Newcastle Inner City Bypass – Rankin Park to Jesmond

Environmental impact statement

Technical Paper 4 – Urban Design, Landscape Character and Visual Impact Assessment

November 2016

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NEWCASTLE INNER CITY BYPASS - RANKIN PARK TO JESMOND

Urban Design and Landscape Character and Visual Impact Assessment

KI STUDIO INTEGRATED ENVIRONMENTAL DESIGN

NSW GOVERNMENT Transport Roads & Maritime Services

aurecon

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This report has been prepared:

FOR:

aurecon

BY:

KI STUDIO
INTEGRATED ENVIRONMENTAL DESIGN

Level 3, Studio 3
"The Cooperage"
56 Bowman Street
PYRMONT NSW 2009

t. +61 29571 7900
f. +61 29571 7600

email: jvg@kistudio.com.au

Contact: Judy van Gelderen

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1.0 INTRODUCTION

1.1 BACKGROUND

Roads and Maritime Services (Roads and Maritime) is seeking approval to construct the fifth section of the Newcastle Inner City Bypass between Rankin Park and Jesmond (the project). The approval is sought under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The Newcastle Inner City Bypass is part of Roads and Maritimes' long-term strategy to provide an orbital road within Newcastle's road network to connect the Pacific Highway at Bennetts Green with the Pacific Highway at Sandgate.

Construction of the project would form part of the Newcastle Inner City Bypass. This would provide improved traffic flows across the western suburbs of Newcastle and connect key regional destinations such as Bennetts Green, Charlestown and Jesmond shopping centres, John Hunter Hospital precinct, The University of Newcastle and the Pacific Highway.

The north-south road corridor was first planned in the 1950s and incorporated into the Northumberland County Planning Scheme in 1957.

Sections of the Newcastle Inner City Bypass have opened progressively since the early 1980s as outlined in Table 1.1.

Section	Route	Length	Status
A	West Charlestown Bypass	6 km	Completed in 2003
B	Kotara to Rankin Park	2.4 km	Completed in 1983
C	Rankin Park to Jesmond	3.4 km	Subject to this planning approval
D	Jesmond to Shortland	3.2 km	Completed in 1993
E	Shortland to Sandgate	2.3 km	Completed in 2014

Table 1.1 Newcastle Inner City Bypass sections status

Figure 1.1 Location map

A strategic design for the Rankin Park to Jesmond project was displayed for community comment in 2007. Community feedback was considered to finalise the preferred route corridor, which was reserved in Newcastle City Council's local environmental plan.

In June 2014 the NSW Government announced it would complete the $280 million Rankin Park to Jesmond section of the bypass, including $150 million from Restart NSW to progress the project. Roads and Maritime has since carried out a comprehensive review of the 2007 strategic design and a refined strategic design was displayed for community feedback in May and June 2016. A concept design has since been developed for the project, which forms the basis of this assessment that has been prepared to support the environmental impact statement (EIS) for the project.

1.2 THE PROJECT

The project would involve the construction of about 3.4 kilometres of new four lane divided road between Lookout Road at New Lambton Heights and Newcastle Road at Jesmond. The project is located in the Newcastle local government area (LGA), about 11 kilometres west of the Newcastle central business district and about 160 kilometres north of Sydney (refer to Figure 1.1).

Key features of the project are shown on Figure 1.2 and include:

- New road with two lanes in each direction, separated by a median
- Three interchanges, consisting of:
  - Northern interchange providing access to Newcastle Road and the existing Jesmond to Shortland section of the Newcastle Inner City Bypass. The full interchange provides all movements to/from the bypass and Newcastle Road
  - Hospital interchange providing access between John Hunter Hospital precinct and the bypass. The half-interchange providing access to/from the north
  - Southern interchange providing access to Lookout Road and the existing Kotara to Rankin Park section of the Newcastle Inner City Bypass. The bypass would travel under McCaffrey Drive. The half interchange provides connection in both directions on Lookout Road
- Structures along the road to allow for drainage, animal and bushwalker access
- Tie in and upgrades to connecting roads, including Lookout Road, McCaffrey Drive and Newcastle Road
- Large cut and fill embankments due to steep and undulating terrain
- Pedestrian and cycling facilities, including a shared path bridge over Newcastle Road
- Noise barriers and/or architectural treatment, as required
- Permanent operational water quality measures.

Ancillary work to facilitate construction of the project (Figure 1.3), including:

- Adjustment, relocation and/or protection of public utilities and services
- Mine subsidence treatment, as required
- Temporary construction facilities, including sedimentation basins, compounds and stockpile sites
- Temporary and permanent access tracks
- Concrete/asphalt batching plant, as required.

PROJECT OBJECTIVES:

The key objectives of the project are to:

- Provide continuity of the Newcastle Inner City Bypass between Bennetts Green and Sandgate
- Reduce travel times and congestion on the Newcastle Inner City Bypass
- Provide traffic relief on key parts of the surrounding road network.
- In so doing, it is intended to:
  - Improve road safety
  - Minimise impacts on the natural and built environment
  - Provide value for money.

To support the project objectives, the concept design and EIS has been developed by:

- Designing the project to consider the environmental constraints and avoid or minimise impacts to the environment
- Satisfying the technical requirements for the design of the project
- Optimising the concept design to ensure the project can be constructed and maintained both practically and efficiently
- Applying appropriate urban design, landscape and visual principles in the concept design of the project elements
- Carrying out appropriate community and stakeholder consultation
- Designing all connections, modifications and improvements necessary to link the project to the existing road network
- Planning temporary arrangements which minimise disruption to local and through traffic and maintain access to adjacent properties during construction.

The overall project goal is to achieve the best possible result for each of the above tasks, both in isolation and when considered together.

