main roads or on only one side of local roads.

[The sensitivity of the zone is considered high due to the scenic nature of the rolling pastures, scattered trees and proximity of local residents.](#)

LCZ 3 - Thompsons Creek

Existing landscape character

Located to the north of the study area, Thompsons Creek is a creekline which runs along the southern boundary of the Royal Australian Airforce site, passes under The Northern Road and meanders through Bringelly Reserve towards a water body south of the Bringelly brickworks. Generally it is quite degraded and has been affected by domestic livestock, urban expansion and farming.

This creek zone dissects the Bringelly acreages and receives drainage from the broad undulating ground adjacent to it. East of The Northern Road the creek is considered to be flood prone (Sydney Region Growth Centres Development Control Map - South West Growth Centre (Edition 2)). The character attributes of this zone are described below.

Built form and heritage

Built form and construction is prevented within the floodplain of this zone.

Connectivity and access

The creek cuts through private properties and consequently there is limited public access to the creek. The only public access is in Bringelly Recreation Reserve although formal access has not been provided.

Vegetation

The creek is visually enclosed by the alluvial woodland vegetation and some areas of existing riparian vegetation including trees and scattered shrubs.

Spatial quality

Mid distance views of gently undulating rural residential lands can be seen from the creek and are filtered or blocked by creek vegetation.

Due to the generally degraded and modified nature of the creek corridor and its limited public access, the zone is considered to have low sensitivity.

4. URBAN DESIGN STRATEGY

This chapter identifies and describes the urban design objectives and principles that have been developed to guide the concept design developed by GHD and presented in the draft *Urban Design and Landscape Architecture* report, to ensure that the project is physically, visually, and operationally integrated with the surrounding environment. Following this, a number of urban design recommendations are provided for proposal-wide structures, landscape formations, roadside furniture, and landscape works.

4.1 Urban Design Objectives and Principles

Roads and Maritime Urban Design Outcomes

Key physical features of the proposed intersection upgrade include:

- An interchange to separate vehicles on The Northern Road and Bringelly Road to allow for better traffic flow
- Widening The Northern Road and Bringelly Road from two lanes to four lanes (two in each direction) with a wide central median to allow for six lanes in the future
- Installing new on and off ramps, turning lanes and traffic lights
- Changing access arrangements for existing local road intersections
- Providing an off-road shared path for pedestrians and cyclists and crossings at traffic lights.

While the benefits of the proposed intersection upgrade include:

- Increasing traffic capacity for future growth and development on The Northern Road and Bringelly Road corridors and surrounding areas
- Providing opportunities for improved public transport and an improved flow of traffic for road users
- Improving road safety for all road users by:
 - Providing an interchange to separate traffic on The Northern Road and Bringelly Road
 - Providing wide central medians on The Northern Road and Bringelly Road to separate opposing traffic flows
- Improving safety for pedestrians and cyclists by providing a shared path and increasing connectivity for pedestrians by providing new footpaths
- Improving turning movements for heavy vehicles, in particular from Greendale Road onto The Northern Road.

Roads and Maritime Urban Design Performance Criteria

The primary project objectives of the proposal is to provide an integrated engineering and urban design outcome that:

- Fits sensitively into the built, natural and community environments through which they pass, and is well designed and contributes to the character and functioning of the area both now and into the future
- Contributes to the accessibility and connectivity of people within regions and communities
- Contributes to the overall quality of the public domain for the community and all road users.

These would be implemented in accordance with the Roads and Maritime Beyond the Pavement (2014) performance themes of safety, cost effectiveness and sustainability.

Urban Design Vision

The following vision statement articulates the desired outcome for The Northern Road.

While performing efficiently and safely for local residents and regional motorists and visitors to Sydney, The Northern Road will retain its considerable scenic and heritage values. The planning and design of the road will respond to the rural context, retaining a driving experience that facilitates the appreciation of the landscape within and beyond the road reservation.

Project specific objectives and principles

The future character and quality of the motorist's and adjoining residents' experience of the road, for example connectivity and modal choice, will be determined not only by the planning and design of future upgrades of the road within its reservation, but substantially by the planning, design and development of the land adjoining the corridor. In that sense the vision relies on a commitment by State and Local Government agencies to address all of the issues raised in the previous chapters and implement the Objectives and Principles, and Strategies set out in the following sections of this document.

The following urban design objectives and principles have been prepared in order to guide the development of the concept design outcome for the proposal.

A. Objective: Provide an elegant road alignment that is responsive to, and integrated with the natural and built landscape.

- Ensure that the character of the local topography is a tangible experience for the motorist by providing, as much as possible, a horizontal (curving) and vertical (undulating) road alignment, which mimics the existing, conditions
- Ensure consistency with adjacent The Northern Road upgrade projects
- Minimise the visual scale of the proposal
- Maximise the motorist's experience of the surrounding natural and cultural landscapes
- Develop a simple and unified palette of elements and details that are attractive and easily maintained
- Provide adequate and visible connections to Bringelly Village shops, and new suburban town centres and recreation areas
- Devise a planting/ revegetation strategy that takes into account the long-term visual quality and functional changes within the road corridor
- Protect creeks and creek banks by maximising tree retention and planting at creek crossings and aligning shared pedestrian/ cycle paths in close proximity to the carriageway.

B. Objective: Facilitate the provision of good urban design outcomes to future growth and development areas adjoining the road.

- Work with appropriate authorities to develop a visual, urban design and landscape character of the road corridor by promoting planning/ design strategies that achieve

a high quality environment and amenity at the interface between The Northern Road, Bringelly Village shops, and future growth centres

- Provide a memorable experience at the grade separated interchange to create a sense of place
- Develop a constant visual quality that demonstrates a high standard of infrastructure and public space design and finishes, including visible elements such as bridge and retaining walls
- Provide simple and elegant bridge structures designed in accordance with Roads and Maritime Bridge Aesthetics Guidelines
- Improve accessibility to the proposed western Sydney airport, South West Priority Growth Area and Broader Western Sydney Employment Area (BWSEA)
- Design the interchange to be a self explaining road environment that is easily legible and identifiable to road users on their journey along The Northern Road
- Create a strong visual connection between the interchange and local area through the use of context specific planting and materials
- Minimise the use of retaining walls as far as practicable recognising land constraints, geology and the need to retain vegetation
- Ensure the provision of safe, convenient and enjoyable pedestrian and cycle connections in the most appropriate/ accessible location within the locality in the context of future growth and urban development patterns
- Ensure the bus stop areas are well lit for orientation and safety
- Generally limit lighting to major intersections and points of interest only to retain the rural nature of the road corridor
- Avoid the need for noise walls. Where noise attenuation is required consider mounds or wall/mound combination. Where a wall is the only option, consider the use of a pattern or colour to mitigate the visual impacts of the wall.

C. Objective: Protect and enhance existing views, character, heritage and cultural values of the corridor.

- Retain and reinforce the diverse character of the route, including the distinctive character of the urban areas and the distinction between urban and non-urban areas
- Retain, and where possible improve, regional views and views to important landmarks
- Maintain and enhance heritage and cultural landmarks along the route.
- Retain existing view corridors to establish a sense of place for the journey along The Northern Road
- Control the placement of utilities in the corridor and locate underground where possible to preserve character, enhance views and maximise planting opportunities.

5. LANDSCAPE CHARACTER ASSESSMENT

5.1 Overview

Roads and Maritime's 'Guideline for Landscape Character and Visual Impact Assessment' (Roads and Maritime, 2013) provides the following definition of landscape character:

'The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.'

The study area has been divided into three LCZ as discussed in Chapter 3 and as illustrated in [Figure 3-1](#). The sensitivity of each zone was assessed and a summary of the ratings are presented in [Table 5-1](#).

This chapter describes the magnitude of the impact of the proposal for each LCZ and the resulting landscape character impact is outlined for each zone.

For the landscape character assessment, magnitude refers to the type of proposal and its compatibility with the character of the existing landscape. All anticipated elements of the proposal both during construction and on completion, including the alignment, road infrastructure, ITS, planting, lighting, etc, are considered. The scale of elements (height, length), as well as its location or setting (within woodland, rural land, or over creek crossings), all have a bearing on the magnitude of the physical presence of the proposal.

A high magnitude results if the proposal is a major development or piece of road infrastructure and contrasts highly with the surrounding landscape, or entails heavy modification of the existing landscape. This would occur as a result of the large scale removal of existing vegetation. A moderate magnitude rating would result if the proposal is moderately integrated into the landscape. A low magnitude rating would occur if the proposal is of a small scale and integrates well into the landscape.

The magnitude impact rating also considers whether the proposal has a positive or negative impact on the landscape character of the zone. For example, a proposal may be of a large scale but may provide beneficial outcomes such as increased open space, enhancement of the areas 'sense of place', better connectivity and a safer road environment.

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix [Refer Figure 1-2](#).

Table 5-1: LCZs sensitivity ratings

Landscape Character Zone		Sensitivity
LCZ 1	Bringelly Village shops	Moderate to Low
LCZ 2	Bringelly acreage	High
LCZ 3	Thompsons Creek	Low

5.2 Landscape Character Impact

Operational impacts of the proposal on LCZ 1 - Bringelly Village shops

The proposed works are minimal within this zone and are restricted to a 3.0 metre wide shared path proposed to be built within the existing road alignment on the eastern side of the southbound travel lane for the entire length of the landscape character zone and a cul-de-sac termination of the old alignment.

A new shared path diverts from the new alignment of The Northern Road at chainage 300 and continues north for approximately 1400 m through this landscape character zone before re-joining the new road alignment at chainage 1700. This configuration allows the Robinson Road connection to be well serviced.

Currently The Northern Road is a two-lane single carriageway road with a speed limit of 60 km/h through the Bringelly Village shops area and 40 km/h school zone in the vicinity of the intersection with Bringelly Public School.

Scattered Cumberland Plain Woodland occurs along the edge of edges of the roads in the area and is typical for much of The Northern Road alignment through this character zone. There are a number of mature native trees growing in the zone for most of the length of the road. A new shared path, which is located inside the existing road corridor adjacent the southbound road shoulder, is unlikely to significant impact on the existing roadside vegetation.

The existing section of The Northern Road will be converted to a 'no through road' and a cul-de-sac will be provided in the northern most section of this landscape character zone. Due to the existing character being a two lane road, it is regarded that this change will not have a major impact within the zone.

Construction impacts

In addition to the proposals' impacts, there would be short term indirect impacts during construction related to site establishment which would likely involve the placement of temporary concrete safety barriers and fencing to create a safe work zone. Following construction, or progressively during the works where possible, this infrastructure would be dismantled and restored to its pre-construction state.

Overall, the magnitude of change within this landscape character zone is assessed to be Low, due to the minimal nature of the works.

Table 5-2: Landscape character assessment (LCZ1)

Landscape Character Assessment	
Sensitivity	Moderate
Magnitude	Low
Landscape Character Impact	Moderate - Low

Operational impacts of the proposal on LCZ 2 - Bringelly acreage

The proposed works have the greatest impact within this zone. The works will include:

- An upgrade of Bringelly Road between Kelvin Park Drive and Greendale Road to become two lanes in each direction with wide central medians
- A new 1 km section of The Northern Road between Robinson Road and Thompsons Creek will be constructed to the east of the existing alignment and will include two traffic lanes in each direction
- Four metre wide shoulders connecting to the on and off ramps of the interchange and allowing for the future provision of a bus lane
- An underpass about 60 m long beneath the upgraded section of Bringelly Road which will include retaining walls to minimise the extent of batters
- 2.5 m wide shoulders along The Northern Road under the interchange for a length of about one kilometre
- A wide central median to allow construction of a future third traffic lane in each direction
- A new signalised intersection on Bringelly Road over The Northern Road
- Two new bus stops on The Northern Road northbound and southbound interchange on ramps
- A three metre wide shared paths for pedestrians and cyclists
- A new connection between Robinson Road and The Northern Road
- Conversion of the existing section of The Northern Road to a 'no through road', providing a cul-de-sac at the southern end near Robinson Road

Construction impacts

In addition to the proposals' impacts, there would be short term impacts during construction related to site establishment which would likely involve the placement of temporary concrete safety barriers and fencing to create a safe work zone. Within the works zone there is likely to be earth moving equipment, trucks and cranes in operation.

During this time, an area of land close to the intersection of Belmore Road and The Northern Road is likely to be used as a construction compound area. The site would likely be surrounded by temporary fencing and consist of storage facilities, stockpile areas, site buildings and other facilities. Following construction the site would be dismantled and restored to its pre-construction state.

The majority of the works take place within this within this existing rural residential landscape character zone, therefore, the magnitude is assessed to be **High**.

Table 5-3: Landscape character assessment (LCZ2)

Landscape Character Assessment	
Sensitivity	High
Magnitude	High
Landscape Character Impact	High

Operational impacts of the proposal on LCZ 3 - Thompsons Creek

The proposed works are minimal within this zone and are restricted to the fill batters associated with the widened road corridor adjacent the northbound travel lane. The limit of works for this project lies south of the existing bridge across Thompsons Creek and it will be during the next stage of works that the existing bridge, across Thompsons Creek, will be upgraded.

The works will require the removal of a small area of mostly native vegetation associated with the additional road carriageway batters south west of Thompson Creek.

Construction impacts

Small areas of exotic and native vegetation would likely need to be removed in this zone for the construction of new fill batters. It is likely that there would be short term impacts during construction related to site establishment which could possibly involve the placement of temporary concrete safety barriers and fencing to create a safe work zone.

Overall, the magnitude within this landscape character zone is considered Low as the proposal transitions to the existing two lane road.

Table 5-4: Landscape character assessment (LCZ3)

Landscape Character Assessment	
Sensitivity	Low
Magnitude	Low
Landscape Character Impact	Low

5.3 Summary of Landscape Character Impact

The landscape character impact assessment of the proposal described above, represents a qualitative assessment based on the three LCZs. The results of these assessments range from High to Low and are summarised in [Table 5-5](#).

Table 5-5: LCZs Impact Assessment Summary

LCZ		Sensitivity	Magnitude	Impact
LCZ 1	Bringelly Village shops	Moderate	Low	Moderate-Low
LCZ 2	Bringelly acreage	High	High	High
LCZ 3	Thompsons Creek	Low	Low	Low

The greatest impacts caused by the proposal on the landscape character, generally occur where the sensitivity to change is greatest. In this situation, this occurs in the areas where the interchange works are located in or close to rural 'Bringelly acreage' residential areas. These are predominantly located either side of The Northern Road alignment to the north and south of the intersections and east of the interchange.

The magnitude of the impacts of the proposed works on landscape character are high through to low, as the works occur close to an established motorway corridor and are largely screened from adjoining areas by the under bridge structure of The Northern Road below Bringelly Road. The areas of greatest magnitude occur close to the under bridge where the proximity of residential areas to the works is closest.

Out of the three LCZs, the range of landscape character impact ratings were determined as follows:

- One LCZ would have a High impact on its landscape character
- No LCZs would have a High to Moderate impact on its landscape character
- No LCZs would have a Moderate impact on its landscape character
- One LCZ would have a Moderate to Low impact on its landscape character
- One LCZ would have a Low impact on its landscape character.

6. VISUAL IMPACT

6.1 Visual Impact Methodology

Visual Catchment

The extent from which the proposal would be visible from adjoining areas varies along the length of the study area. It is influenced by topography, vegetation, land uses (rural, residential, industrial) and associated buildings. A detailed field and desktop assessment was undertaken to determine the area from where the proposal would be visible, defined as the Visual Envelope Map (VEM), as illustrated in Figure 6-1.

Views to the proposal are generally constrained by the under bridge structure which utilises the existing ridge line to ensure the interchange does not sit higher in the landscape than the existing Bringelly Road alignment.

The visual receivers of the proposal include residents, shoppers, workers, school children, pedestrians, cyclists and motorists.

Viewpoint Locations

Within the VEM, key viewpoints have been identified along the road corridor and at public domain areas. This involved the analysis of views, from the road, to identify the extent to which houses and other buildings were visible. This provided an indication of the likely level of visibility from these buildings, as it was not feasible to inspect private residences to check potential views from these properties. Locations and directions of chosen viewpoints are representative of the range of viewpoints both within and beyond the road corridor, and are indicated in Figure 6-1.

Visual Impact Assessment

The magnitude of change to existing views and the sensitivity of the viewer has been assessed for each of the chosen viewpoints.

Magnitude

Magnitude of change to existing views refers to the nature and scale of the proposal, and the extent and proximity of the view to it. Magnitude represents the contrast in scale, form and type of proposal to the location and context to which it is to be placed.

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

Sensitivity

Sensitivity is the measure of the visual importance of the view and is dependent on:

- Distance between viewer and the proposal.
- The category of viewer, for example, resident, worker, shopper, open space user.
- The elements of the proposal that are visible.

- Importance of the view, for example, identified in tourist guides, static or moving viewpoint, do people deliberately seek the view.