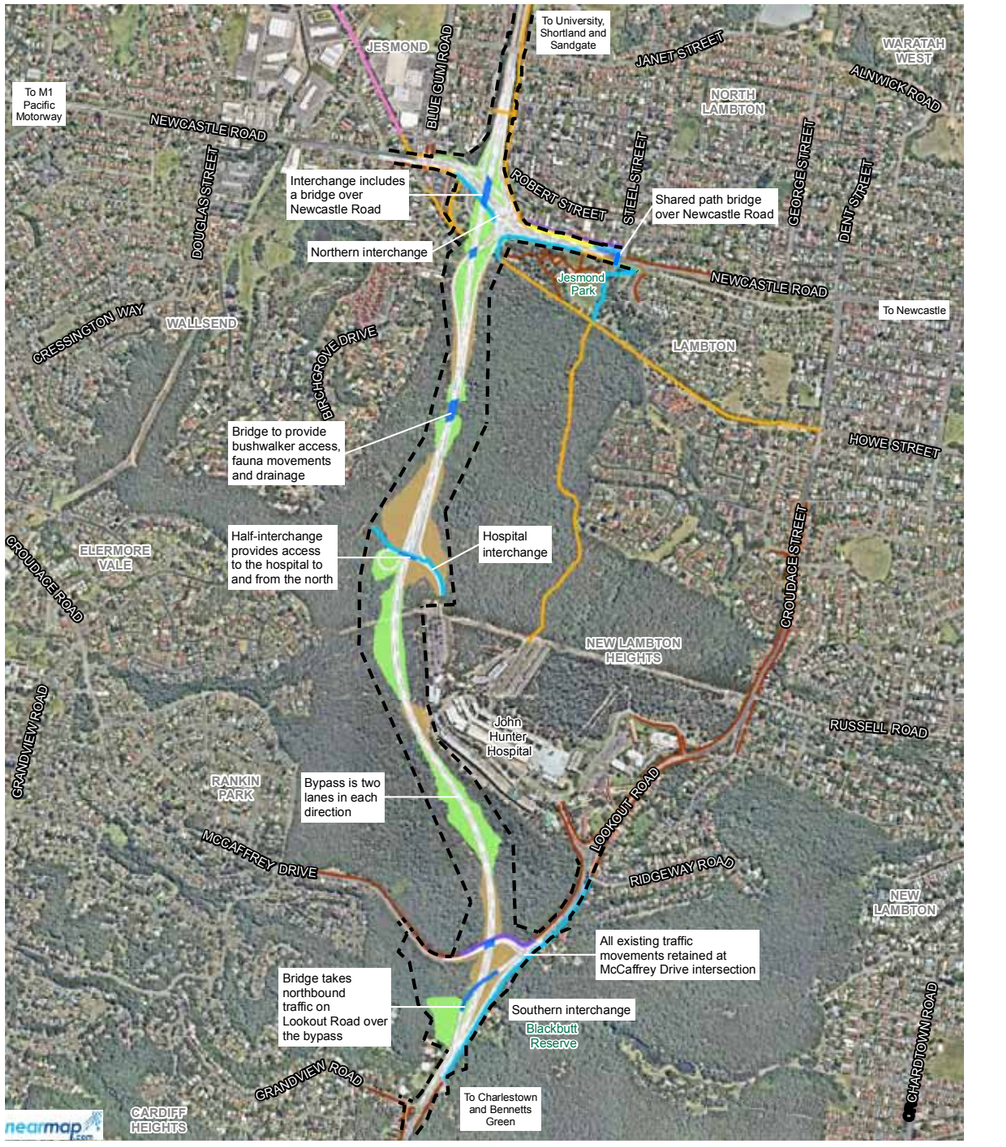

Figure 1.2 Plan illustrating the project's setting and key features. The black dashed outline defines the limits of the project's area.

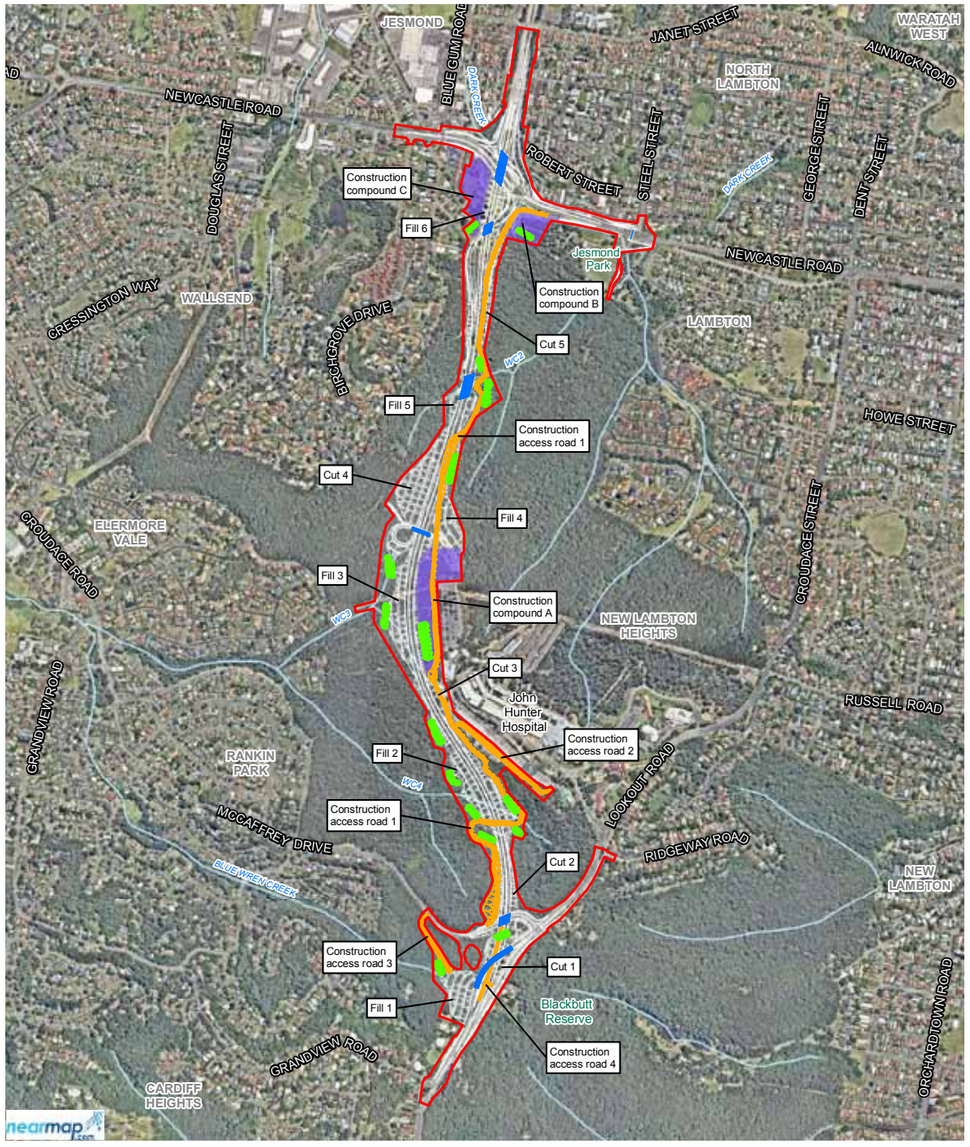

Figure 1.3 Plan illustrating the project's construction ancillary facilities.

1.3 PURPOSE OF THIS REPORT

The purpose of this report is to provide urban design input into the project, whilst simultaneously undertaking landscape character and visual impact assessments. The assessment aims to facilitate an integrated urban design and engineering design outcome for the project, to minimise impacts where possible.

The landscape character and visual impact assessments inform the design process by identifying potential impacts that the proposed project would have on the surrounding project area, identifying strategies to improve the design and proposing mitigation measures for the identified impacts.

The resulting urban design strategy, combined with the landscape character and visual impact assessments, informs the project approval authority, other agencies and the community about the overall design and expected impacts of the project. This report has been prepared as part of the Environmental Impact Statement for the project.

1.4 METHODOLOGY

Preparation of this report has involved a desktop analysis and site visits. The assessment is based on Roads and Maritime Guidelines, specifically:

- Guidelines for landscape character and visual impact assessment No. EIA-N04,"Version 2.0 Issue Date 28 March 2013"; and consideration of the Roads and Maritime latest revision to this document.
- Beyond the Pavement, January 2014
- Bridge Aesthetics, August 2012
- Landscape Design Guidelines, April 2008

The assessment is based on both the landscape character impact and the visual impact. The landscape character impact is based on the aggregate of an area's built, natural and cultural character and sense of place. In this regard, it is measured by the combination of the area's sensitivity and the magnitude (scale, character and distance). As part of the sensitivity assessment, public perception of the project, its absorption capacity and the area significance whether local, regional or national have been taken into account.

For example, commercial properties are generally considered less sensitive than private residences, and heritage properties are generally considered more sensitive than residential properties. Transient type spaces are generally considered less sensitive compared to spaces that people linger in.

The visual impact is based on specific viewpoints taking into consideration the sensitivity of the viewer as well as the visual effect or magnitude of the project based on scale, distance, contrast etc.

Table 1.1 shown below illustrates how the level of sensitivity and magnitude are combined to achieve an overall level of impact for both the landscape character impact and the visual impact.

The methodology used to undertake the study is summarised as follows:

- Background review of the preliminary concept design and supporting material to gain an appreciation of the project
- Detailed site visit to identify sensitivities, views, visual catchments, magnitude of change etc, and to gain a full appreciation of the interface of the proposed road in its setting
- Contextual analysis evaluating the characteristics of the site including land uses, scenic values, character zones and landform
- Determination of sensitivity levels based on the contextual analysis
- Determination of visual exposure and preparation of a visual envelope map to determine the visual catchment of the project
- In collaboration with the project team, iterative identification of strategies that would improve the outcome of the project from an urban design, landscape character and visual impact point of view
- Description of the design based on the urban design input and mitigation strategies
- Evaluation of the project's impact on the landscape character
- Selection of viewpoints within the visual catchment that are representative of the varying site conditions and the project
- Evaluation of the project's visual impact by comparing the sensitivity of existing viewpoints and the magnitude of impact of the project upon them
- Identification of any further mitigating measures that could be incorporated into the design.

Sensitivity \ Magnitude	high	moderate	low	negligible
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

Table 1.2 Visual Impacts Rating Table, example illustrating the resulting impact as a combination of sensitivity and magnitude. Guidelines for landscape character and visual impact assessment No. EIA-N04,"Version 2.0 Issue Date 28 March 2013"

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2.0 CONTEXTUAL ANALYSIS

2.1 LANDSCAPE CONTEXT

The project crosses through highly sensitive bushland, which is a key landscape feature of the setting, situated in an otherwise dense urban environment. This is a unique feature of this section of the bypass.

Figure 2.4 illustrates the proposed project alignment within the strong bushland setting, with four major open spaces/reserves- Blackbutt Reserve, George McGregor Park, the Bushland Reserve to the east, surrounding John Hunter Hospital and Jesmond Park to the north of the project.

Other reserves include Invermore Close, Sygna Close Reserve (Figure 2.2), and Dangerfield Reserve (Figure 2.3).

The road corridor is almost completely within a bushland corridor, except for the northern area at Jesmond, and the nearby Hospital Precinct, in close proximity mid way along, on the eastern corridor. Refer to Figure 2.1 for the bushland context in which the Hospital Precinct sits.

The bushland context offers opportunities in terms of visual mitigation, but also constraints in terms of mitigating impacts upon the bushland areas from an environmental and sustainability perspective. Informal trails and fire trails are used by recreational bushwalkers throughout the project area.

Figure 2.1 *View looking west across the bushland setting from the Hospital Precinct carpark*

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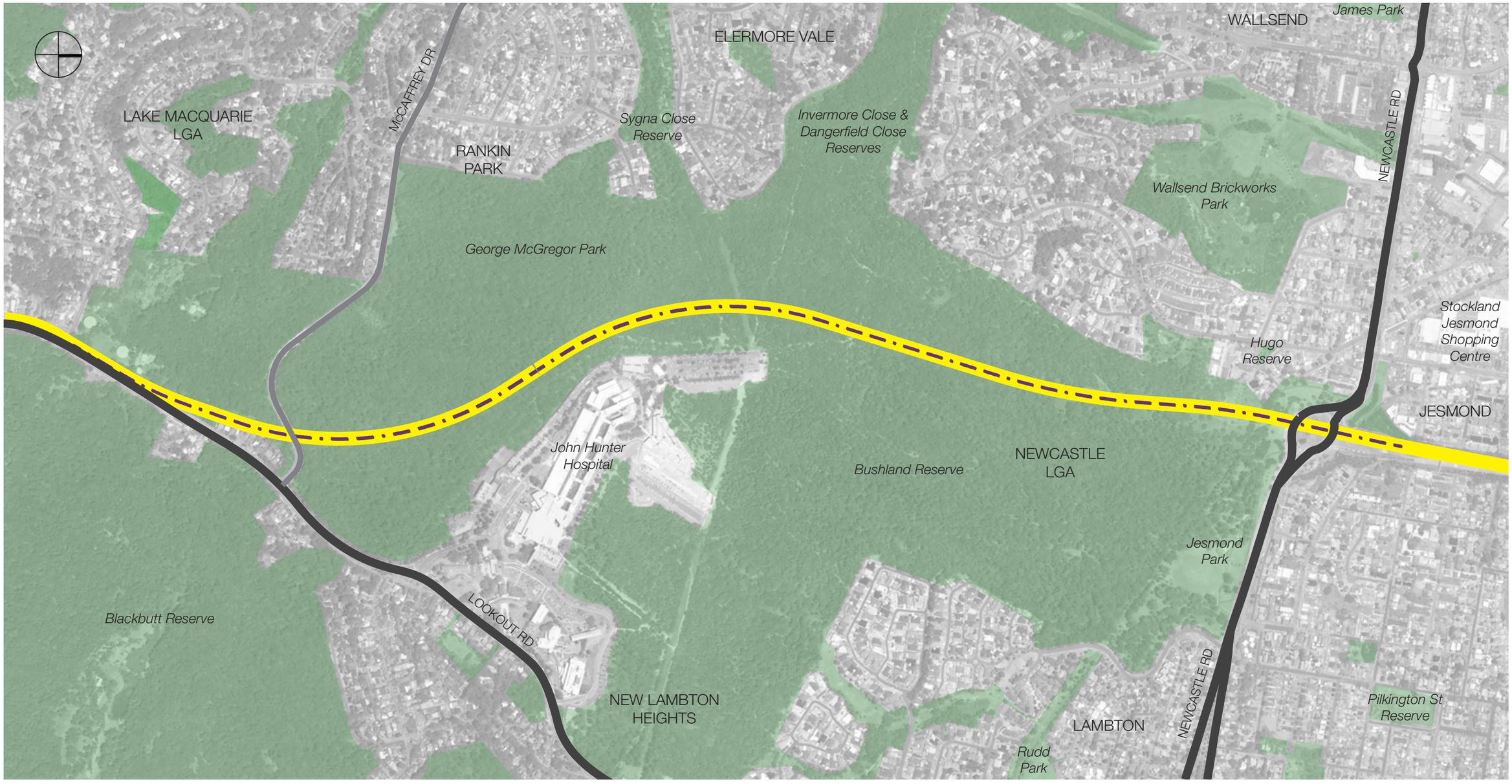
Figure 2.2 *View of Sygna Close Reserve*

Figure 2.3 *View of Dangerfield Reserve*



Legend

Landcape context

- Bushland / Parks
- Built form
- Newcastle Inner City Bypass
- Rankin Park to Jesmond
- Arterial Road
- Sub Arterial Road

Figure 2.4 Landscape context map

2.2 NETWORK CONTEXT

The Newcastle Inner City Bypass (Highway 23) between the Pacific Highway at Bennetts Green and the Pacific Highway at Sandgate provides a major orbital arterial road for the city, alleviating traffic congestion in the city centre and acting as a local distributor.

The road is divided into five distinctive sections (from south to north), West Charleston Bypass, Rankin Park to Kotara, Rankin Park to Jesmond, Jesmond to Shortland and Shortland to Sandgate (Refer figure 2.5).

The Rankin Park to Jesmond section, has not been constructed and is the critical link to complete the overall orbital. Its route would divert from Lookout Road to the south of the intersection of McCaffrey Drive, skirting around the west of the John Hunter Hospital and crossing over Newcastle Road to join the Jesmond to Shortland section.