Visual sensitivity includes the consideration of the perceived cultural and historical values of the visual environment and the elements within it.

Generally, viewers with the highest sensitivity include:

- Residents who have existing attractive views that will be affected by the proposal.
- Users of public open space where their attention is focused on the visual landscape, for example, lookouts or other scenic natural areas.
- Communities that place high cultural and historical significance on the visual landscape.

Viewers with the lowest sensitivity are most likely to be:

- Employees focused on their work
- Motorists whose attention is focused on driving.

Impact

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix ([Refer Figure 1-2](#)).

The following pages contain an assessment quantifying the visual impact at each viewpoint. The impact ratings are measured on their impact relative to each other within the scope of the proposal rather than to an absolute scale covering all potential forms of impact.

Key viewpoints

A total of 12 viewpoints have been identified on the basis of the criteria outlined above. Each viewpoint is comprised of the following summary information:

- Location
- Viewpoint selection rationale
- Proposal elements visible
- Visual impact based on assessment of magnitude of change and sensitivity
- Mitigation measures that have been incorporated into the landscape and engineering designs.

The viewpoints are as indicated in [Figure 6-1](#) and are listed from east to west.

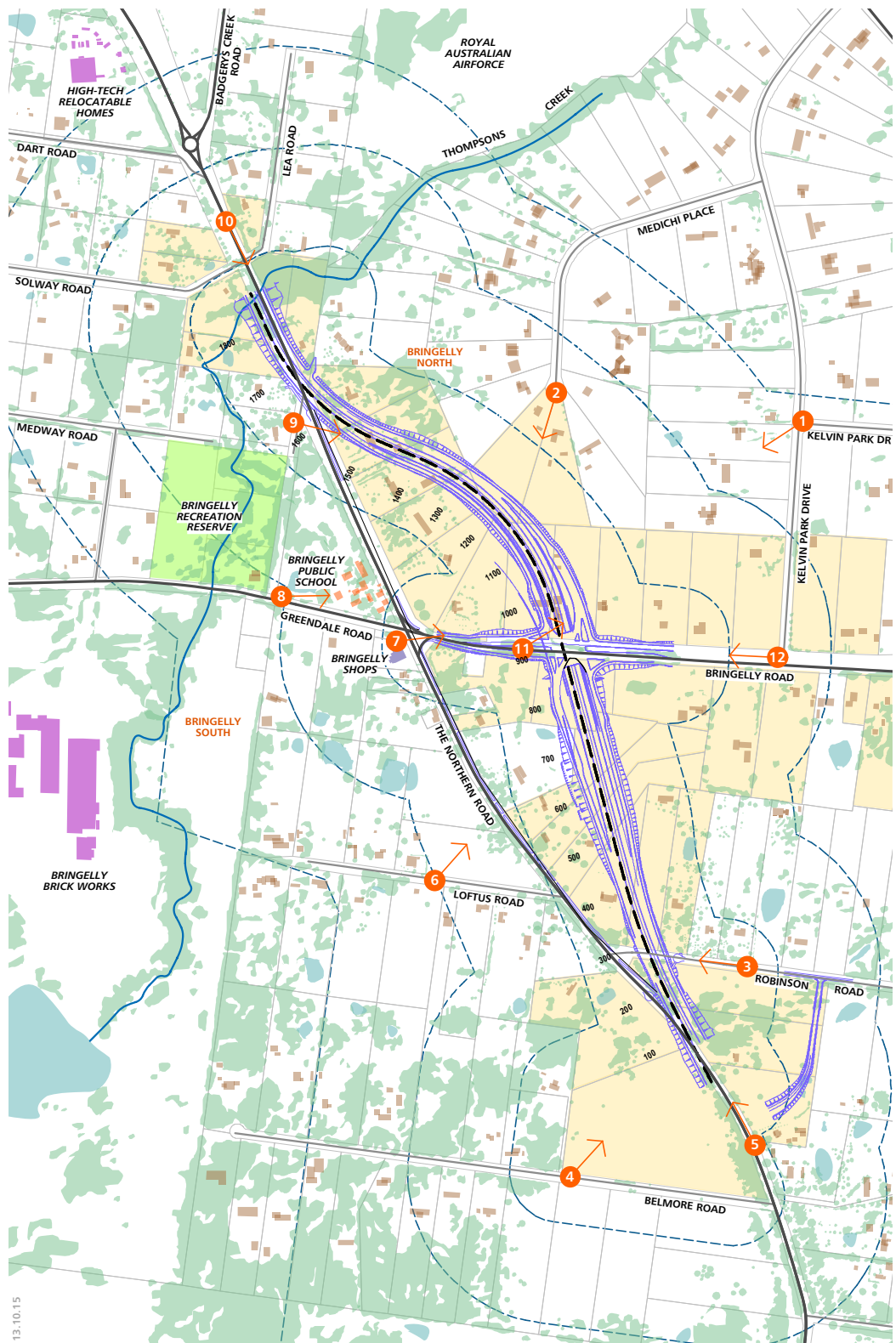















Figure 6-1: Viewpoint location plan

LEGEND			
	INTERCHANGE ALIGNMENT (50% CONCEPT DESIGN)		SELECTED VIEWPOINTS
	HIGHWAY/ ROADS		VISUAL CATCHMENT ZONES (100M, 300M, 500M)
	STREETS		CADASTRAL BOUNDARIES
	WATERWAYS/WATERBODIES		IMPACTED PROPERTIES
	VEGETATION		PRIVATE DWELLINGS
	RESERVE/RECREATION		BRINGELLY PUBLIC SCHOOL
			AGRICULTURAL/INDUSTRIAL
			SHOPPING CENTRE

6.3 Visual Impact Assessment

Viewpoint 1

Location:
Kelvin Park Drive intersection



Viewer:
Residents and motorists

Distance to the proposal:
500 m from the grade separated interchange

View type:
Long distance view

Elements of the proposal visible:

- From this viewpoint it is unlikely that there will be views of Bringelly Road or the under bridge of The Northern Road however at least two dwellings with associated vegetation will be removed as well as some existing native vegetation which currently lines Bringelly Road.

Sensitivity	Magnitude	Impact
Moderate	Negligible	Negligible
The sensitivity of the residents would be considered high, however, their distance from works (over 500 m) and the limited extent of the elements that would be visible as a result of existing houses reduces the rating to moderate.	Although the residential dwellings and gardens in the mid distance partially obscure the view, a small amount of vegetation will be removed associated with the impacted properties and the Bringelly Road carriageway widening. Planting of similar native species inside the site works boundary would mitigate the magnitude of the works as they mature over time. At a distance of 500 m from the site works boundary it is unlikely that site establishment infrastructure or construction machinery will be prominent.	

Viewpoint 2

Location:
Medich Place (southern end of the cul-de-sac)



Viewer:
Residents

Distance to the proposal:
220 m from the new section of The Northern Road

View type:
Mid distance view

- Elements of the proposal visible:
- Possible views of the western retaining wall of the under bridge
 - Possible views of new fill batters associated with the southbound travel lanes
 - Possible views of the wide depressed central median with feature planting
 - Views of traffic moving along the travel lanes of Bringelly Road and The Northern Road.

Sensitivity	Magnitude	Impact
High	Moderate	High to Moderate
Residents within the area would have high sensitivity to changes, due to the proximity of their private spaces and orientation to the interchange works.	Although the foreground residential dwellings and gardens partially obscure the view, some elements of the interchange listed above may be visible from this viewpoint. Planting of similar native species inside the site works boundary would mitigate the magnitude of the works as they mature over time. During construction the temporary concrete safety barriers and fencing to create a safe work zone may be visible.	

Viewpoint 3

Location:

Robinson Road, adjacent Lot 17



Viewer:

Residents and motorists

Distance to the proposal:

150 m from the new section of The Northern Road

View type:

Foreground view

Elements of the proposal visible:

- Minor works associated at the southern tie-in with The Northern Road
- Conversion of Robinson Road intersection with The Northern Road in to a 'no through road' and providing a cul-de-sac
- A new connection between Robinson Road and The Northern Road
- Removal of some existing vegetation immediately adjacent The Northern Road
- New embankment batters associated with southbound travel lanes
- Views of traffic moving along the two northbound and two southbound travel lanes of The Northern Road
- A wide raised central median with accent planting and turf edging.

Sensitivity	Magnitude	Impact
Moderate	Moderate	Moderate
Motorists would have a low sensitivity to change while residents within the area would have moderate sensitivity to the changes. The majority of properties close to the interchange works are set back from the road and are densely vegetated to their perimeter boundary, limiting distant views.	<p>Although the foreground trees partially obscure the view, the elements of the proposal listed above are likely to be partially visible in this view.</p> <p>It is likely that some vegetation close to The Northern Road carriageway would be removed, however, replacement planting with similar native species would mitigate the magnitude of the works as they mature over time.</p> <p>During construction the temporary concrete safety barriers and fencing to create a safe work zone may be visible.</p>	

Viewpoint 4

Location:
Belmore Road



- Viewer:
Residents and motorists
- Distance to the proposal:
320 m from the new section of The Northern Road
- View type:
Long distance view
- Elements of the proposal visible:
- Southern tie-in with The Northern Road
 - Batter embankments associated with the southbound travel lanes
 - Temporary site compound area.

Sensitivity	Magnitude	Impact
Moderate	Low	Moderate to Low
The sensitivity of the residents would be considered high, however, their distance from works (320 m) and the limited extent of the elements that would be visible reduces the rating to moderate.	Although at a some distance from the viewier the elements of the proposal listed above may be partially visible from this view as some vegetation close to The Northern Road carriageway would be removed. However, replacement planting with similar native species would mitigate the magnitude of the works as they mature over time. During construction, a compound area will operate in the foreground. This would likely be surrounded by temporary fencing and consist of storage facilities, stockpile areas, site buildings and other facilities. Following construction the site would be dismantled and restored to its pre-construction state.	

Viewpoint 5

Location:
The Northern Road, Lot 1110



Viewer:
Motorists

Distance to the proposal:
140 m from the southern tie-in of the new section of The Northern Road with the existing

View type:
Foreground view

Elements of the proposal visible:

- Southern tie-in with the existing alignment of The Northern Road
- Two north and southbound a travel lanes of the new alignment
- Batters on both sides of the new carriageway
- The existing carriageway of The Northern Road off to the west and converted into a cul-de-sac.

Sensitivity	Magnitude	Impact
Low	Moderate	Moderate to Low
Motorists on The Northern Road would have low sensitivity to change in this existing road environment.	<p>From this viewpoint the existing two way road will be replaced by four travel lanes and more vehicular traffic on the widened road carriageway would be visible.</p> <p>New planting with similar native species would mitigate the magnitude of the works by screening views of the southern 'no through road' a cul-de-sac from The Northern Road motorists.</p> <p>During construction the temporary concrete safety barriers and fencing creating a safe work zone will be visible while the new road alignment is under construction.</p>	

Viewpoint 6

Location:
Loftus Road, Lot 16



Viewer:
Residents and motorists

Distance to the proposal:
370 m from the new alignment of The Northern Road

View type:
Mid-long distance view

- Elements of the proposal visible:
- The new road alignment is located east of the existing road
 - A new shared three metre wide local access path will be constructed within the existing road alignment, on the eastern side. It is unlikely that this will be visible from this viewpoint.

Sensitivity	Magnitude	Impact
Moderate	Low	Moderate to Low
The sensitivity of residents would be considered high, however, their distance from the works and the screening of the existing vegetation associated with the existing The Northern Road alignment reduces the rating to moderate. Motorists on The Northern Road would have low sensitivity to change.	Foreground trees associated with the existing alignment of The Northern Road will almost fully obscure the view of the shared path as well as the new alignment of The Northern Road. During construction temporary concrete safety barriers and fencing which will create a safe work zone could possibly be visible but is unlikely.	

Viewpoint 7

Location:
Bringelly Village shops



Viewer:
Visitors to the Bringelly Village shops and motorists

Distance to the proposal:
90 m from the Bringelly Road upgrade

View type:
Foreground view

Elements of the proposal visible:

- Two traffic lanes in each direction between The Northern Road/Bringelly Road interchange and east to Kelvin Park Drive, with wide central medians with accent planting and turf edging that will allow for a future third traffic lane in each direction
- A new signalised intersection on Bringelly Road over The Northern Road further east of this viewpoint
- New shared path local access pavement on the eastern side of The Northern Road and removal of some existing trees which are adjacent the carriageway.

Sensitivity	Magnitude	Impact
Low	Moderate	Moderate to Low
The sensitivity would be low as the viewers would be patrons using the parking facilities of the local shops who would have their attention focussed on carpark operations and shopping. Motorists on Bringelly Road and The Northern Road would have low sensitivity to change.	Close to the existing intersection, areas of vegetation adjacent Bringelly Road would be removed however, replacement planting with similar native species would mitigate the magnitude of the works as they mature over time. During construction the temporary concrete safety barriers and fencing creating a safe work zone will be visible as well as earth moving machinery and trucks.	

Viewpoint 8

Location:
Greendale Road close to the south west boundary of Bringelly Public School



Viewer:
School children and motorists

Distance to the proposal:
480 m from the new section of The Northern Road

View type:
Long distance view

- Elements of the proposal visible:**
- The new interchange alignment is 430 m further away from this viewpoint
 - Possibly some batters associated with the northbound travel lanes may be visible.

Sensitivity	Magnitude	Impact
Low	Negligible	Negligible
The sensitivity of school children in the grounds of the Bringelly Public School would be low as their attention would be focussed internally on sports and other activities. Motorists on Greendale Road would have low sensitivity to change.	Vegetation close to The Northern Road will screen the majority if not all of the interchange works from this viewpoint. There is the potential for small and intermittent views of the new alignment through the vegetation but these glimpses would be over 400 m away. During construction it is unlikely that any construction activity or associated infrastructure would be visible.	

Viewpoint 9

Location:
Thames Road



Viewer:
Residents and motorists

Distance to the proposal:
85 m from the new section of The Northern Road

View type:
Mid distance view

Elements of the proposal visible:

- Conversion of The Northern Road in to a 'no through road' cul-de-sac
- Service/ access road pavement
- New shared path local access pavement on the eastern edge of the cul-de-sac
- Batters associated with the new interchange alignment
- Views of traffic moving along the two northbound and two southbound travel lanes of The Northern Road re-alignment.
- Possible view of central depressed median with feature planting.

Sensitivity	Magnitude	Impact
High	Moderate	High to Moderate
Residents within the area would have high sensitivity to changes, due to the proximity of their private spaces to the interchange works. Motorists on The Northern Road would have low sensitivity to change.	The works would nearly triple the width of the road pavement and require the removal of a large amount of existing vegetation. New planting with similar native species would help to mitigate the magnitude of the works by screening views which reduces the rating to moderate. During construction temporary concrete safety barriers and fencing creating a safe work zone will be visible as well as earth moving machinery and trucks.	

Viewpoint 10

Location:

The Northern Road at the intersection of Badgerys Creek Road



Viewer:

Motorists

Distance to the proposal:

155 m from the northern tie-in of the new section of The Northern Road with the existing

View type:

Mid distance view

Elements of the proposal visible:

- Northern tie-in with existing and Stage 2C at Thompsons Creek and Lea Road.

Sensitivity	Magnitude	Impact
Low	Moderate	Moderate to Low
Motorists on The Northern Road would have low sensitivity to change in this road environment.	From this viewpoint the existing two way road will be replaced by four travel lanes and more vehicular traffic on the widened road carriageway would be visible. Temporary concrete safety barriers and fencing creating a safe work zone will be visible while the new road alignment is under construction.	

Viewpoint 11

Location:
Bringelly Road (east of the existing intersection with The Northern Road)



Plate 6-11: Viewpoint 11

Viewer:
Motorists

Distance to the proposal:
0 m to the upgraded Bringelly Road

View type:
Foreground view

- Elements of the proposal visible:**
- Anti-throw screen associated with the under bridge of The Northern Road
 - Two traffic lanes in each direction between The Northern Road/Bringelly Road interchange and east to Kelvin Park Drive, with wide central medians with accent planting and turf edging that will allow for a future third traffic lane in each direction
 - A new signalised intersection on Bringelly Road over The Northern Road.

Sensitivity	Magnitude	Impact
Low	Moderate	Moderate to Low
Motorists on Bringelly Road would have low sensitivity to change in this road environment.	<p>The works would almost double the extent of visible road pavement and would require the removal of some existing vegetation. New planting with similar native species would help to mitigate the magnitude of the works by screening views which reduces the rating to moderate.</p> <p>During construction temporary concrete safety barriers and fencing creating a safe work zone will be visible as well as earth moving machinery and trucks.</p>	

Viewpoint 12

Location:
Bringelly Road at the corner of Kelvin Park Drive



Plate 6-12: Viewpoint 12

Viewer:
Motorists

Distance to the proposal:
200 m from the eastern tie-in of the proposal with the existing Bringelly Road

View type:
Mid distance view

- Elements of the proposal visible:
- Two traffic lanes in each direction between Kelvin Park Drive and The Northern Road/Bringelly Road interchange, with wide central medians to allow for a future third traffic lane in each direction.

Sensitivity	Magnitude	Impact
Low	Low	Low
Motorists on Kelvin Park Drive and on Bringelly Road would have low sensitivity to change in this road environment.	Foreground trees will partially obscure the view of the widened road, however the removal of some existing vegetation adjacent the existing road carriageway is likely. New planting with similar native species would help to mitigate the magnitude of the works by screening views which reduces the rating to low. During construction temporary concrete safety barriers and fencing which will create a safe work zone could possibly be visible but is unlikely.	

6.2 Visual Impact Summary

A total of 12 viewpoints form the basis of the visual impact assessment. The viewpoints are focused across the range of anticipated magnitudes and sensitivities including residents, pedestrians, shoppers and motorists, providing a more even ratings outcome. A summary of the assessment results are presented Table 7-1.

Out of the 12 selected viewpoints, the range of visual impact ratings were determined as follows:

- No viewpoints would have High visual impact
- Two viewpoints would have High to Moderate visual impact
- One viewpoint would have Moderate visual impact
- Six viewpoints would have Moderate to Low visual impact
- One viewpoint would have Low visual impact
- Two viewpoints would have Negligible visual impact.

A rating of High to Moderate occurs in an area where proximity to the works is greatest in particular at Medich Place and Thames Road potentially exposing residential viewers to the interchange works.

The Moderate, Moderate to Low, Low and Negligible ratings are the most common and reflect the generally low visibility of the proposal to those outside of the road corridor. It also indicates that the scale of the proposal would be consistent with this road environment.

Landscape and urban design mitigation strategies have been developed from the outcomes of the landscape character and visual assessments, as a way of mitigating the potential impacts. These mitigation measures, as well as those to be further considered in the detailed design stage of the project are discussed in the following Chapter 7.

Table 6-1: Visual Impact Summary

Viewpoint	View type	Sensitivity	Magnitude	Impact
VP 1	Long distance view	Moderate	Negligible	Negligible
VP 2	Mid distance view	High	Moderate	High to Moderate
VP 3	Foreground view	Moderate	Moderate	Moderate
VP 4	Long distance view	Moderate	Low	Moderate to Low
VP 5	Foreground view	Low	Moderate	Moderate to Low
VP 6	Mid distance view	Moderate	Low	Moderate to Low
VP 7	Foreground view	Low	Moderate	Moderate to Low
VP 8	Mid distance view	Low	Negligible	Negligible
VP 9	Mid distance view	High	Moderate	High to Moderate
VP 10	Mid distance view	Low	Moderate	Moderate to Low
VP 11	Foreground view	Low	Moderate	Moderate to Low
VP 12	Mid distance view	Low	Low	Low

7. MITIGATION STRATEGY

7.1 Mitigation incorporated in the Concept Design

The integration of the engineering and performance objectives with urban and landscape design objectives for the proposal aims to produce a design outcome that fits sensitively with the existing qualities and characteristics of the areas adjacent The Northern Road corridor and surrounding Bringelly acreage areas. In order to achieve this, a range of mitigation measures have been incorporated into the proposal as the concept developed. These measures combine to develop a solution that seeks to protect and enhance the existing visual character of The Northern Road and its surrounds, where possible.

The mitigation measures that have been investigated during the development of the urban and landscape design concept are summarised below.

Grade separated interchange

The works at the interchange involve construction of a grade separated interchange east of the existing intersection of The Northern Road, Bringelly Road and Greendale Road where Bringelly Road will pass over The Northern Road. Works will include:

- Widening and upgrading approximately 400 m of Bringelly Road between Kelvin Park Drive and Greendale Road with increased number of travel lanes with a wide central medians and wide shoulders
- On and off ramps to The Northern Road
- Semi transparent throw screen
- Additional bus bays
- Embankments
- Impacts of existing properties
- Removal of existing vegetation.

Mitigation measures would include:

- Minimising the removal of existing vegetation within and beyond the site works boundary
- Planting of Cumberland Plain Woodland species to replace those being removed to provide screening of the works to the surrounding areas
- Planting of shrub species in the median, taking into account clear zone requirements
- Highlighting the regional importance of the interchange with additional landscape treatments.

New section of The Northern Road

A new section of The Northern Road will be constructed between Robinson Road and Thompsons Creek, to the east of the existing alignment. The new section would be about one kilometre long and about 50 m wide (including embankments), and would include:

- An underpass about 60 m long beneath the upgraded section of Bringelly Road
- Retaining walls
- Embankments
- Removal of existing vegetation.

Mitigation measures would include:

- Minimising the removal of existing vegetation within and beyond the site works boundary
- Minimising loss of property amenity where possible
- Planting of Cumberland Plain Woodland species to replace those being removed to provide screening of the works to the surrounding areas
- Planting of shrub species in the median, taking into account clear zone requirements.

The Northern Road (existing alignment)

The existing alignment of The Northern Road will be converted to a 'no through road' and will service Loftus Road and Greendale Road, the Bringelly Shops and the Bringelly Public School. Works will include:

- Provision of a cul-de-sac at the southern end near Robinson Road at a cul-de-sac at Thames Road at the northern end
- Retention of the existing bus stops on the existing alignment of The Northern Road
- Provision of a three metre wide shared paths for pedestrians and cyclists built within the existing road alignment.

Mitigation measures would include:

- Revegetation of works areas with Cumberland Plain Woodland species (including grasses, ground covers and shrubs, depending on sight line requirements).

Ancillary areas

At the southern end of the interchange site works will include:

- A new connection between Robinson Road and The Northern Road
- Site compound area at the intersection of Belmore Road and The Northern Road.

Mitigation measures would include:

- Revegetation of the site compound area with species, including grasses, ground covers and shrubs that will restore the site to its pre-construction state
- Revegetation of road works areas with Cumberland Plain Woodland species (including grasses, ground covers and shrubs, depending on sight line requirements).
-

7.2 Mitigation during construction

The following mitigation measures would be implemented during construction:

- Detail design and documentation drawings would define the extent of all construction activity including temporary works in order to protect the area during construction
- Construction facilities should be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use
- Provide suitable barriers to screen views from adjacent areas during construction
- Once construction is complete, or progressively throughout the works where possible, return these sites to at least their pre-construction state
- Keep pollution and dust emissions to a minimum and monitor throughout the project construction period

- Divert or re-route footpaths that would be affected by construction activities
- Existing trees to be retained within construction facilities areas would be identified, protected and maintained
- Temporary lighting should be screened or diverted to reduce unnecessary light spill
- Heritage items should be protected
- Material used for temporary land reclamation would be removed once the works are complete

8. CONCLUSION

The study area for the proposal sees the widening and upgrade of 400 m of Bringelly Road and construction of a new one kilometre section of The Northern Road between Robinson Road and Thompsons Creek. The study area runs through the centre of the Cumberland Plain, a vast, undulating, shallow basin, incised by a number of creeks flowing north to the Hawkesbury River.

Understanding the built, natural and cultural character surrounding the proposed grade separated interchange, identifying opportunities and articulating urban design objectives and principles have been integral components of the design approach to this project. An iterative, inter-disciplinary, process has been adopted to:

- Achieve a project that fits sensitively with the existing qualities and characteristics of The Northern Road and surrounding rural/ acreage setting
- Maintain the essential qualities and character of the corridor and the sense of place imparted by The Northern Road experience, particularly the Cumberland Plain Woodland plantings
- Achieve an integrated road design form and character that blends with the adjoining areas
- Develop a simple and unified palette of roadside elements and details that are attractive and easily maintained.

The landscape character impact assessment of the interchange, represents a qualitative assessment of the impact that the proposal has on the three Landscape Character Zones. These are summarised below:

- Bringelly Village shops - moderate impact
- Bringelly Acreage - high impact
- Thompsons Creek - low impact

The magnitude of the impacts on landscape character are high through to low, as the works occur close to an established motorway corridor and are largely screened from adjoining areas by the under bridge structure of The Northern Road below Bringelly Road. The areas of greatest magnitude occur close to the under bridge where the proximity of residential areas to the works is closest.

The magnitude of change to existing views and the sensitivity of the viewer was assessed for each of the 12 viewpoints. These were selected to represent a range of anticipated magnitudes and sensitivities including residents, pedestrians, shoppers and motorists. Out of the 12 selected viewpoints, the range of visual impact ratings were determined as follows:

- Two viewpoints would have High to Moderate visual impact
- Two viewpoints would have Moderate visual impact
- Five viewpoints would have Moderate to Low visual impact
- One viewpoint would have Low visual impact
- Two viewpoints would have Negligible visual impact.

The overall character of the grade separated interchange at the intersection of The Northern Road and Bringelly Road would remain largely intact, however, there would be

high to moderate visual and landscape character impacts where the new alignment of The Northern Road adjoins residential areas, which require mitigation.

The urban design and landscape objectives and principles developed for this project take into account urban design and visual character, not only for the study area itself, but also reflect its relationship with the surrounding semi rural and residential areas.

The urban design concept developed by GHD applies the urban design and landscape objectives and principles to provide an integrated outcome that helps fit the project as sensitively as possible into its context and to minimise the impacts of the project on the character of the grade separated interchange and its surrounds, through the incorporation of a number of mitigation measures. The urban design and landscape concept would aim to:

- Minimise the removal of existing vegetation
- Incorporate materials and finishes for new road elements, including noise walls and retaining walls, that are site appropriate
- Include a planting design of Cumberland Plain Woodland species intended to reduce the scale of the proposed road infrastructure and grade separated interchange
- Highlight the intersection of The Northern Road and Bringelly Road interchange with additional landscape treatments

Development of the proposed project during a future phases needs to consider the key mitigation strategies outlined in this report to ensure integration of the works into the surrounds.

9. APPENDICES

9.1 The Northern Road/Bringelly Road Grade Sepearated Interchange Concept Design

GHDWOODHEAD

The Northern Road/ Bringelly Road Grade Separated Interchange Concept Design

Urban Design and Landscape Architecture

November 2015





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Figure 19: Exploration of bridge interchange built form

Figure 20: Planting mix

Figure 21: Cross section

Figure 22: Planting matrix

Figure 23: The new section of The Northern Road

Figure 24: Grade separated interchange view

The background of the slide features a photograph of a stone wall in the foreground, with a dense line of trees and foliage behind it. The entire image is covered with a semi-transparent green filter. The text '1.' is positioned in the lower-middle part of the image, overlaid on the green filter.

1.

Introduction

1.1 Overview

This report describes the Urban and Landscape Design component of The Northern Road / Bringelly Road Grade Separated Interchange.

Roads and Maritime Services (Roads and Maritime) is proposing to upgrade the intersection of The Northern Road and Bringelly Road in Bringelly to a grade separated interchange (referred to as 'the proposal' for the purposes of this report). The proposal is located within the Western Sydney Priority Growth Area and South West Priority Land Release Area (formerly known as the South West Growth Centre), about 45 km south-west of the Sydney central business district and 12 km west of Liverpool (refer to Figure 01).

The proposal would tie into The Northern Road Upgrade Stage 2A (Peter Brock Drive to Belmore Road) to the south, The Northern Road Upgrade Stage 2C (Thames Road to Mersey Road) to the north, and the Bringelly Road Upgrade Stage 2 (King Street to The Northern Road) to the east.

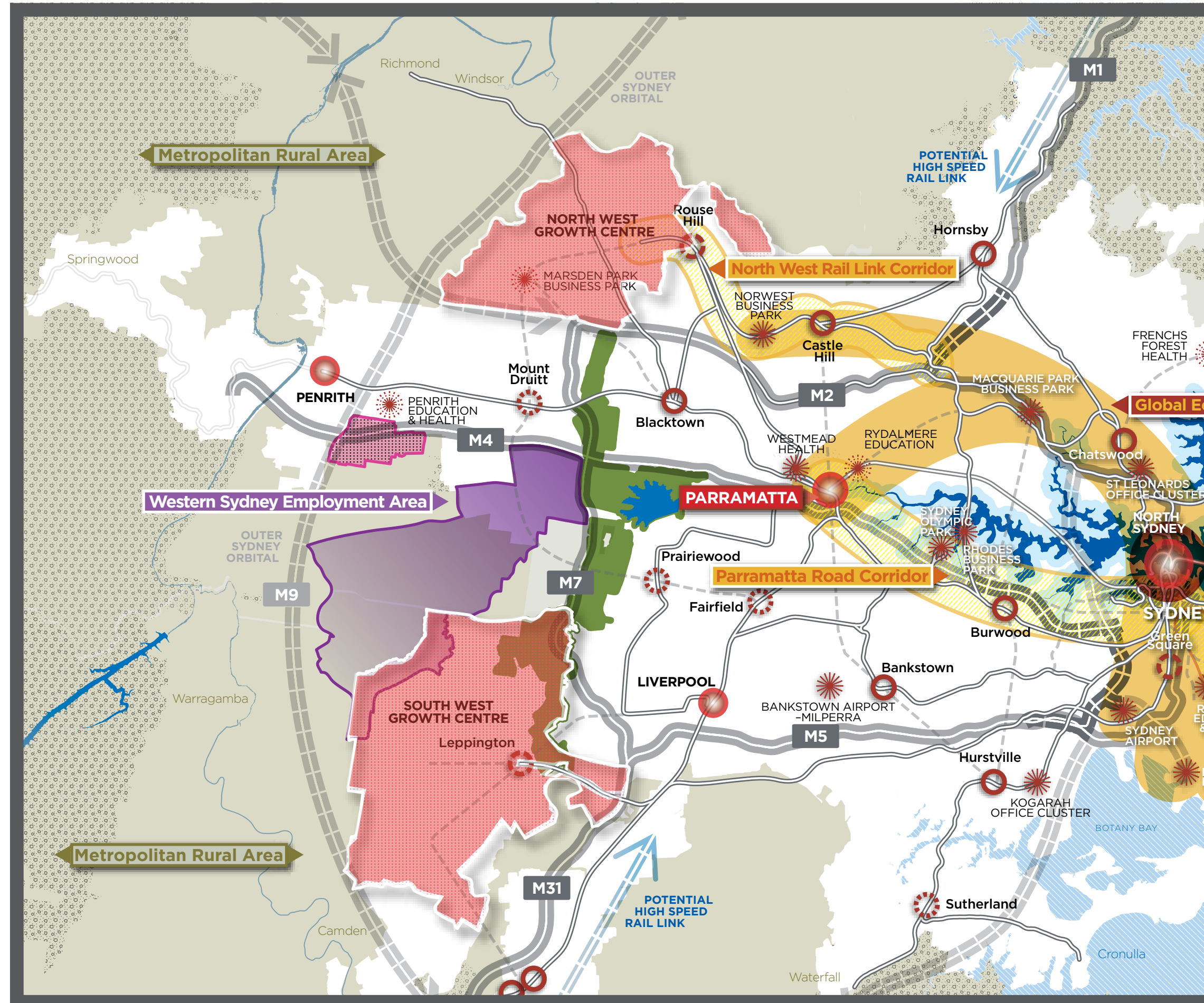
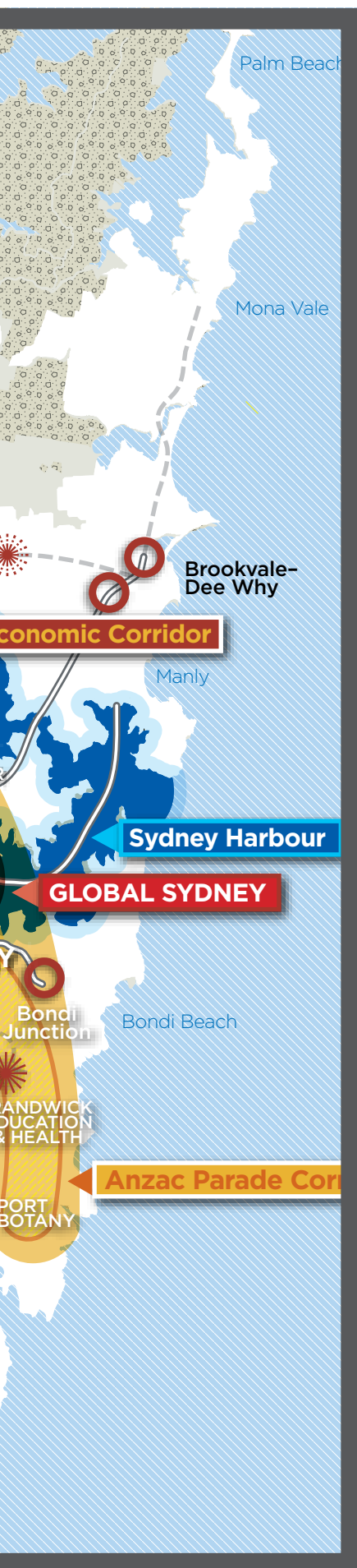


Figure 01. Vision for Sydney 2031:
Draft Metropolitan Strategy for Sydney



1.2 Proposal outline

The proposal involves constructing a grade separated interchange about 300 m east of the existing intersection of The Northern Road, Bringelly Road and Greendale Road. This will involve The Northern Road passing under Bringelly Road. The proposal also involves modifications to the existing intersection. The key features of the proposal are described as follows:

1.2.1 Bringelly Road

- Widening and upgrading of about 400 m of Bringelly Road, between Kelvin Park Drive and Greendale Road, to provide:
 - Two traffic lanes in each direction between Kelvin Park Drive and The Northern Road/Bringelly Road interchange, with wide central medians to allow for a future third traffic lane in each direction
 - Two traffic lanes in each direction on the western side of the interchange, transitioning to one lane in each direction to tie into Greendale Road
 - Two metre wide shoulders in each direction
- Providing a new traffic light intersection on Bringelly Road over the new section of The Northern Road, with turning movements provided in all directions
- Providing dual right turn movements in all directions to and from the new section of The Northern Road and Bringelly Road, and dedicated left turn lanes in all directions.