The Rankin Park to Jesmond section of the Newcastle Inner City Bypass would provide traffic relief to the surrounding road network, in particular the existing route of Lookout Road, Croudace Street and Newcastle Road.

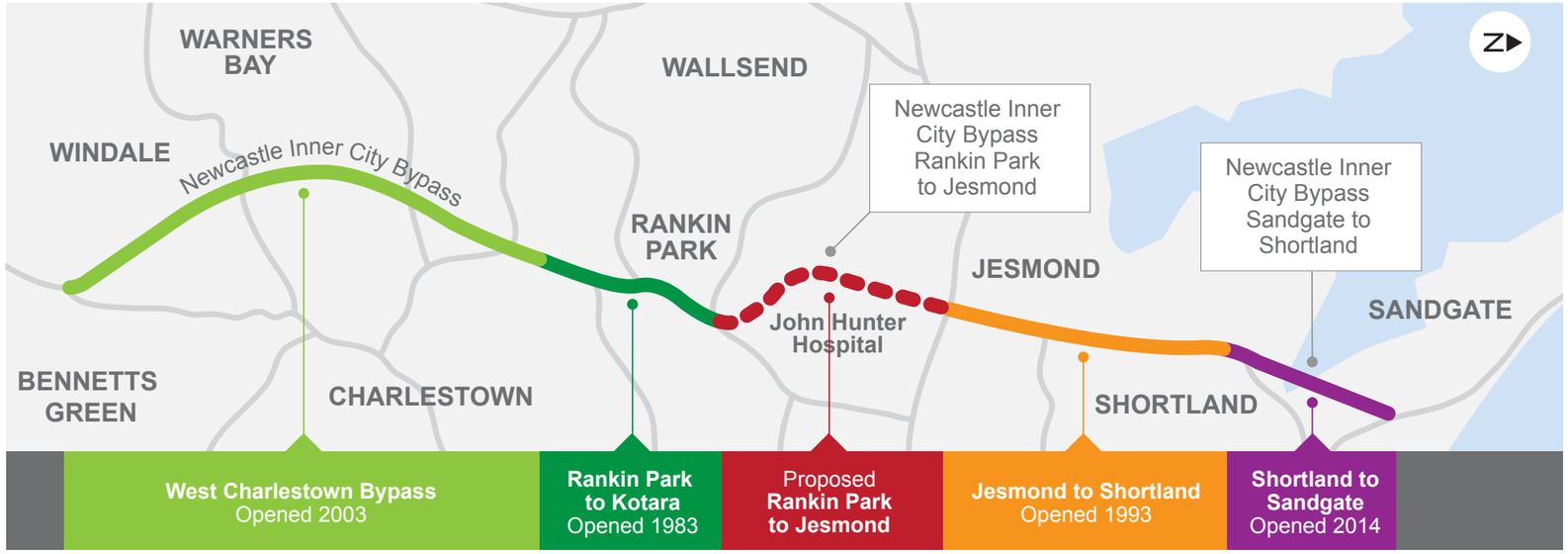
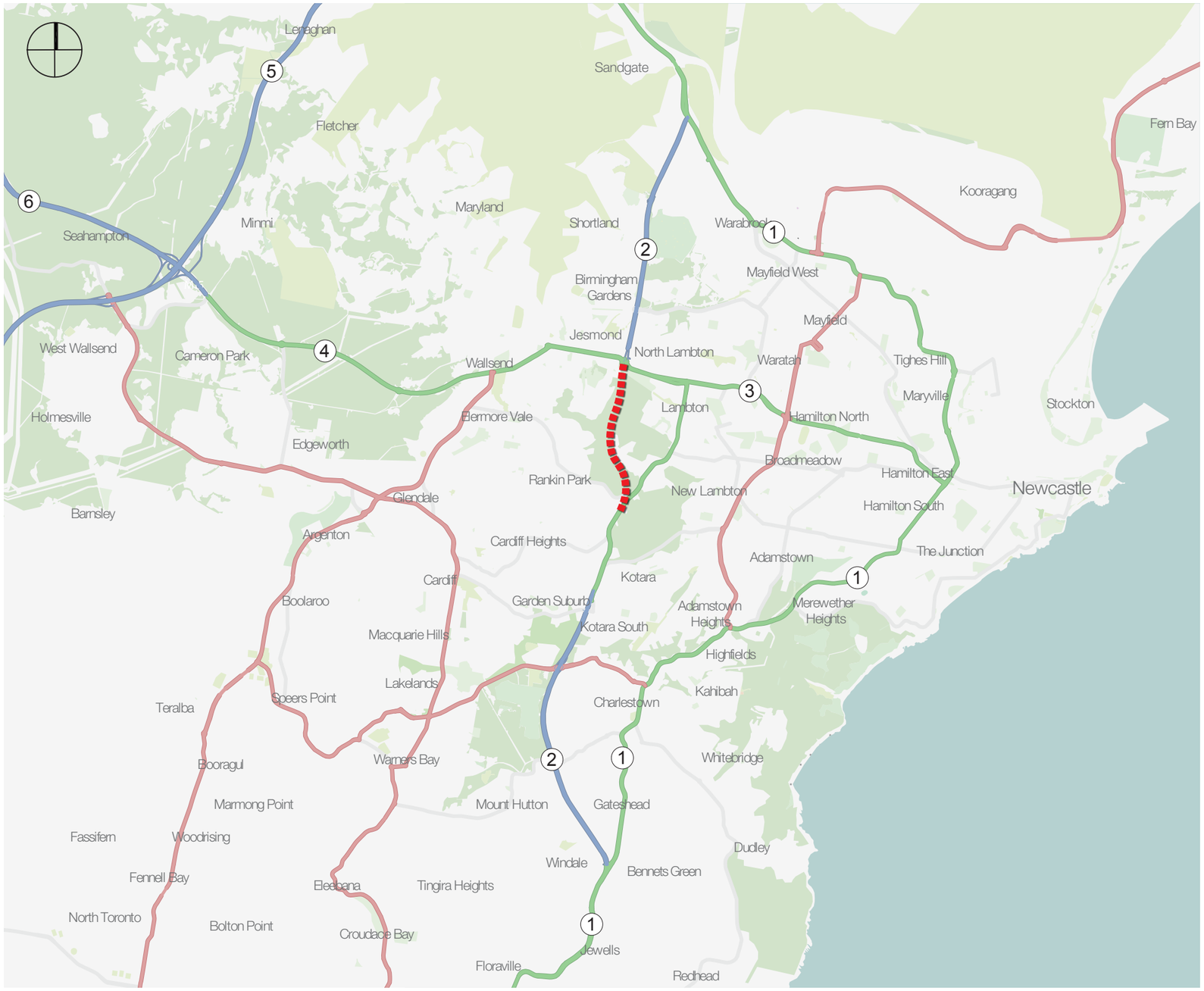


Figure 2.5 Newcastle Inner City Bypass - Timeline of construction, illustrating the various sections of the Newcastle Inner City Bypass.
(Source: RMS - Roads and Maritime Services; http://www.rms.nsw.gov.au/images/projects/hunter/newcastle-inner-city-bypass/banner-newcastle-inner-city-bypass.jpg)



The adjacent map illustrates the regional context of the Newcastle Inner City Bypass within greater Newcastle (refer figure 2.6). The road provides a critical link with the Pacific Highway to the north and south and intersects a major arterial road linking the city centre with the Pacific Motorway (M1) via Newcastle Link Road and Newcastle Road.

Indicative proposed alignment for Rankin Park to Jesmond

1. Pacific Highway
2. Newcastle Inner City Bypass
3. Newcastle Road
4. Newcastle Link Road
5. Pacific Motorway (M1)
6. Hunter Expressway

Figure 2.6 Regional road network map of the project area.

2.3 NATURAL ENVIRONMENT

Topography, main drainage lines, water bodies and the 1:100 year flood zone are shown on the adjacent map (figure 2.9). As illustrated, the landform and topography within and adjacent the study area ranges for gently undulating hills with rounded ridges and crests in the north to steep gullies and slopes in the southern section of the study area.

Should bridges, and viaducts not be proposed through the challenging topography areas, there would be extensive cuts and fills required in such a landscape.

The main ridgeline runs in a meandering fashion, but generally in a north- south direction through the project site. A view looking west from this main ridgeline is shown in figure 2.7.

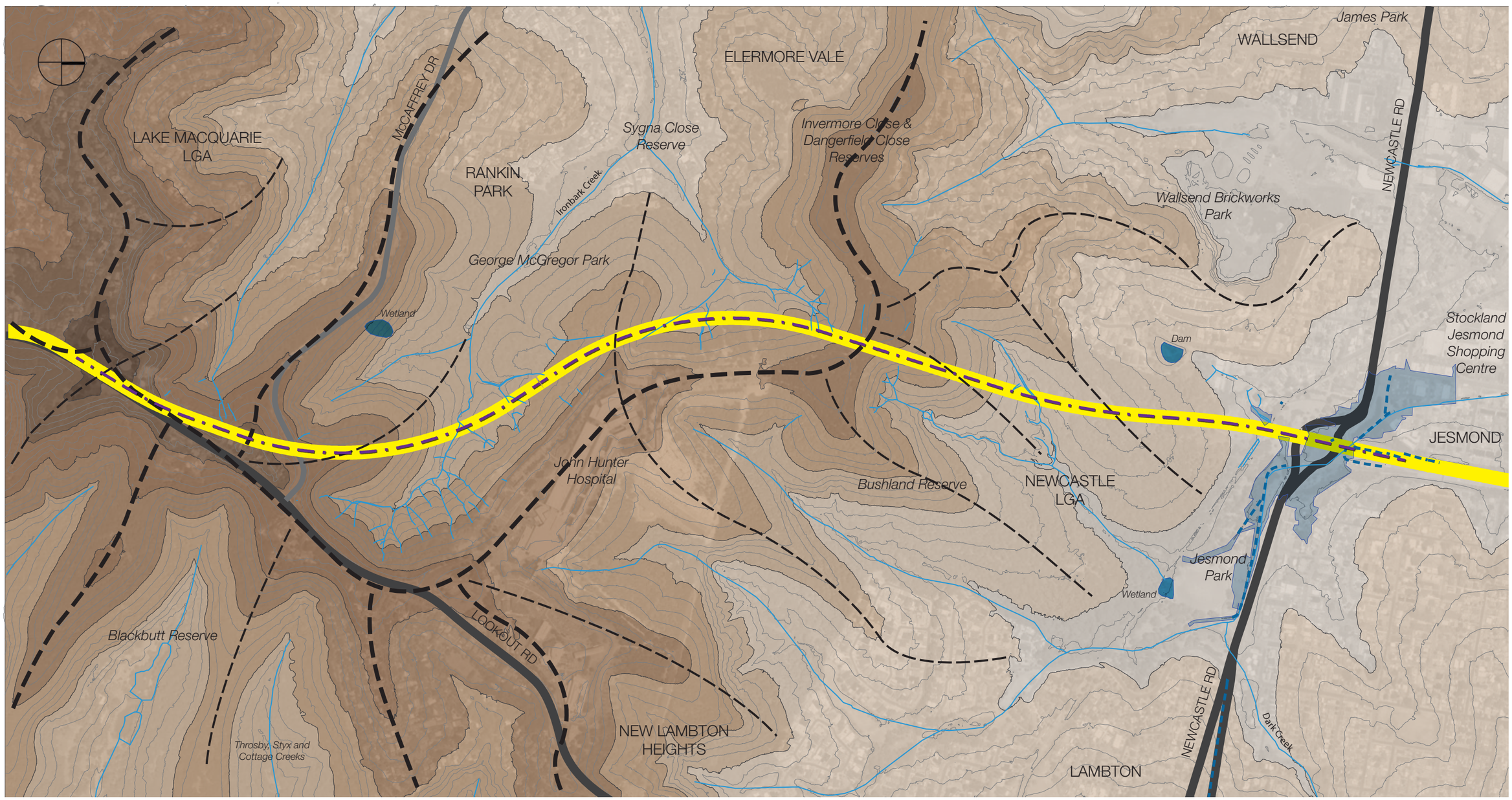
The elevation is shown in tonal increments of 20 metres and from south to north, an elevation change of 120m exists, from Lookout Road (130m AHD) and Newcastle Road (10m AHD), with a 70 metre natural surface drop from Lookout Road at the southern end. Slopes range up to 12%, hence will create challenges for the engineering design, in such undulating topography.

The major ridgeline referred to above divides the water catchments that intersect the project site. North of the John Hunter Hospital, the project site drains into Dark Creek catchment; and then into Ironbark Creek. Areas east of Lookout Road drain towards a number of unnamed tributaries that flow towards Styx Creek. To the west of Lookout Road, the project area drains into Blue Wren Creek and an unnamed creek that both flow into Ironbark Creek (refer figure 2.8).

With these many drainage lines and tributaries of creek lines, care needs to be taken to minimise impacts to existing drainage systems.

Figure 2.7 *View looking west from the bushland setting on a ridgeline, along the power line easement to distant ranges beyond residential areas.*

Figure 2.8 *Ironbark Creek after rain*



Legend

Topography & Drainage

- Major Ridgeline
- Minor Ridgeline
- High Ground

Water

- Water Courses / Creek Lines
- Drainage Lines
- Water Bodies
- 100 Year Flood (*)

*Source: Aurecon, 2015

- Newcastle Inner City Bypass
- Rankin Park to Jesmond
- Arterial Road
- Sub Arterial Road

Figure 2.9 *Topography and Drainage*

2.4 LAND USE AND CONNECTIVITY

The project would predominantly cross through land use dedicated for road infrastructure or environmental management. Most residential areas surrounding the project are well away from the proposed alignment, (refer figure 2.12) with the closest landuse interfacing with the new works situated in the vicinity of Northern Interchange and the Hospital Precinct, zoned hospital infrastructure.

The adjacent map (figure 2.14) illustrates the interface of the various land uses identified in the Local Environment Plan (LEP) with the project. Lookout Road would continue its function as a major arterial road, yet the project would divert traffic away from this road, increasing future capacity. Lookout Road would continue to be a key access road to both the Hospital Precinct and Newcastle's CBD from the south.

The proposed Hospital Interchange would enhance access to the Hospital Precinct and improve operations for emergency vehicles. At the Northern Interchange, the pedestrian and cycle connectivity across the corridor in an east/west direction is critical. The existing cycleway along the old tram line is an important route for this user groups.

In terms of connectivity within the bushland, a series of informal tracks (refer figure 2.13) would be impacted by the project. Some of these connections would be retained in locations where bridges and overpasses occur to maintain the general permeability of the area. Refer to Section 5.1 for further discussion on connectivity.