1.2.2 The new section of The Northern Road

- Constructing a new section of The Northern Road between Robinson Road and Thompsons Creek, to the southern abutment of the bridge. The new section will be about one kilometre long and about 50 m wide (including embankments). The proposal would include the following:
 - Two traffic lanes in each direction
 - Shoulders of four metres wide connecting to the on and off ramps of the interchange, allowing for the future provision of a bus lane
 - An underpass 60 m long beneath the upgraded section of Bringelly Road
 - Shoulders of two and a half metres wide along the new section of The Northern Road under the interchange for a length of about one kilometre
 - A wide central median to allow construction of a future third traffic lane in each direction
- Providing a new signalised intersection on Bringelly Road over The Northern Road, with turning movements provided in all directions
- Providing dual right turn movements in all directions to and from The Northern Road and Bringelly Road, and dedicated left turn lanes in all directions
- Providing bus service facilities by:
 - Retaining the existing bus stops on the existing section of The Northern Road
 - Relocating existing bus stops on Bringelly Road to suit the interchange
 - Providing two new bus stops on the new section of The Northern Road northbound and southbound interchange on the proposed ramps
 - Providing a bus only lane for buses travelling north and south along the new section of The Northern Road at the traffic light intersection on Bringelly Road

- Providing future three metres wide shared path for pedestrians and cyclists
- Providing a new connection between Robinson Road and The Northern Road via an extension to the realigned Belmore Road intersection.

1.2.3 The existing section of The Northern Road

- Converting the existing section of The Northern Road to a 'no through road', providing a cul-de-sac at the southern end near Robinson Road, and a cul-de-sac at Thames Road at the northern end.

1.3 Scope of work

The purpose of this report is to advise and assist the development of the concept design in accordance with the urban design objectives and principles identified in The Northern Road / Bringelly Road Grade Separated Interchange Landscape Character and the Visual Impact Assessment Report (2015). This report should also be read in conjunction with the outcomes of the The Northern Road / Bringelly Road Grade Separated Interchange Review of Environmental Factors (2015).

The report includes plans, sections and illustrations to illustrate the urban design outcome for the project covering the road elements and how they are integrated into the holistic design. A narrative is included in the report to document the development of the concept and refer to the considerations made to avoid or minimise the negative impacts of the road onto the natural and built settings.

The extent of the scope of work is to accommodate the grade separated interchange as it connects to The Northern Road and Bringelly Road.

The scope of work includes the surrounding surface road network to be upgraded to accommodate increased traffic demand. The following roads and associated intersections will be upgraded as part of the work:

- Bringelly Road
- The new section of The Northern Road
- The existing section of The Northern Road.

It is anticipated that construction of the proposal would start in late 2016 / early 2017 and would be open to traffic by the end of 2017.

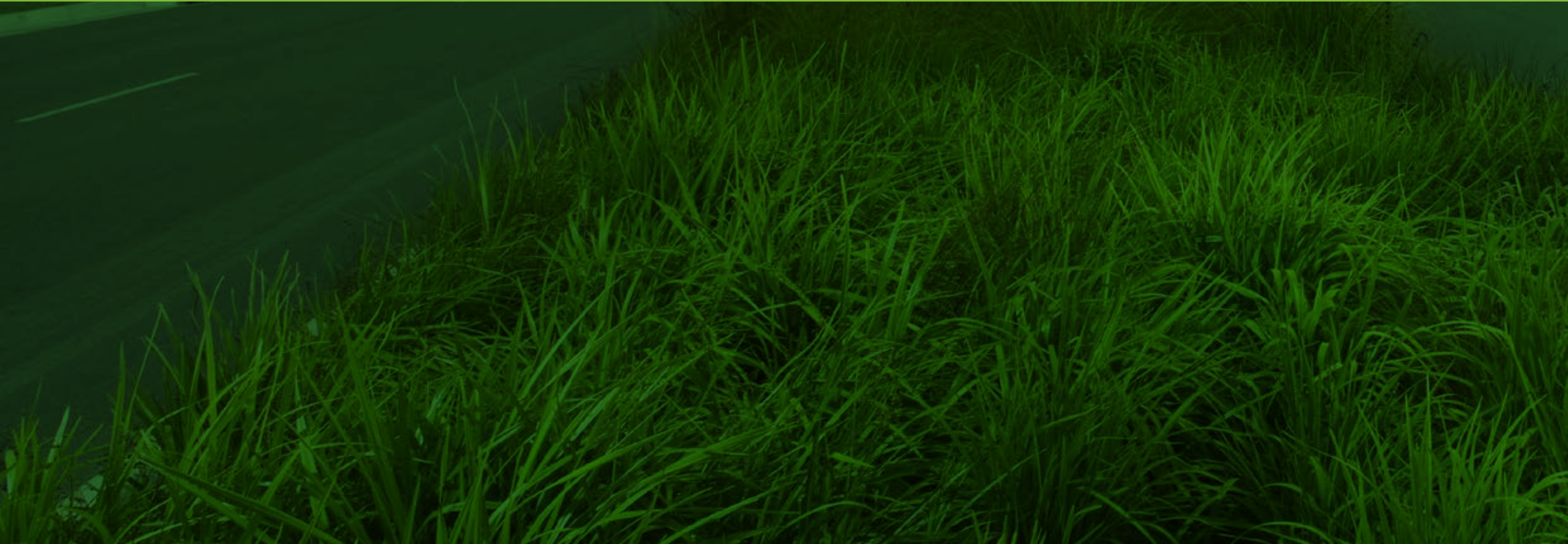




1.4 Report structure

The report is comprised of the following sections:

- Section 1, Introduction: Provides an overview of the project scope of work
- Section 2, Context: Summarises the existing and future context of the project area
- Section 3, Urban Design Strategy: Summarises the objectives, principles, and urban design strategies and concept
- Section 4, Urban Design Concept: Highlights the landscape design concept. Describes the retaining wall concept, and Bringelly Road bridge aesthetics and finishes
- Section 5, Palette: Describes the proposed external materials and finishes
- Section 6, Visualisations: Provides realistic three dimensional images for the urban design and landscape concept.



The background of the slide is a photograph of a paved road curving through a landscape with grass and young trees. A semi-transparent green filter is applied to the entire image. A bright yellow triangle is positioned in the top-left corner, pointing towards the center of the slide.

2.

Context

2.1 Existing context

The local roads affected by the upgrade work are currently mostly undivided single lane country roads. The land use next to these roads is a mix of five acre residential, rural and agricultural uses.

2.2 Future context

Future opportunities could include urban renewal and development opportunities towards the western and eastern ends of Bringelly Road.

The intersection of the grade separated interchange with The Northern Road will connect the local context directly with Liverpool and Camden. New views, will be created by opening up the landscape to accommodate the intersection, this will visually connect the local area with The Northern Road.

Both the pedestrian and bicycle network have been considered and integrated into the Bringelly Road and The Northern Road design. In particular the shared pathway, integrated into the design of The Northern Road, provides a continuous connection along the edge of the proposed road corridor.

According to the 2031 vision for Sydney illustrated in the Draft Metropolitan Strategy, the future context of the area will incorporate the Western Sydney Priority Growth Area and the South West Priority Land Release Area.

It is anticipated that the rail network from Leppington and Edmondson Park will be progressed to link the existing rail corridor with the western Sydney airport and Bringelly Village Centre.

This proposal supports the identified future growth.

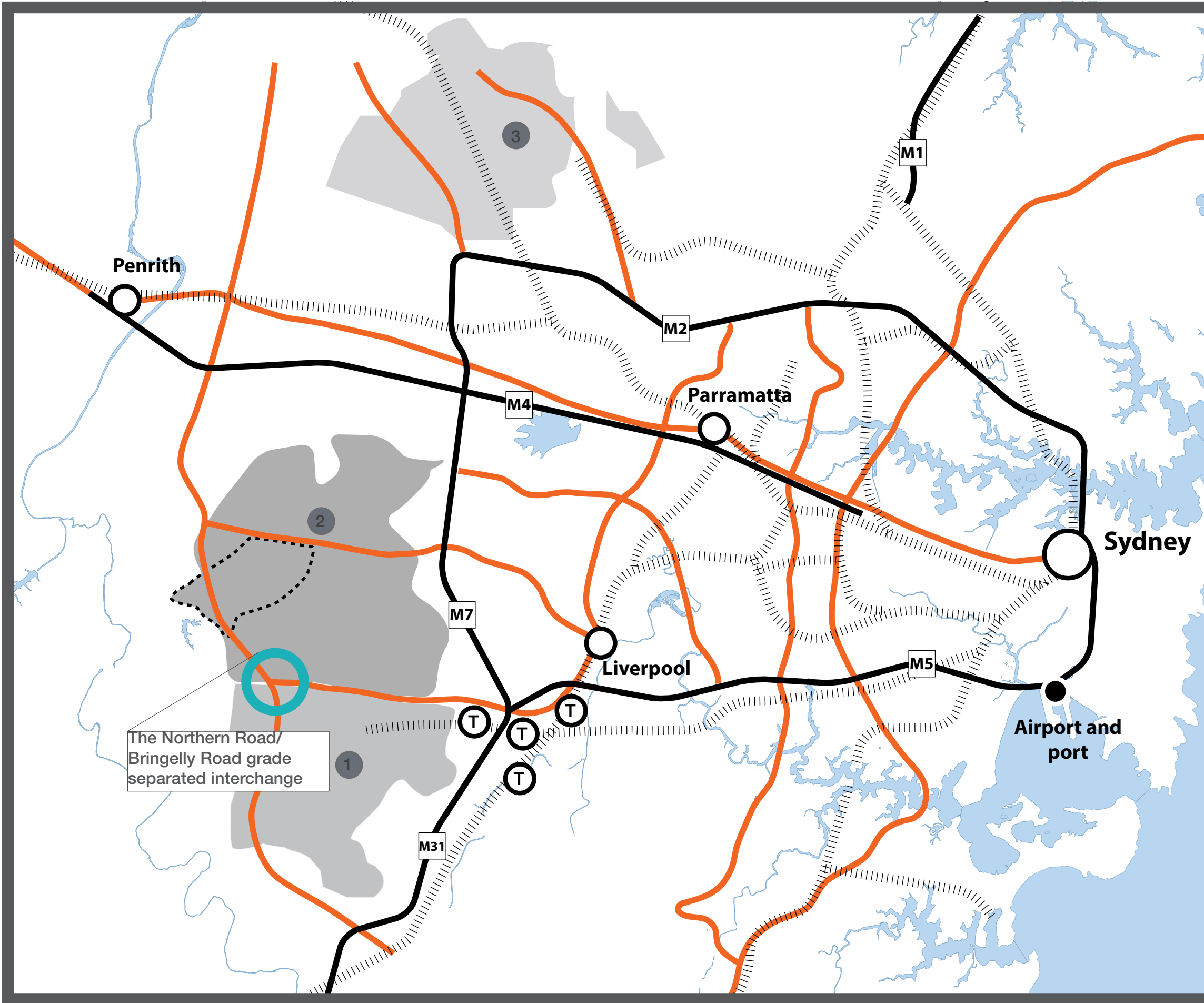
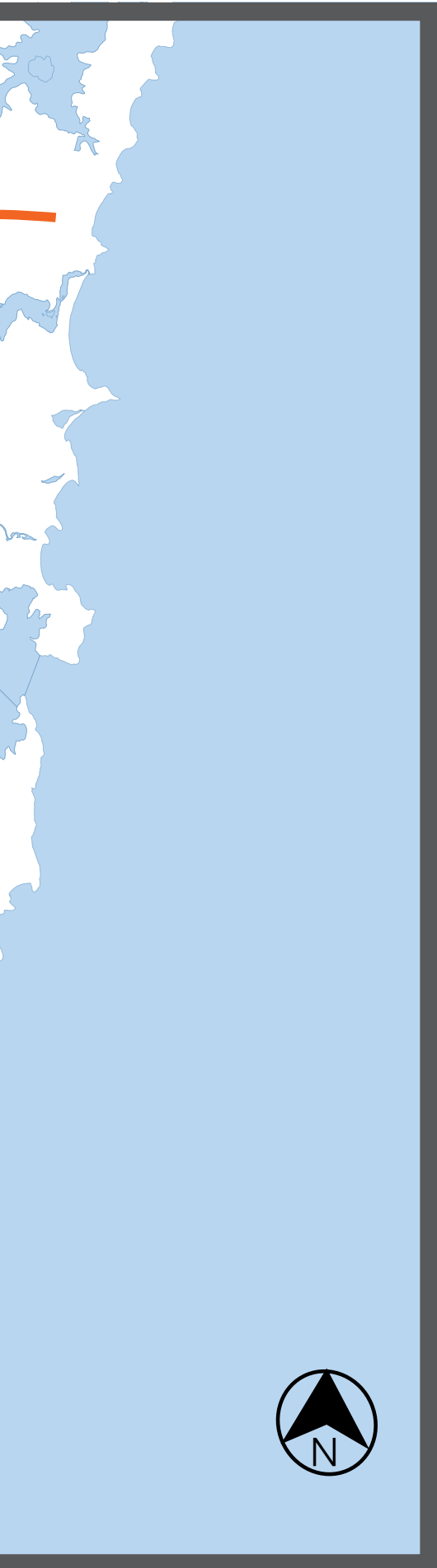













Figure 02. Context map



Legend

-  Existing motorway
-  Existing arterial road
-  Site
-  Existing rail
-  South West Priority Land Release Area
-  Western Sydney Priority Growth Area
-  North West Growth Area
-  Urban centre
-  Airport and port
-  Local train station
-  Badgery's Creek airport

2.3 Landscape character

There are three Landscape Character Zones (LCZ) in this study area. The landscape character and visual impact assessment prepared by Spackman Mossop Michaels describe the LCZ's in the following sections:

2.3.1 LCZ1 Bringelly Village

- A two storey brick commercial/ retail shopping centre to the south of Bringelly Road is prominent to the west of The Northern Road. Three, single storey residential homes are located south-west of the intersection
- There is a formal footpath (about one metre wide) which runs along The Northern Road and services the Bringelly Village shops and Bringelly Public School
- There is some existing native vegetation south-east of the Bringelly Road intersection as well as some areas of planted trees, shrubs and turf areas that are associated with Bringelly Village shops and Bringelly Public School
- Bringelly Village shops are the main activity generator in this zone and are accessed from driveways off The Northern Road and Greendale Road. During school terms, Bringelly Public School is also an activity generator, with the main school access via Greendale Road
- This zone is reasonably open due to single storey buildings and low shrub and tree planting and the wide grassed verge to the east, north of Bringelly Road
- The main overhead power lines run east of The Northern Road with occasional diversions across The Northern Road to service Bringelly Village shops, residential properties and Bringelly Public School.