Heritage interest

As identified in the *Non-Aboriginal Heritage Assessment, Newcastle Inner City Bypass Rankin Park to Jesmond* prepared by GHD, May 2016, the current shared use path follows the historical alignment of the tramway, the former Newcastle-Wallsend Tram Line which was opened in 1887 and closed in 1951. The section of this tram line traverses the project area, as shown on the adjacent map (figure 2.14); and is used for the majority of its length as a cycleway as illustrated in figures 2.10 and 2.11.

The tramway itself is not identified as a heritage item in the Newcastle Heritage Study (Suters 1997a), although it makes comment that remains of past railway lines should be retained where possible.

The project needs to ensure that impacts to this cycleway are minimised, which is an important community asset and is a critical east-west link. Other non- indigenous heritage sites notated on the LEP include items within the Hospital Precinct, none of which would be directly impacted by the project.

Figure 2.10 *Cycle path on old tram line alignment, Jesmond Park, near the Northern Interchange.*

Figure 2.11 *Cycle path through woodland area, east of the Northern Interchange.*

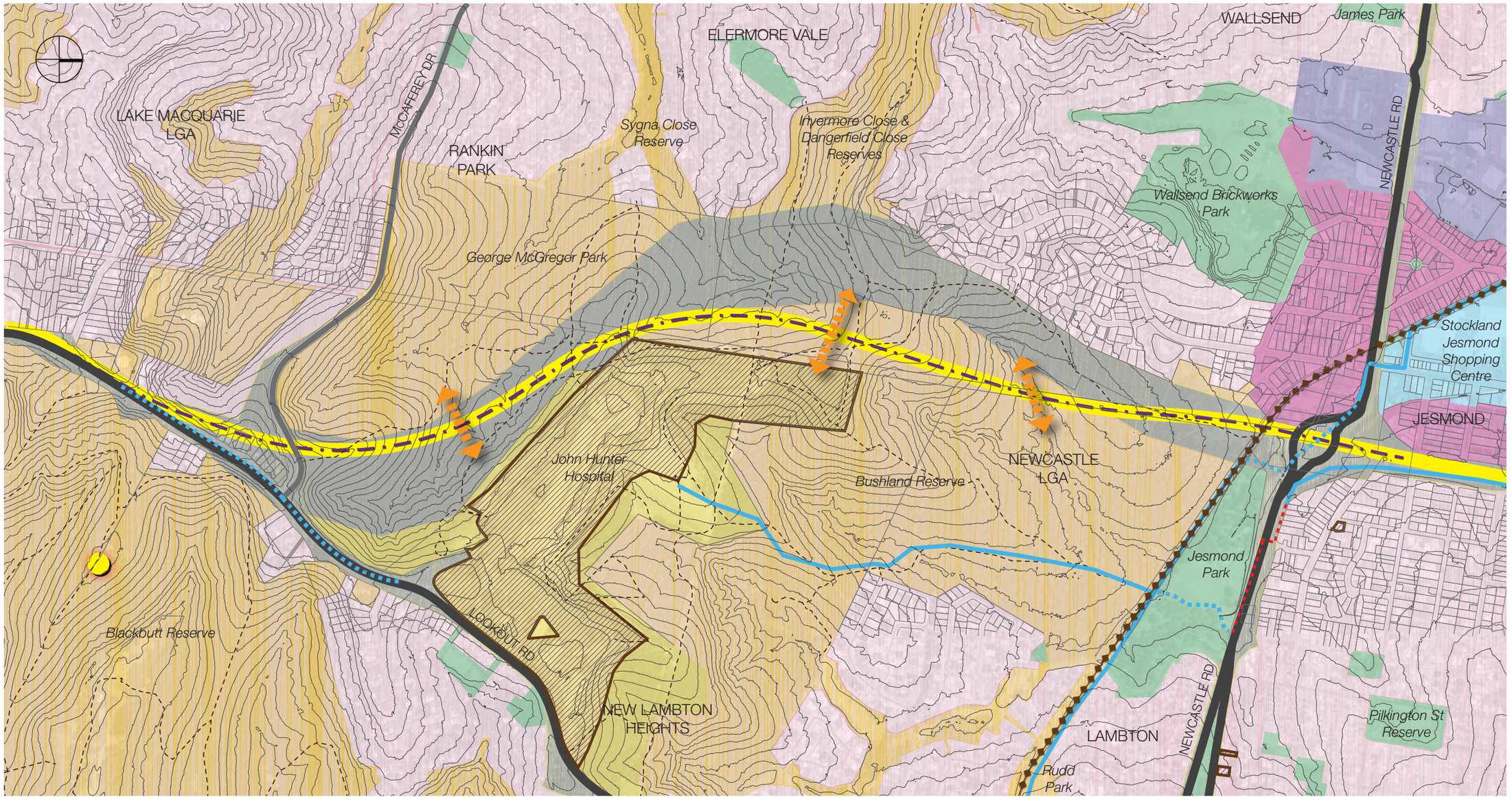
Figure 2.12 *Looking west through Spotted Gum forest fringe areas, on edge of residential areas adjacent to the original corridor, Wallsend.*

Figure 2.13 *Existing fire track in forested areas in the vicinity of Sygna Close.*

The area immediately to the south of the intersection of Newcastle Road and the existing Newcastle Inner City Bypass has been identified as an unlisted item known as Hollywood, a former shanty town.

Regarding Aboriginal heritage, the Awabakal and Worimi peoples are recognised and acknowledged as the traditional custodians The project area is situated within the boundary of the Awabakal Local Aboriginal Land Council (LALC). Numerous investigations have been undertaken and did not identify any Aboriginal heritage sites or potential archaeological deposits within the area likely to be affected by the project. The archaeological significance of the study area was found to be low.

For further information refer to Chapter 15 Aboriginal Heritage 2016.



Legend

Landuse

- Environmental Management
- Infrastructure-Road
- Infrastructure-Hospital
- Public Recreation
- Low Density Residential
- Medium Density Residential
- Local Centre
- Light Industrial

- Newcastle Inner City Bypass
- Rankin Park to Jesmond
- Arterial Road
- Sub Arterial Road

- Non-Aboriginal Heritage Item (1)
- Aboriginal Heritage Item (2)
- Old Tram Line

Connectivity

- Off Road Cycleway (Existing / Proposed)
- Proposed On Road Cycleway
- Existing Informal Walking Trails
- Explore Connectivity Opportunity

*Sources:
(1) Technical Paper 9 Non-Aboriginal Heritage, 2016

(2) Chapter 15 Aboriginal Heritage, 2016

Figure 2.14 *Land use and Connectivity*

2.5 SOIL LANDSCAPES

The adjacent soil landscapes map reinforces the original natural patterns that were one there before the area was disturbed by urbanisation.

The indigenous species patterns, based on the Soil Landscapes, should drive the planting selection for the project, where space permits, to ensure a sustainable landscape evolves long term.

Such an approach would ensure a lower maintenance landscape evolves over time, as species are chosen for correct soil/water conditions. The indigenous species also support the local fauna/bird species, hence promoting biodiversity.

This section summarises the influencing soil landscapes across the study area, with information extracted from the *"Soil Landscapes of the Newcastle, 1:100,000 Sheet",* published by Land & Water Conservation. Key soil landscapes across the project area include:

GATESHEAD

Undulating to rolling hills, predominantly cleared woodland and open forest. Moderately deep soil, Yellow Podsolic soils, and yellow Soloths on conglomerate crests and sideslopes, with some shallow rapidly drained Lithosols. Moderately deep to deep Red Podzolic Soils and red soloths upon shale material.

Typically contains areas of water erosion hazard, areas of mine subsidence, localised steep slopes, shallow soils and high run-off.