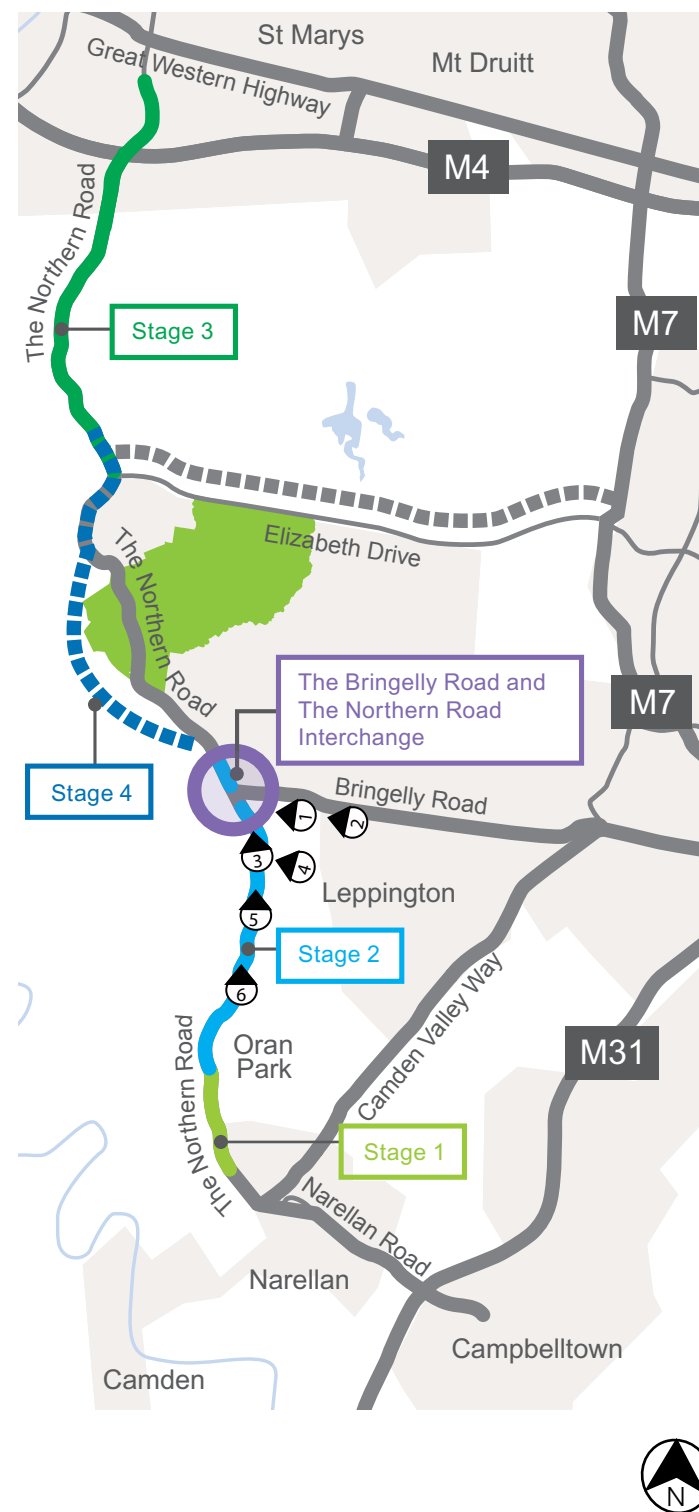
2.3.2 LCZ2 Bringelly acreage

- Most of the zones have been divided into five acre lots most with one main single storey residential building
- There are occasional lots with established gardens as well as lots with farmland agriculture including fruit, vegetable and livestock production
- Within the study area there are numerous aboriginal heritage sites along Bringelly Road and The Northern Road

- In terms of non-aboriginal heritage items, Cottage 1186 has been identified as a heritage item and the Bringelly Church as a potential archeological site. Finally the Bringelly Road/Greendale Road corridor with its associated rural cultural landscape has been identified as having potential heritage significance
- To the west of the Bringelly Public School which is the Bringelly Recreation Reserve
- There is a stretch of concrete path that runs on the western side of The Northern Road, existing public transport is limited to a bus service that runs along Bringelly Road and north along The Northern Road
- Typically the five acre lots have exotic and native planting and large open grassed areas with some areas of existing native vegetation along the road edges. Some lots also consist of intensive food production or turf farms
- The Bringelly Recreation Reserve would be considered a key activity area, particularly on weekends and week nights when organised sports take place
- Typically, this character zone is defined by mid-distance views of gently undulating rural residential lands which are, in some locations, filtered or blocked by established roadside trees and shrubs
- Overhead power lines run throughout the zone sometimes on both sides of the main roads or on only one side of local roads.

2.3.3 LCZ3 Thompson's Creek

- Built form and construction is prevented within the flood plain of this zone
- The creek cuts through private properties and consequently there is limited public access to the creek. The only public access is in Bringelly Recreation Reserve although formal access has not been provided
- The creek is visually enclosed by the alluvial woodland vegetation and some areas of existing riparian vegetation including trees and scattered shrubs
- Mid distance views of gently undulating rural residential lands can be seen from the creek and are filtered or blocked by creek vegetation.



1 Bringelly Village existing building typology



2 Existing landscape character



3 Existing residential building typology



4 Existing rural residential typology



5 Existing cycleway road use



6 Existing tree and road corridor to The Northern Road

Figure 03. Location plan for existing site photographs
 Source – *The Roads and Maritime website*

Urban design strategy

The urban design objectives and principals that have been identified guide the overall concept design and ensure a suit of complimentary elements are developed and implemented. Three overarching project objectives have been established. It is the role of these objectives to assist in achieving the urban design vision for the grade separated interchange project.

The objectives which set the urban, architectural and landscape design strategies for the wider project and inform The Northern Road upgrades urban design approach are outlined in the following sections.

Urban design vision for The Northern Road

The following vision statement articulates the desired outcome for The Northern Road.

While performing efficiently and safely for local and regional motorists and visitors to Sydney, The Northern Road will retain its considerable scenic and heritage values. The planning and design of the road will respond to the rural context, retaining a driving experience that facilitates the appreciation of the landscape within and beyond the road reservation.

3.



Bonville upgrade dual carriageway and bypass

3.1 Objectives and principles

The future character and quality of the motorist's and adjoining residents' experience of the road will be determined not only by the planning and design of future upgrades of the road within its reservation, but substantially by the planning, design and development of the land adjoining the corridor.

The following urban design objectives and principles have been prepared to guide the development of the concept design outcome for the proposal.

Objective: Provide an elegant road alignment that is responsive to, and integrated with the natural and built landscape.

- Ensure that the character of the local topography is a tangible experience for the motorist by providing, as much as possible, a horizontal (curving) and vertical (undulating) road alignment, which mimics the existing conditions
- Ensure consistency with nearby The Northern Road upgrade projects
- Minimise the visual scale of the proposal
- Maximise the motorist's experience of the surrounding natural and cultural landscapes
- Develop a simple and unified palette of elements and details that are attractive and easily maintained
- Provide adequate and visible connections to Bringelly Village, and new suburban town centres and recreation areas
- Devise a planting revegetation strategy that takes into account the long-term visual quality and functional changes within the road corridor
- Protect creeks and creek banks by maximising tree retention and planting at creek crossings and aligning shared pedestrian/ cycle paths in close proximity to the carriageway.



Cycleway Centennial Park



Yelgun to Chinderah Pacific Highway



Hunter Expressway



Kiama bypass



Walcha



Marylands Fence

Objective: Facilitate the provision of good urban design outcomes to future growth and development areas adjoining the road.

- Work with appropriate authorities to develop a visual, urban design and landscape character of the road corridor by promoting planning/design strategies that achieve a high quality environment and amenity at the interface between The Northern Road, Bringelly Village and future growth centres
- Provide a memorable experience at the grade separated interchange to create a sense of place
- Develop a constant visual quality that demonstrates a high standard of infrastructure and public space design and finishes, including visible elements such as bridge and retaining walls
- Provide simple and elegant bridge structures designed in accordance with Bridge Aesthetics (Roads and Maritime, 2012)
- Improve accessibility to the proposed Western Sydney Airport, South West Priority Growth Area and Broader Western Sydney Employment Area
- Design the interchange to be a self explaining road environment that is easily legible and identifiable to road users on their journey along The Northern Road
- Create a strong visual connection between the interchange and local area through the use of context specific planting and materials
- Minimise the use of retaining walls as far as practicable recognising land constraints, geology and the need to retain vegetation
- Ensure the provision of safe, convenient and enjoyable pedestrian and cycle connections in the most appropriate/ accessible location within the locality in the context of future growth and urban development patterns
- Ensure the bus stop areas are well lit for orientation and safety
- Generally limit lighting to major intersections and points of interest only to retain the rural nature of the road corridor. Lighting will be consistent with full length of The Northern Road
- Avoid the need for noise walls. Where noise attenuation is required consider mounds or wall/mound combination. Where only walls can be provided, provide plain base panel design

- Avoid housing/estate boundary fencing along the road corridor by promoting an active street address with a character consistent with the desired outcomes for the road corridor.

Objective: Protect and enhance existing views, character, heritage and cultural values of the corridor.

- Retain and reinforce the diverse character of the route, including the distinctive character of the urban areas and the distinction between urban and non-urban areas
- Retain, and where possible improve, regional views and views to important landmarks
- Maintain and enhance heritage and cultural landmarks along the route where possible
- Retain existing view corridors to establish a sense of place for the journey along The Northern Road
- Control the placement of utilities in the corridor and locate underground where possible to preserve character, enhance views and maximise planting opportunities.

3.2 Urban design strategies

3.2.1 Grade separated interchange strategy

The concept for the grade separated interchange has been developed from a premise that the surrounding structures must embody Sydney’s western landscape character and climate and provide a memorable experience for the road users.

The built forms that will comprise the grade separated interchange work have been developed with a unified architectural design approach that integrates these elements into the overall project design. This is expressed through consistent material selection and design form. While a general hierarchy ensures these elements work together in a harmonious way.

The elements that constitute the built form for the grade separated interchange include retaining walls, bridge structures and road design elements.

3.2.2 Landscape strategy

The figure adjacent illustrates the conceptual strategy for open space across the study area. Within the three LCZ’s there is an opportunity for specific landscape treatment. These areas have been designed with a landscape treatment to visually absorb the infrastructure in some areas, while creating a visual marker at thresholds, to orient road users and improve the local communities through which the road passes.

The Northern Road has been designed to provide the platform for local transit opportunities, specifically bus stops and safe road crossing points. The regional cycle route located on the eastern side of the existing section of The Northern Road, provides the opportunity for the enhancement of a series of open space pockets to create a linear park system.

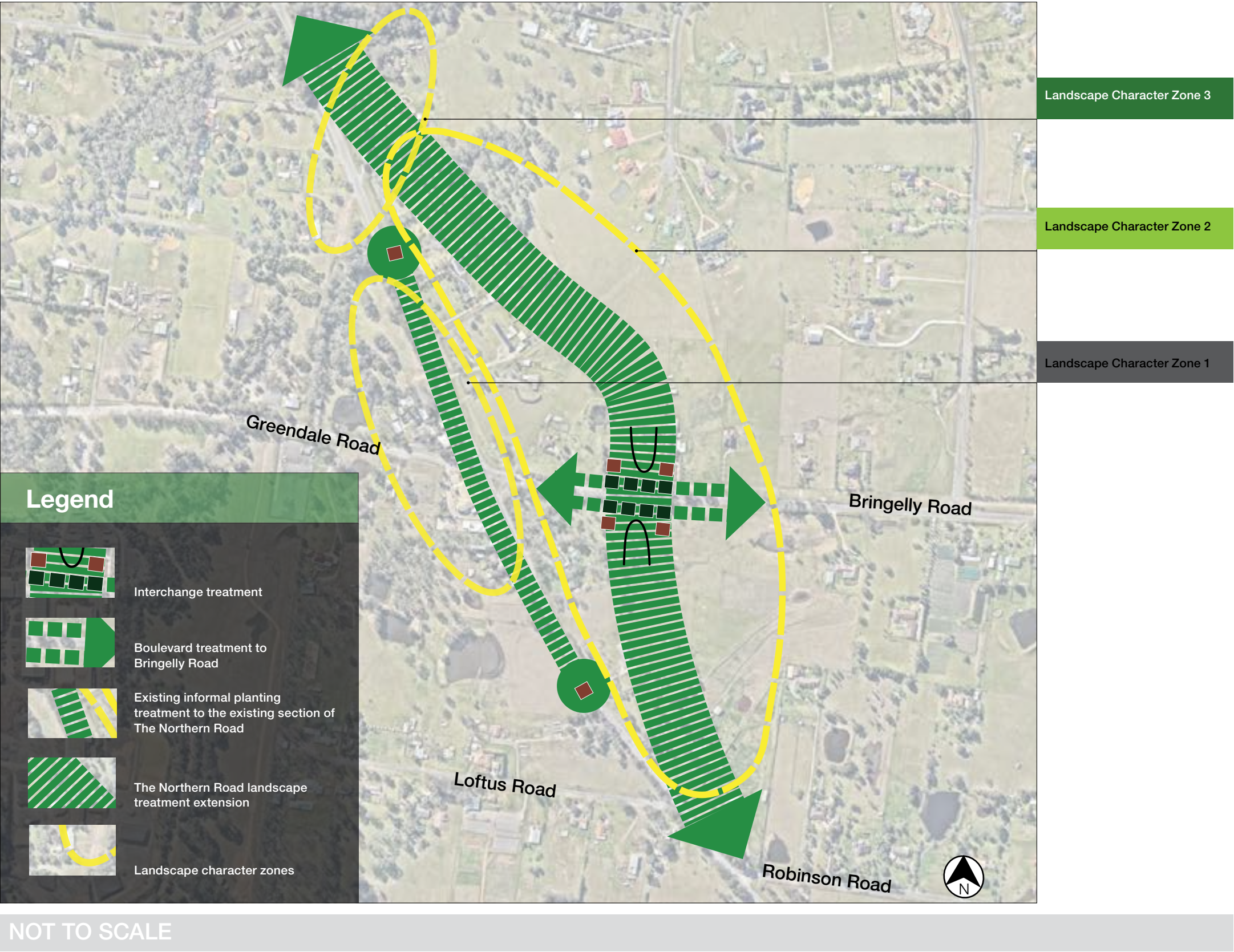
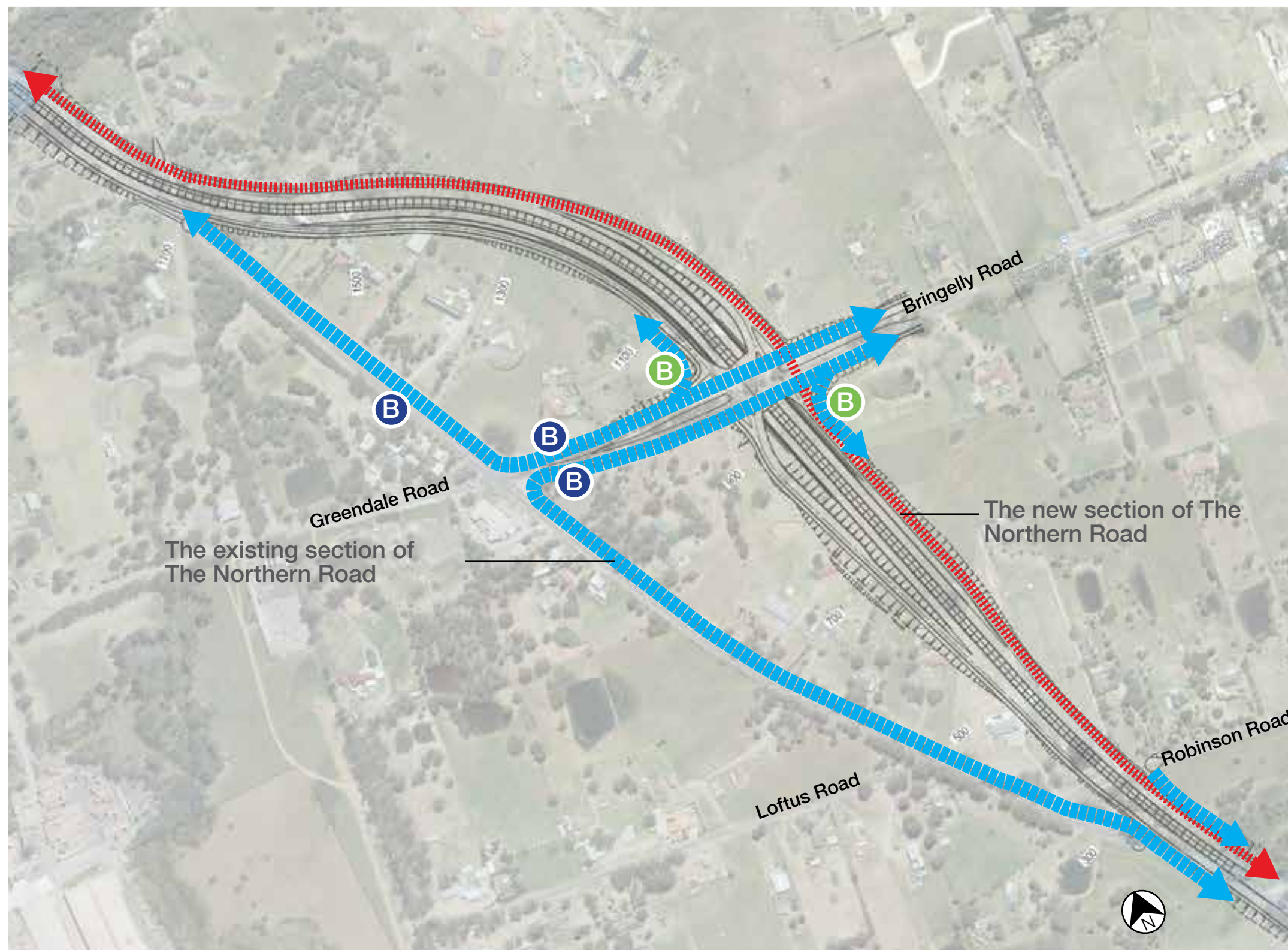


Figure 04. Urban design concept



NOT TO SCALE

3.2.3 Pedestrian and cycleway strategy

The strategy for maintaining pedestrian and cycle movement throughout the new section of The Northern Road is based on the anticipated future development of the adjoining land around Bringelly Village, and towards Camden and Liverpool. Connections will be made to existing regional cycle networks. The scale and complexity of the new section of The Northern Road road network is of a freeway scale in terms of the volume of traffic movement, approach speeds and manoeuvring. For this reason the pedestrian and cycle network has been designed to respond to this scale. Of the utmost importance is the provision of intuitive routes of movement between key community attractions. Crime and Prevention Through Environmental Design principles have been used to guide the location and treatment of the cycleway and crossing points.