Vegetation- predominantly cleared open- forest, some woodland, with Angophora costata, ***Eucalyptus haemastoma, Eucalyptus eugeniodies, Eucalyptus capitellata, Allocasuarina torulosa*** and ***Syncarpia glomulifera, Pittosporum undulatum*** and ***Eucalyptus saligna*** in sheltered gullies.

STOCKRINGTON VARIANT A

Steep rises on conglomerates of Newcastle Coal Measures Adamstown Subgroup. Sideslopes with lower slope gradients. Soils moderately deep to deep rapidly draining Earthy Loams and Friable Loams, on upper slopes.

Typically contains areas of steep slopes, mass movement, water erosion hazard, foundation hazard.

Vegetation
Uncleared tall open-forest with Eucalyptus salligna, E. maculata, E. umbra and *Syncarpia glomulifera.* Along Blue Gum Creek, *Eucalyptus grandis, Toona australis, Acmena smithii, Acacia fimbriata, and Hibiscus heterophyllus. On exposed slopes, Eucalyptus maculata, and Eucalyptus umbra.*

CEDAR HILL

Characterised by rolling to steep rises on siltstones and sandstones. Soils with Brown Podzolic soils and moderately deep, well drainage structured loams. This soil landscape is affected by mass movement and is a high mass movement hazard, high

Vegetation
Predominantly cleared open- forest. On upper slopes, ***Eucalyptus maculata, Eucalyptus punctata, Eucalyptus umbra,*** with ***Acacia mearnsii, Acacia implexa*** with occasional ***Eucalyptus paniculata, Eucalyptus propinqua*** and ***Syncarpia glomulifera*** on sheltered slopes.

Killingworth and Killingworth Variant A
Undulating to rolling hills with slopes between 3 % and 20%. The Landscape Variant A refers to rolling to steep hills greater than 20%.

Typically, soils are shallow to moderately deep, well to perfectly drained Yellow Podzolics, yellow soloths and gleyed Podzoilc Soils on crests ad hillslopes, with shallow, well drained structured loams.

Characteristically, some areas have high water erosion hazard, erosion hazard, include sections of the Mine Subsidence District, with seasonal waterlogging, and very strongly acidic soils of low fertility.

Vegetation
Largely uncleared open forest, with some woodland. dominant species include ***Eucalyptus maculata, E. eugenioides, E. umbra, E. fibrosa,*** and ***E. paniculata.*** Understorey of *Themeda australis, Leptospernum* ***and*** *Xanthorrhea* species.

BERESFORD

On the north interface of the project lies this soil landscape, which is now mainly cleared with development.

Landscape of undulating hills and rises on Permian sediments, with slopes ranging between 3% and 15%, with local relief to 50m, and elevation of 20-50m.

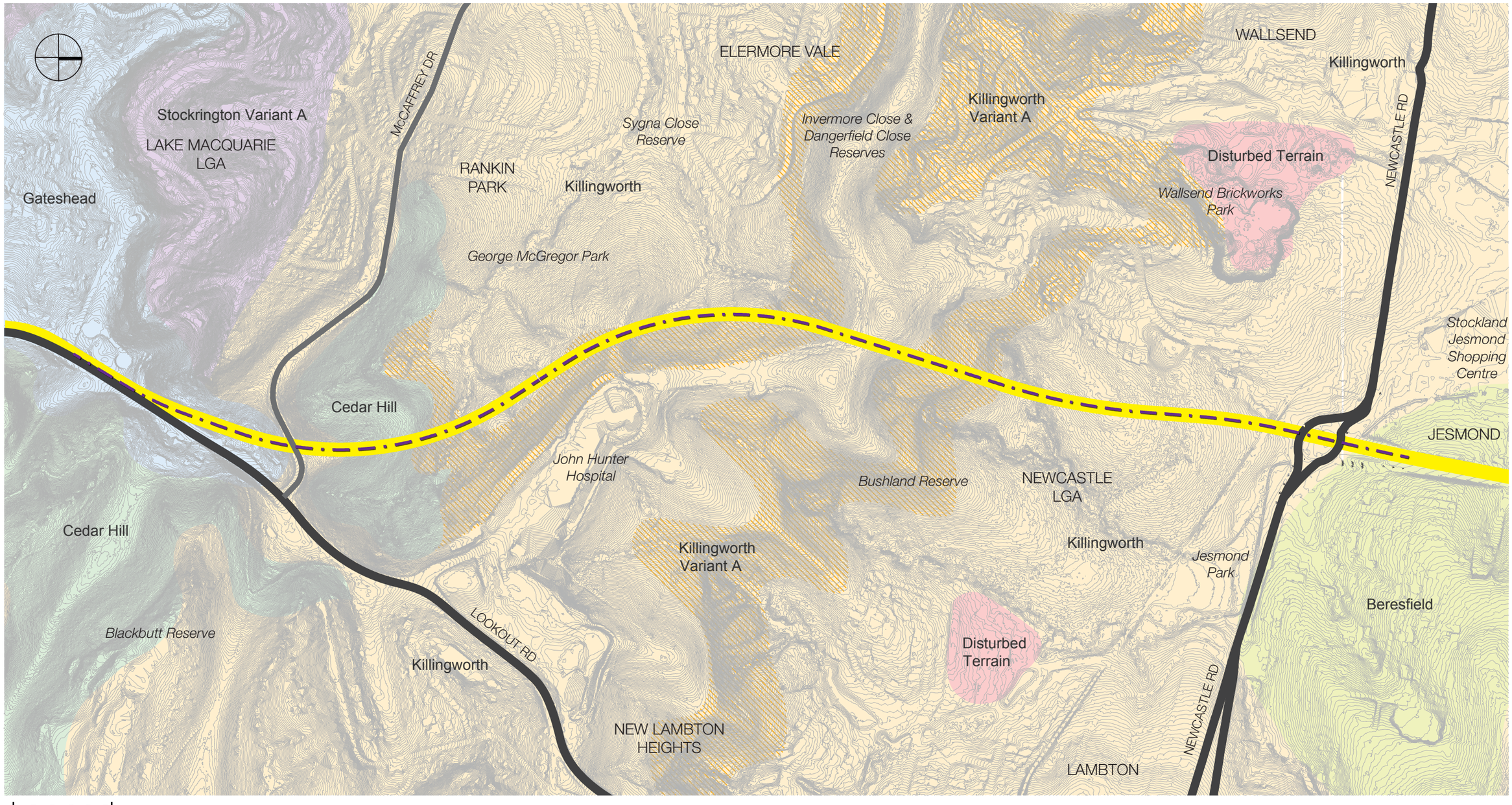
Soils moderately deep, moderately well drained Yellow Podzolic soils, Brown Podzolic soils, and Yellow Podzolic soils, yellow Soloths and Gleyed Podzolic soils on lower slopes.

Typically contains areas of high foundation hazard, water erosion hazard, Mine Subsidence district.

Vegetation
Partially cleared tall, open forest comprising *Eucalypts maculata, E. fibrosa, E. punctata. E. oblonga, E. eugenioides,* and *E. paniculata.* Understorey of *Bursaria spinosa, Melaleuca nodosa,* and *Acacia falcata*.

Eucalyptus tereticornis occurs on some lower slopes.

In drainage lines, *Melaleuca styphelioides, Backhousia myrtifolia* and ***Alphinia excelsa*** are common.