Legend





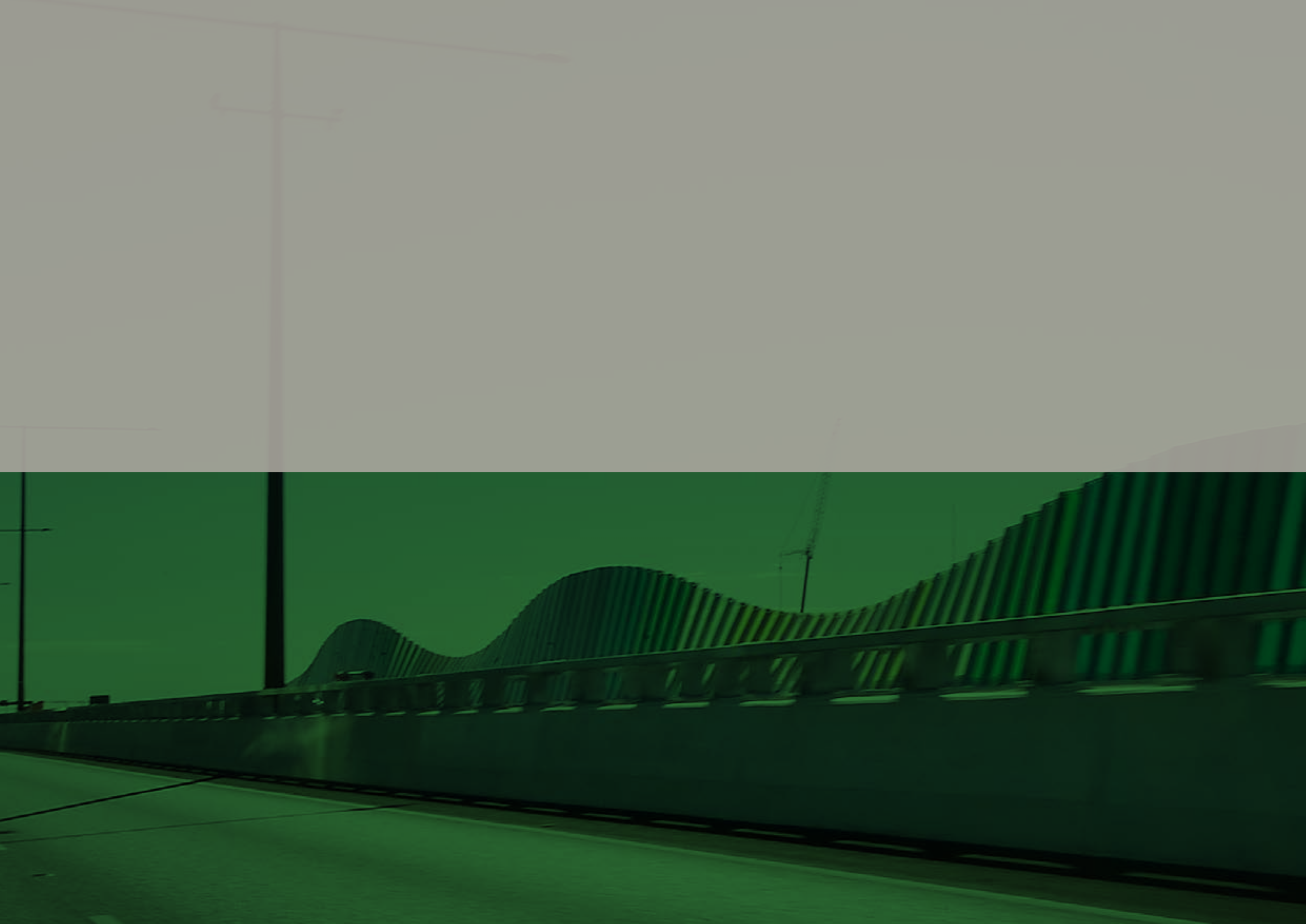
-  Provision for future shared path
-  Shared path
-  Existing bus stop
-  Proposed bus stop

Figure 05. Pedestrian and cycleway strategy





4.

Urban Design Concept



Eucalyptus avenue



Cumberland Plain character



Kings Park Western Australia



Lowes Creek



Tree cluster planting

4.1 Urban design approach

The overall approach for the grade separated interchange is to:

- Use the proposed road alignment under Bringelly Road bridge to create a portal for road users
- Create a strong visual connection between the infrastructure and local area through the use of planting and similar urban design treatments as proposed for The Northern Road to the north and south of the proposal
- Use planting and wall treatments to absorb the visual impact of the grade separated interchange being introduced to this area
- Create new areas of open space and pedestrian amenity.

The grade separated interchange upgrade works are conceived as a series of different land and road typologies.

4.1.1 Bringelly Road

Boulevard planting will be used to promote the quality and unify the character of Bringelly Road and Village. Building upon the existing Eucalyptus species of Cumberland Plain trees located along the existing section of The Northern Road, a boulevard will create a strong image for this major route between Camden Valley Way and Bringelly on the approach to the proposed western Sydney airport at Badgery's Creek. This treatment will improve the pedestrian scale of this roadway, by providing shade and shelter.

A continuous pedestrian and cycle path traverses the length of the Bringelly Road section.

4.1.2 The new section of The Northern Road

The overall approach for The Northern Road upgrade is to continue the informal tree planting cluster application to promote intermittent views to the mid distance.

4.1.3 The existing section of The Northern Road

The existing road reserve planting will be retained and used to soften the edge to neighbouring residential areas. The existing section of The Northern Road will be developed as a district scale rural streetscape, unified visually by tree cluster planting to create a shaded and protected pedestrian environment along the proposed shared pathway to the eastern edge of the road corridor.

4.2 Urban design opportunities

4.2.1 Linear green link

- Re-establish and extend the Cumberland Plain woodland planting to The Northern Road
- Introduce boulevard planting of *Eucalyptus moluccana* to Bringelly Road.

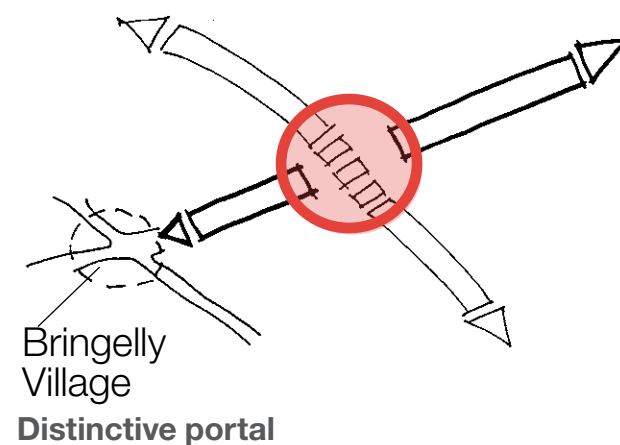
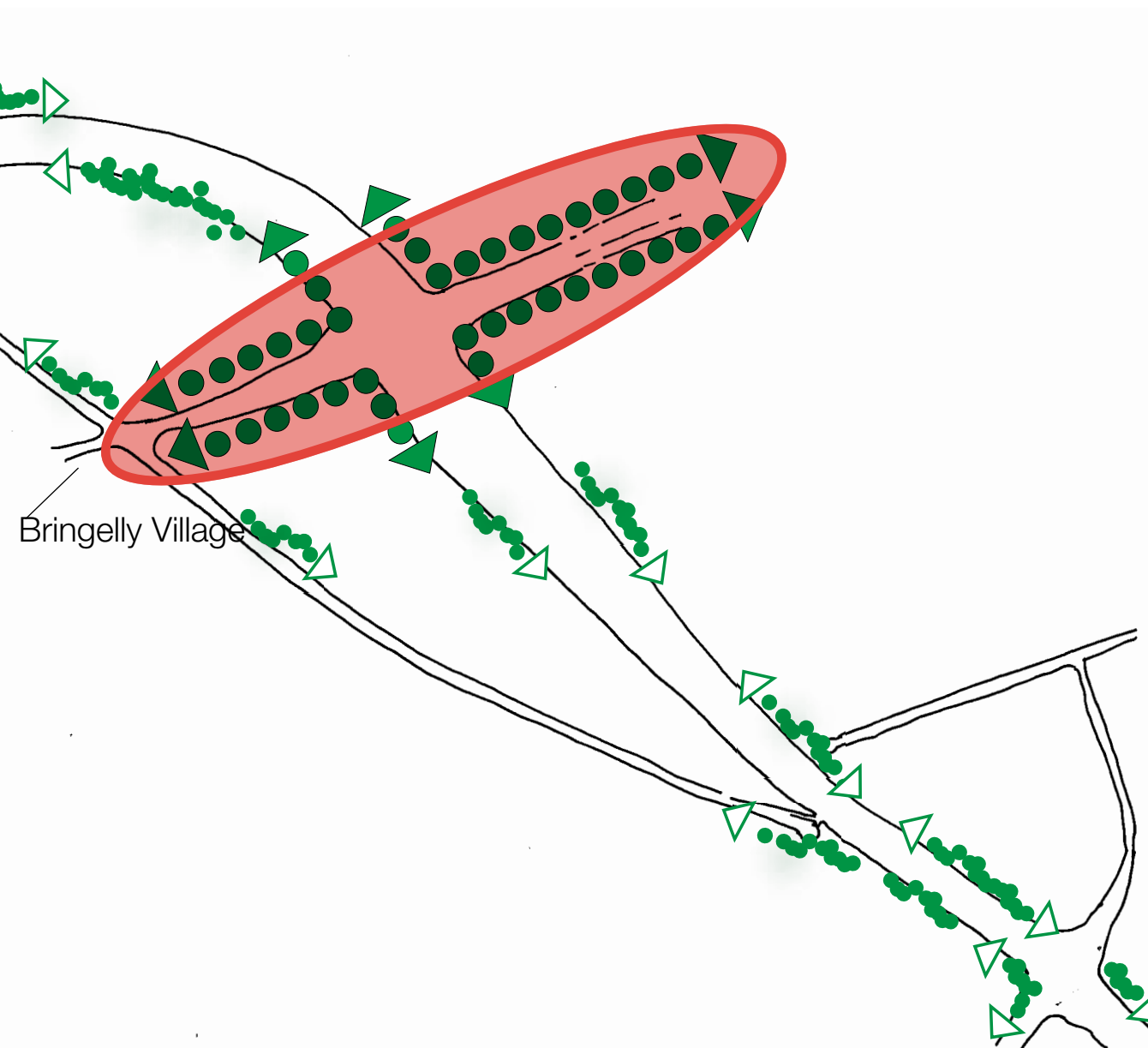
4.2.2 Distinctive portal

- Provide a significant landscape treatment to Bringelly Road that signifies the arrival to Bringelly Village.
- Create a visual reference at the grade separated interchange that reflects Bringelly Village, for example sculpture and brick threshold paving opportunity.

Linear green link



Marylands fence



4.3 Landscape design concept

4.3.1 LCZ1 Bringelly Village

- Local grass and small shrub planting to the dividing median between carriageways where possible (to strengthen the sense of local street and landscape character)
- Retain and protect local heritage built form
- Provision of three metres wide shared pathway to the north and south of Bringelly Road
- Memorable feature planting at the approach to Bringelly Village
- Entry planting to introduce Greendale Road and Bringelly Reserve
- Preservation of existing significant trees and retention of mid distance views
- Provide suitable landscape treatment under overhead power lines.

Planting species:

Trees:

Eucalyptus moluccana

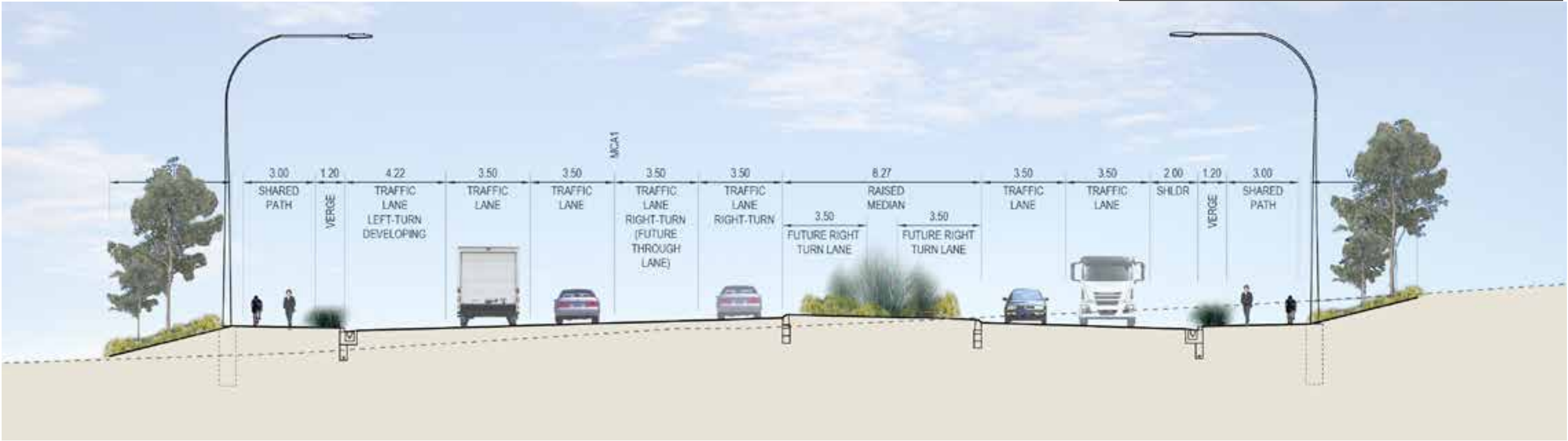
Eucalyptus tereticornis

Low shrub native grasses:

Planting mix 2

Planting mix 5

Seed mix 3

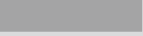


NOT TO SCALE

Figure 06. Landscape section 1-CH:160
Bringelly Road



Legend

-  Tree cluster
-  Low shrub planting mix 2
-  Planting mix 5, median
-  The new section of The Northern Road
-  Road
-  Seed mix 3/ pasture grass
-  Planting mix 5, embankment
-  Screen
-  Retaining wall
-  Shared pedestrian and cycleway path
-  Pedestrian crossing

SCALE 1:2000@A3

Figure 07. Landscape plan
The Northern Road/Bringelly Road grade separated interchange

4.3.2 LCZ2 Bringelly acreage

- Planting types and arrangement to be consistent with Cumberland Plain species and blend with the existing five acre lot residential established gardens
- Planting arrangement to provide views to existing vegetable gardens and livestock/pasture grass land use
- Road and landscape design to be sensitive to existing aboriginal heritage elements and non-aboriginal heritage buildings, such as Cottage from 1186 and Bringelly Church. Bringelly Road and Greendale Road have heritage significance
- Retain and protect Bringelly Reserve and informal sporting facility
- Preserve existing trees as much as possible
- Provide future three metre wide shared pathway and cycleway to the east on the new section of The Northern Road
- Exotic and native planting mix at nodal areas. Pasture grass to boundary edge to join existing agricultural land
- Retain intermittent mid distance views of rural residential land
- Planting to suit existing overhead power lines.

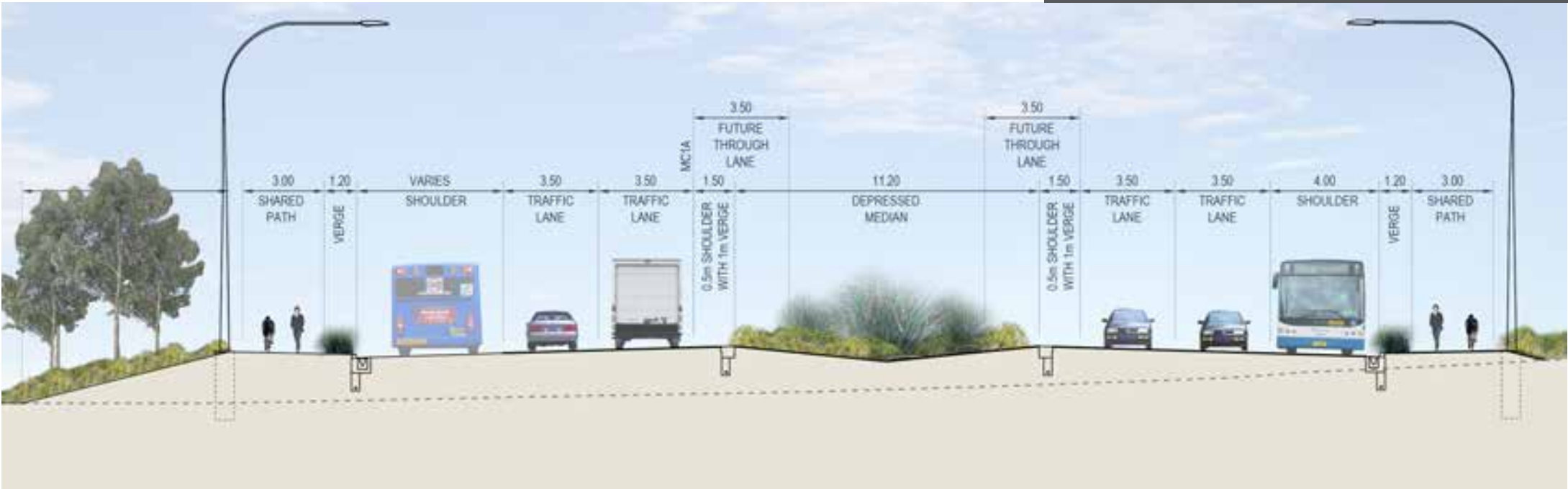
Planting species:

Trees:

- Eucalyptus moluccana
- Eucalyptus tereticornis
- Eucalyptus sideroxylon
- Eucalyptus crebra

Low shrub native grasses:

- Planting mix 2
- Planting mix 5
- Seed mix 3

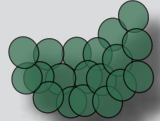


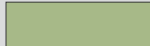




NOT TO SCALE

Figure 08: Landscape section 2-CH: 200
The Northern Road



Legend

-  Tree cluster
-  Planting mix 5, median
-  Road
-  Seed mix 3/ pasture grass
-  Planting mix 5, embankment
-  Shared pedestrian and cycleway path

SCALE 1:2000@A3

Figure 09: Landscape plan
The Northern Road



Legend

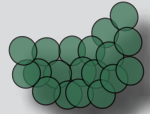

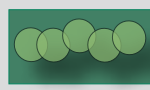
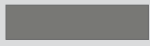

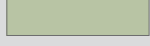
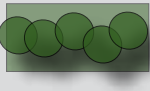
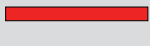

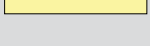
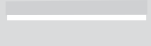
-  Tree cluster
-  Low shrub planting mix 2
-  Planting mix 5, median
-  The new section of The Northern Road
-  Road
-  Seed mix 3/ pasture grass
-  Planting mix 5, embankment
-  Screen
-  Retaining wall
-  Shared pedestrian and cycleway path
-  Pedestrian crossing

Figure 10. Landscape plan
The Northern Road/Bringelly Road grade separated interchange

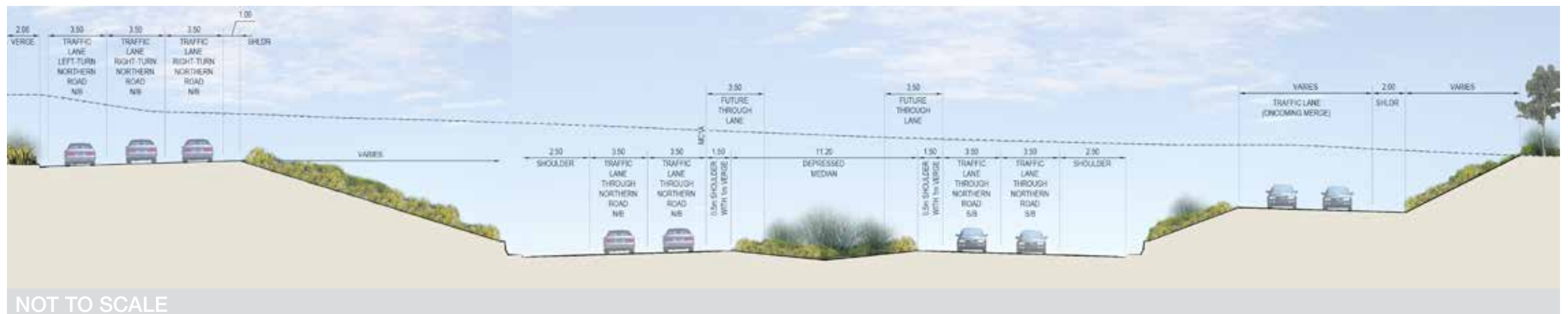


Figure 11: Landscape section 3-CH:800
The Northern Road

4.3.3 LCZ3 Thompson’s Creek

Thompson’s Creek meanders from swale and flood prone areas of agricultural land to the east of The Northern Road through to Bringelly Reserve. Possible connections to the creek provide green pockets of interest and creek edge riparian corridor landscaping.

Planting species:

Trees:

- Eucalyptus moluccana
- Eucalyptus tereticornis
- Eucalyptus sideroxylon
- Eucalyptus crebra

Low shrub native grasses:

- Planting mix 2
- Planting mix 5
- Seed mix 3

Thompson’s Creek

Figure 12: Thompson’s Creek
Existing site conditions

4.4 Retaining wall concept

As with the proposed landscape and planting treatment, the design of retaining walls takes reference from the Cumberland Plain forest structure. The distinctive vertical form of tree trunks is used to generate a pattern of vertical articulation in moulded, light-weight concrete panels.

The resultant undulating panel surface creates irregularly spaced vertical bands of shadow across an otherwise smooth grey painted surface finish. Bold and playful painted colour treatment is used to add further interest at points throughout the corridor. Colour selection draws reference from distinctive trees and forest processes of the local area and Cumberland Plain Woodland. These include the red tones of the Sydney Red Gum and Bloodwood trees, the black trunks of trees following bushfire and the black/bright green of regenerating forests following fire.



Open eucalyptus forest/stringy bark



Sydney red gum/red bloodwood



Bushfire



Bushfire regrowth



Figure 13: Retaining panel concept

4.4.1 Retaining wall images

The retaining wall materiality will draw upon the local area vegetation location and land use reference.

There is one type of retaining wall. The retaining wall at the bridge crossing will frame the walls at The Northern Road / Bringelly Road grade separated interchange.

The walls will predominantly frame areas of the new section of The Northern Road affected by the new Bringelly Road overhead crossing. Insitu concrete retaining walls range in height from approximately 300 mm to seven and a half metres.

The planting to the landscape terrace will be consistent with the planting theme of Cumberland Plain species found locally.

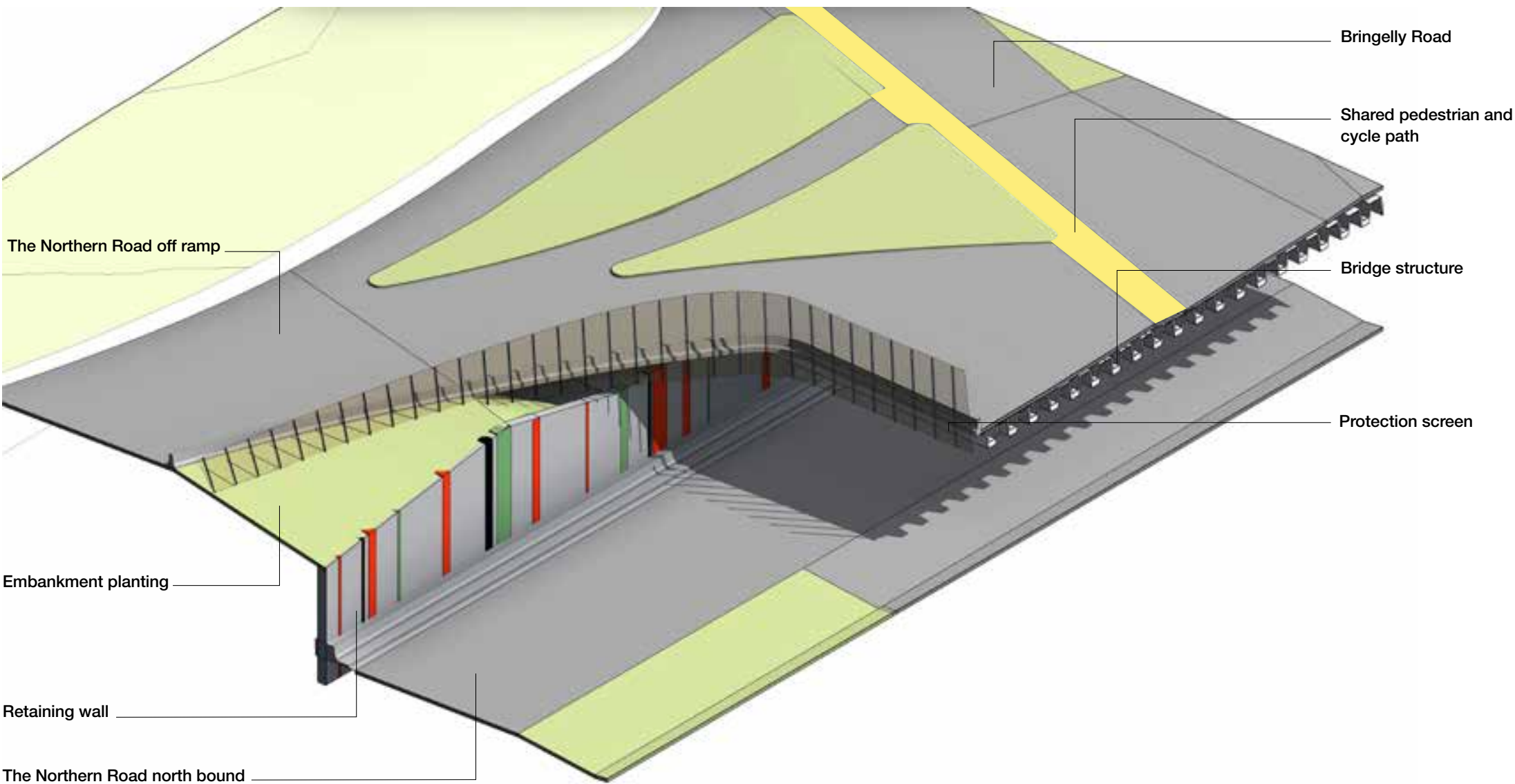


Figure 14: Axonometric view



Figure 15: Retaining panel concept



Figure 16: Bringelly Road view

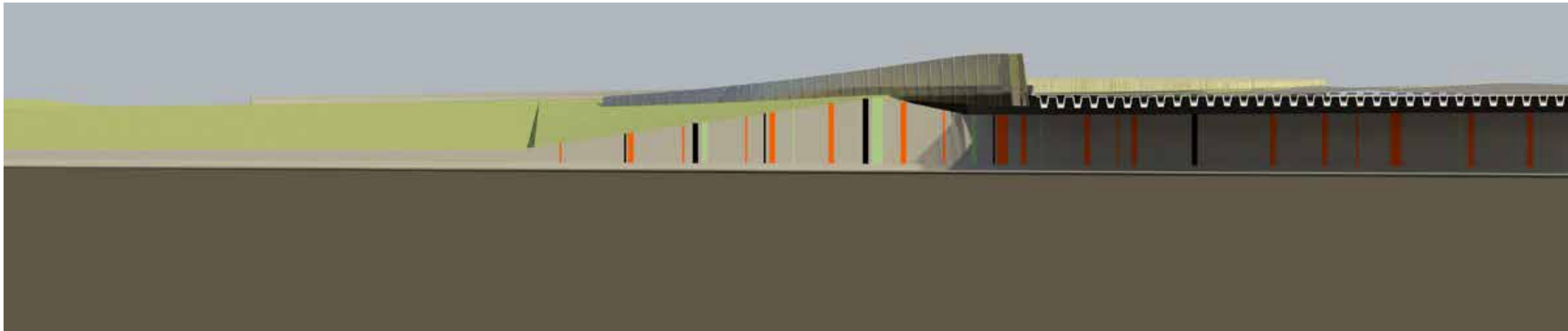


Figure 17: Wall panel elevation

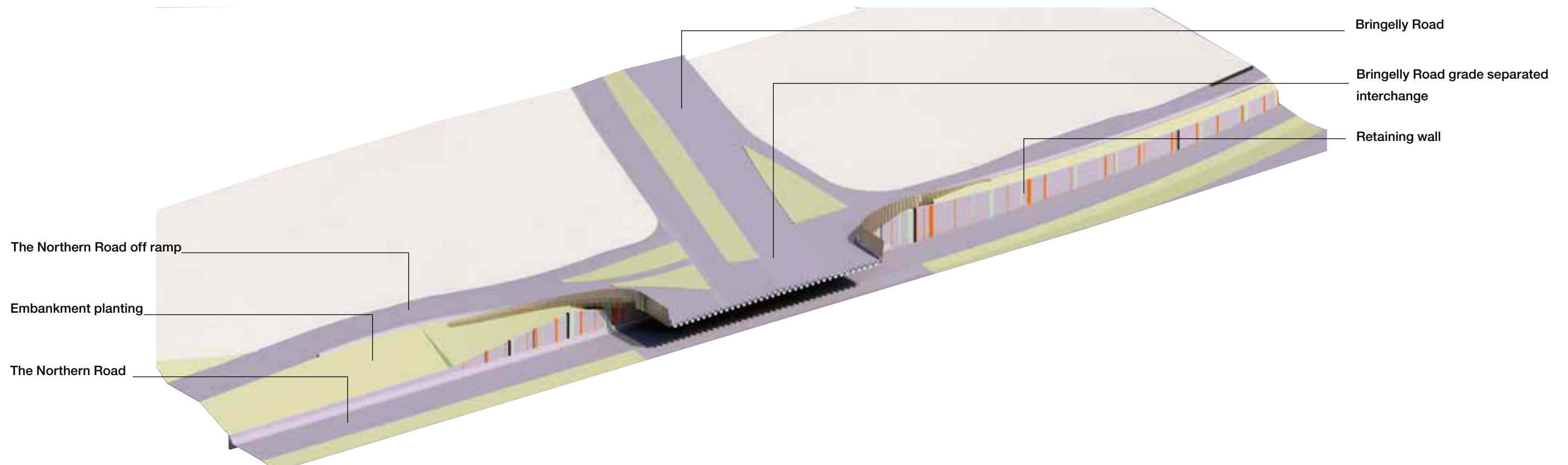


Figure 18: Model detail



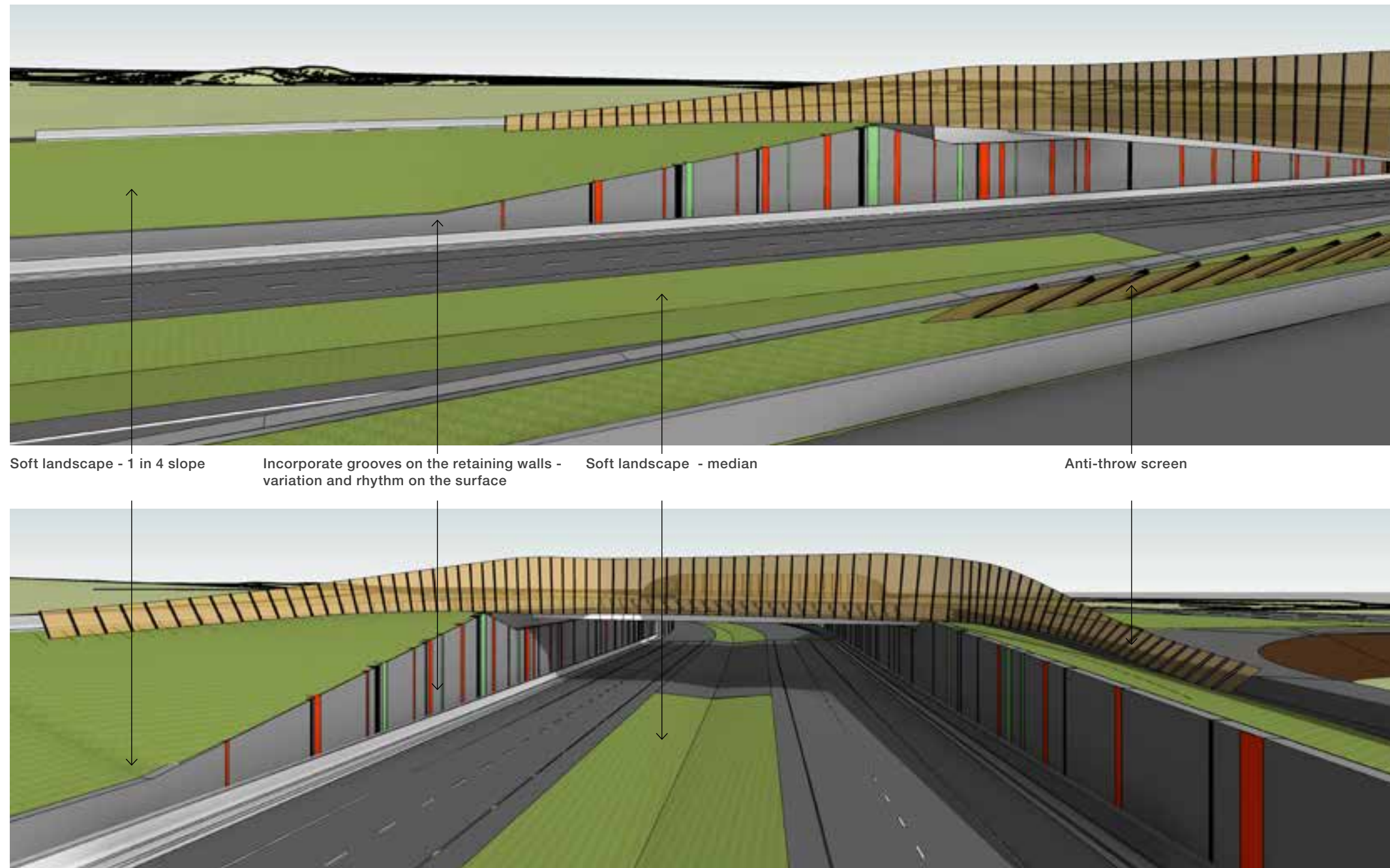


Figure 19: Exploration of bridge interchange built form

4.5 Bringelly Road bridge concept

4.5.1 The bridge structure

The bridge over the new section of The Northern Road comprises a bridge spanning the full width of the proposed carriageways. No supporting piers are proposed within the median, which contributes to unobstructed views at the lower level of the interchange. The design intent is to provide clear lines of sight for the drivers as they pass beneath Bringelly Road.

The retaining walls, with dynamic colour finished panels, continue through this 65 m long portion of the new section of The Northern Road, adding to its visual interest.

4.5.2 Protection screens

The design of the anti throw screens will present a strong, appealing and recognisable presence for both pedestrian users and vehicle users. The design of this element will contribute to the public realm and character of the bridge over The Northern Road. It will become a visual landmark element within this precinct.

The required safety screens are proposed with a dynamic profile and with a smooth curvilinear silhouette. This will be developed further during the design development stage to find a solution that would achieve the technical requirements that is readily constructible whilst contributing to an integrated aesthetic scheme.

Palette

5.

5.1 Hardscape materials palette

The hardscape materials that have been selected are high quality, durable, consistent with surrounding landscape character. The materials include:

- coloured concrete
- coloured concrete with feature coloured aggregate
- brick paving thresholds

The materials selected are inspired by the sense of place in each of the local communities through which The Northern Road passes. Brick represents the historical values of The Northern Road. Blue light emitting diode lighting represents a high quality, highly technological solution and offers a level of contrast in terms of materials specifically selected for the night scene.

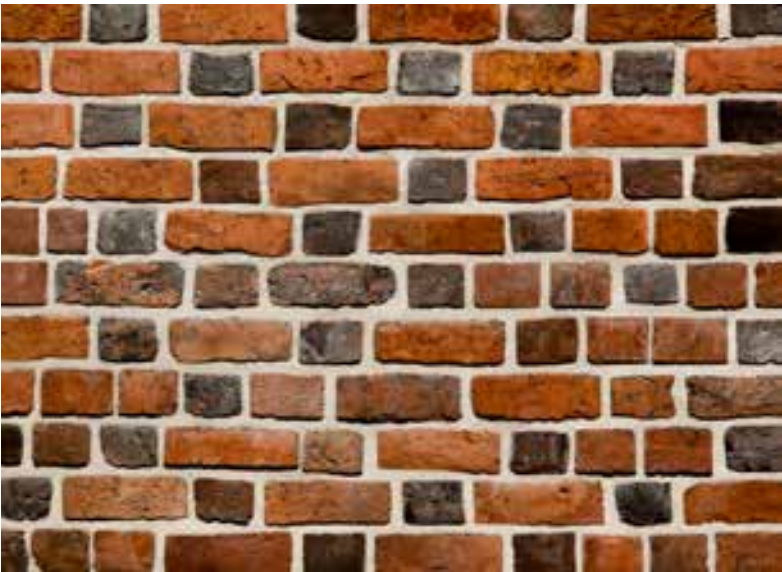
Coloured and textured concrete will be used on the footpaths and shared pathways. A palette of pale sand tones incorporating muted pinks has been chosen to mimic the colours of sandstone.



Coloured concrete



Coloured concrete with feature coloured aggregate



Brick paving thresholds

5.2 Softscape materials palatte

5.2.1 Trees and shrubs

The majority of the plant species proposed are from the Cumberland Plain woodland plant community endemic to this area. The plant palette for trees and shrubs will be refined further during the design development stage.



Eucalyptus moluccana



Eucalyptus tereticornis



Eucalyptus crebra



Eucalyptus sideroxylon



Liriope muscari 'Evergreen Giant'



Lomandra hysterix



Melaleuca thymifolia (1 x 1m)



Indigofera australis



Banksia ericifolia



Dodonea viscosa



Liriope muscari 'Evergreen Giant'



Lomandra longifolia



Lepidosperma laterale



Lomandra hysterix



Melaleuca thymifolia (1 x 1m)



Callistemon linearis (2-3m x 3-5m)



Hardenbergia violaceae



Grevillia juniperina



Gazania tomentosa



Dianella revoluta



Lomandra multiflora



Liriope muscari 'Evergreen Giant'

Figure 20: Planting mix

5.2.2 Plant schedule with typical cross section

Proposed tree planting cluster

Botanical name	Common name
Angophora floribunda	Rough barked apple
Casurina glauca	Swamp she oak
Corymbia maculata	Spotted gum
Eucalyptus crebra	Narrow leaved ironbark
Eucalyptus moluccana	Grey box
Eucalyptus sideroxylon	Red ironbark
Eucalyptus tereticornis	Forest red gum
Melaleuca decora	Decorative paperbark
Melaleuca linariifolia	Snow in summer

Planting mix type 2

Botanical name	Common name
Carex appressa	Tall sledge
Lomandra multiflora	Many flowered mat rush
Themeda australis	Kangaroo grass

Planting mix type 5

Botanical name	Common name
Banksia ericifolia	Heath banksia
Davisea ulicifolia	Gorse bitter pea
Dondonaea viscosa subsp. cuneata	Wedge leaf hop bush
Grevillea juniperina	Juniper leaf grevillea
Indigofera australis	Australian indigo
Liriope muscari 'Evergreen Giant'	Liriope
Lomandra multiflora	Many flowered mat rush
Melaleuca thymifolia	Thyme honey myrtle
Myoporum parvifolium	Creeping boobialla

Seed mix type 3

Botanical name	Common name
Aacia falcata	Hikory wattle
Aristida vagans	Three awned spear grass
Bothriochla macra	Red grass
Bursaria spinosa	Sweet bursaria
Callistemon linearis	Narrow leaved bottlebrush
Capillium spicigerum	Scented top grass
Chloris truncata	Windmill grass
Davisia ulicifolia	Gorse bitter pea
Dodonea viscosa subsp. cuneata	Wedge leaf hop bush
Hardenbergia violacea	Native sarsparilla
Indigofera australis	Australian indigo
Lepidosperma laterale	Variable swordedge
Melaleuca decora	Decorative paperbark

Cover crop species

Echinochloa frumentacea	Japanese millet
Secale cereale	Rye corn

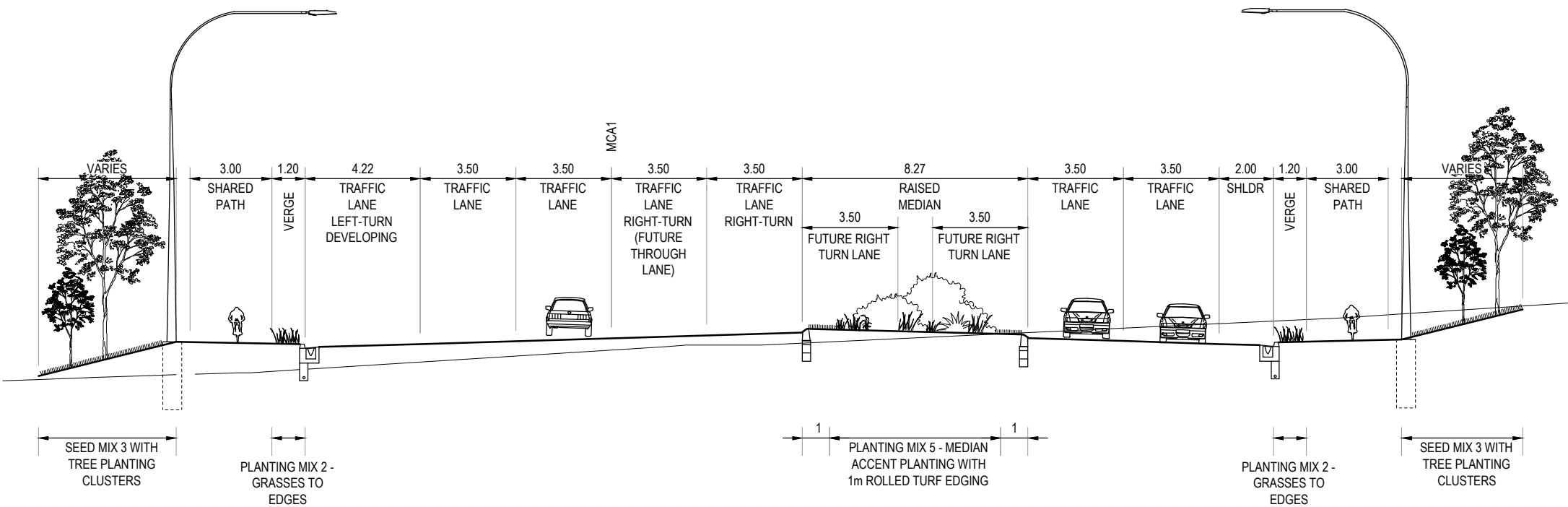


Figure 21: Cross section
Typical planting arrangement. approx. CH 160 Bringelly Road

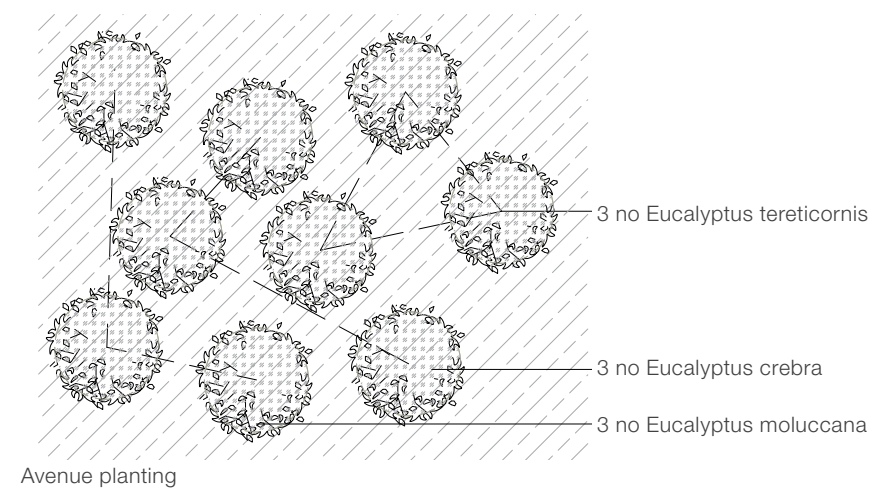
5.2.3 Plant arrangement

Boulevard/Avenue Bringelly Road

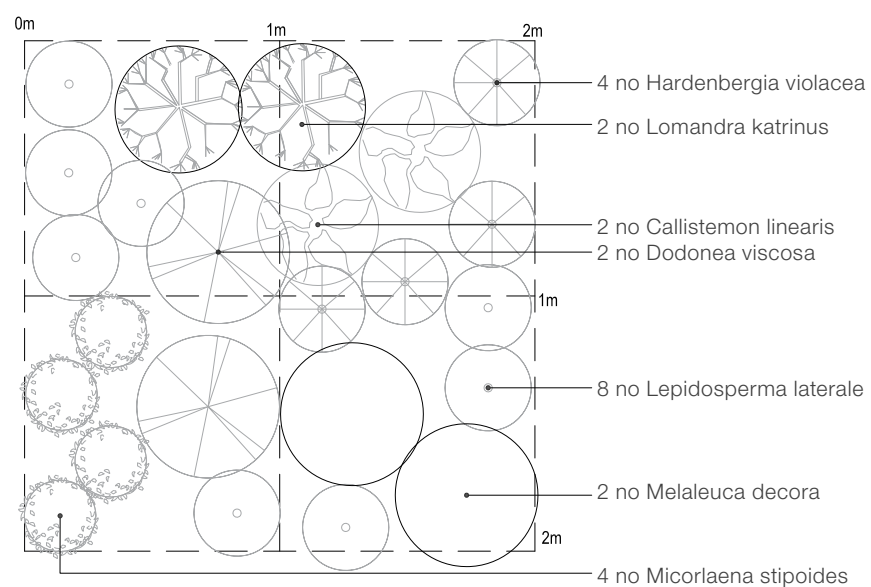
The boulevard planting of *Eucalyptus moluccana* and *Eucalyptus tereticornis* trees will match the existing landscape character. Planting types and layout will be confirmed during design development stage.

The new section of The Northern Road

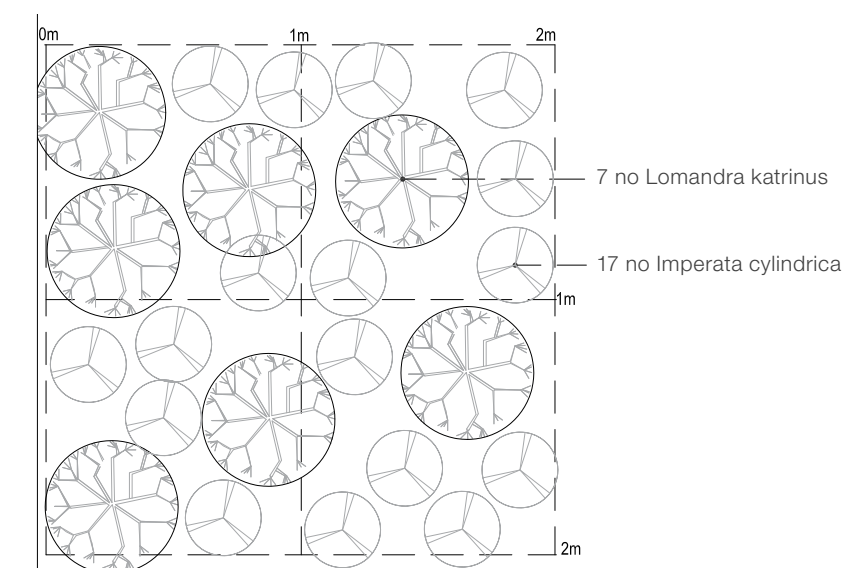
The central median and verge areas will feature shrub and groundcover planting of Cumberland Plain woodland species. Planting types and layout will be confirmed during design development stage.



Avenue planting



Planting mix 5



Planting mix 2

Figure 22: Planting matrix
Typical planting arrangement



Tree cluster



Eucalyptus moluccana



Melaleuca decora



Fernleigh track



Lomandra katrinus



Imperata cylindrica

Visualisations

6.



**Figure 23: The new section of
The Northern Road view**



Figure 24: Grade separated interchange view
Bringelly Road

References

7.

References

- NSW Government 2010, Metropolitan Plan for Sydney 2036, Sydney
- Roads and Maritime Services, 2013, Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment
- Roads and Maritime Services, 2015, The Northern Road and Bringelly Road Grade Separated Interchange Options Report
- Beyond the Pavement - Roads and Traffic Authority of NSW urban design policy, procedure and design principles (RTA, 2009)
- Sinclair Knight Merz (SKM) 2012, The Northern Road upgrade, Narellan to Bringelly Review of Environmental Factors
- Spackman Mossop Michaels, 2011 South West Growth Centre Road Network Strategy
- Roads and Maritime Services 2013, The Northern Road upgrade from Old Northern Roads, Narellan to River Brock Drive, Oran Park, Urban Design Report
- GHD Woodhead, 2014, The Northern Road, Stage 2 Urban Design Report Proposal.

Revision No.	Author	Reviewer signature	Approved for issue name	Approved for issue signature	Date
A	C. O'Dowd	L. Sorrell*	D. Kinniburgh	D. Kinniburgh*	01 OCT 2015
B	C. O'Dowd	L. Sorrell*	D. Kinniburgh	D. Kinniburgh*	04 NOV 2015
C	C. O'Dowd N. Do Vale L. Sorrell	A. Penn*	D. Kinniburgh	D. Kinniburgh*	11 NOV 2015

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