Legend

Soil Landscape

- Gateshead
- Stockrington Variant A
- Killingworth
- Killingworth Variant A
- Disturbed Terrain
- Beresfield
- Cedar Hill

- Newcastle Inner City Bypass
- Rankin Park to Jesmond
- Arterial Road
- Sub Arterial Road

*Sources:
Soil Landscapes of the Newcastle
1:100 000 Sheet
1995

Figure 2.15 Soil Landscapes

2.6 VEGETATION

The vegetation communities across the corridor, as identified in the Biodiversity Assessment Report, 2016, are shown on the adjacent map.

In summary the following main points re distribution of the main vegetation communities, and attributes are:

Smooth-barked Apple -Red Bloodwood open forest

the most abundant community on site, immediately south of McCaffrey Drive to north of Dangerfield Drive Reserve, dense canopy with shrub and ground cover with high density of native species. Refer to figures 2.17 and 2.18.

Smooth-barked Apple-Sydney Peppermint-Turpentine healthy open forest-

two small isolated patches, subjected to weed invasion, containing high diversity and density of native species, and number of threatened flora. Three patches- one behind John Hunter Hospital, and behind residential properties east of Illoura Street.

Spotted Gum -Broad leaved ironbark grassy open forest

this community is consistent with the Lower Hunter Spotted Gum-Ironbark Forest in the Sydney Basin Bio-region and is listed as endangered under the TSC Act . Community occurs in the northern end of the site just south of Jesmond Park. There are variants shown with differing canopy, shrub and groundcover conditions. Refer to figure 2.16.

Sydney Blue Gum-White Mahogany shrubby tall open forest-

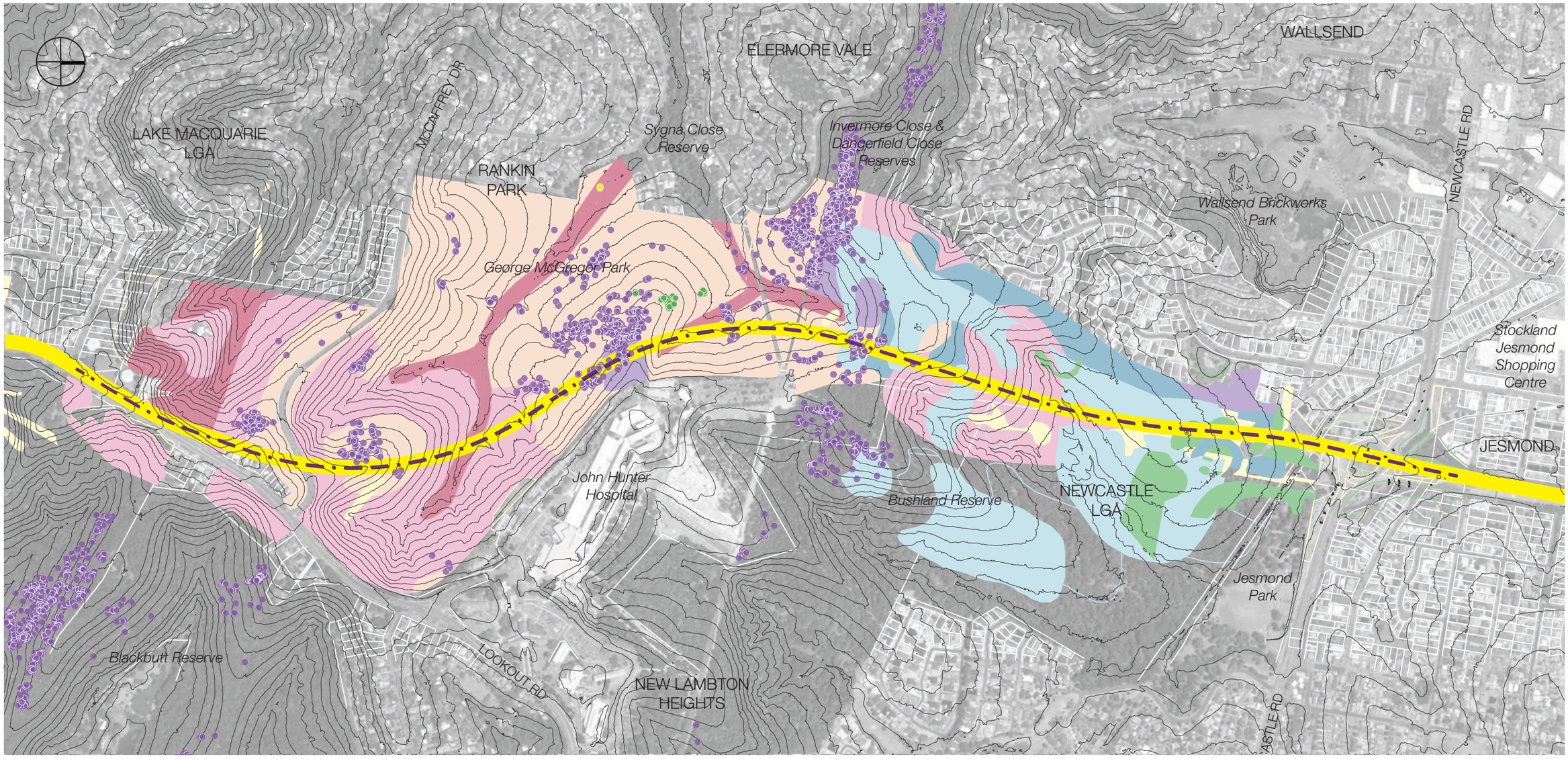
contains a high diversity of native species, resident of the Powerful Owl, located within centre of the study area (behind John Hunter Hospital) and Lookout Road through to Sygna Close Reserve.

Key native species selected from these vegetation communities for use in re-vegetation are listed in the Urban Design Plan, section 5.1 of this report.

Figure 2.16 Spotted Gum forest -Broad leaved ironbark grassy open forest

Figure 2.17 Smooth-barked Apple -Red Bloodwood open forest

Figure 2.18 Smooth-barked Apple -Red Bloodwood open forest panorama



Legend

Vegetation Communities

- HU621 - Smooth-barked Apple - Red Bloodwood open forest
- HU622 - Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest
- HU629 - Spotted Gum - Broad-leaved Ironbark grassy open forest (EEC)
- HU631 - Spotted Gum - Grey Ironbark open forest
- HU637 - Sydney Blue Gum - White Mahogany shrubby tall open forest
- Low Hunter Spotted Gum Ironbark Forest (EEC) (revised region)
- Planted and parkland vegetation
- Exotic Vegetation

*Source: Technical Paper 2 - Biodiversity Assessment Report, 2016

Ecology

Threatened Flora Species:

- Black-eyed Susan (Tetratheca juncea)
- Magenta Lilly Pilly (Syzygium paniculatum)
- Small-flower Grevillea (Grevillea parviflora)

- Newcastle Inner City Bypass
- Rankin Park to Jesmond

Figure 2.19 Vegetation Communities

2.7 BUILT FORM

A variety of built form elements integrate site specific themes along the various road sections of the overall bypass to reinforce the road's identity and travel experience. These references vary from fauna themes to the history of mining in the area.

There is limited visual continuity between the various treatments, creating distinctive visual experiences along the roadway. Yet, this approach is considered to constrain the overall visual identity of the bypass. Hence, the urban design resolution of built form elements should investigate strategies to visually link the adjacent sections of roadway to reinforce this continuity.

The adjacent map (refer figure 2.20) illustrates the Rankin Park to Jesmond section (dashed yellow line) in context with adjacent sections of the bypass and the various existing built form treatments constructed.

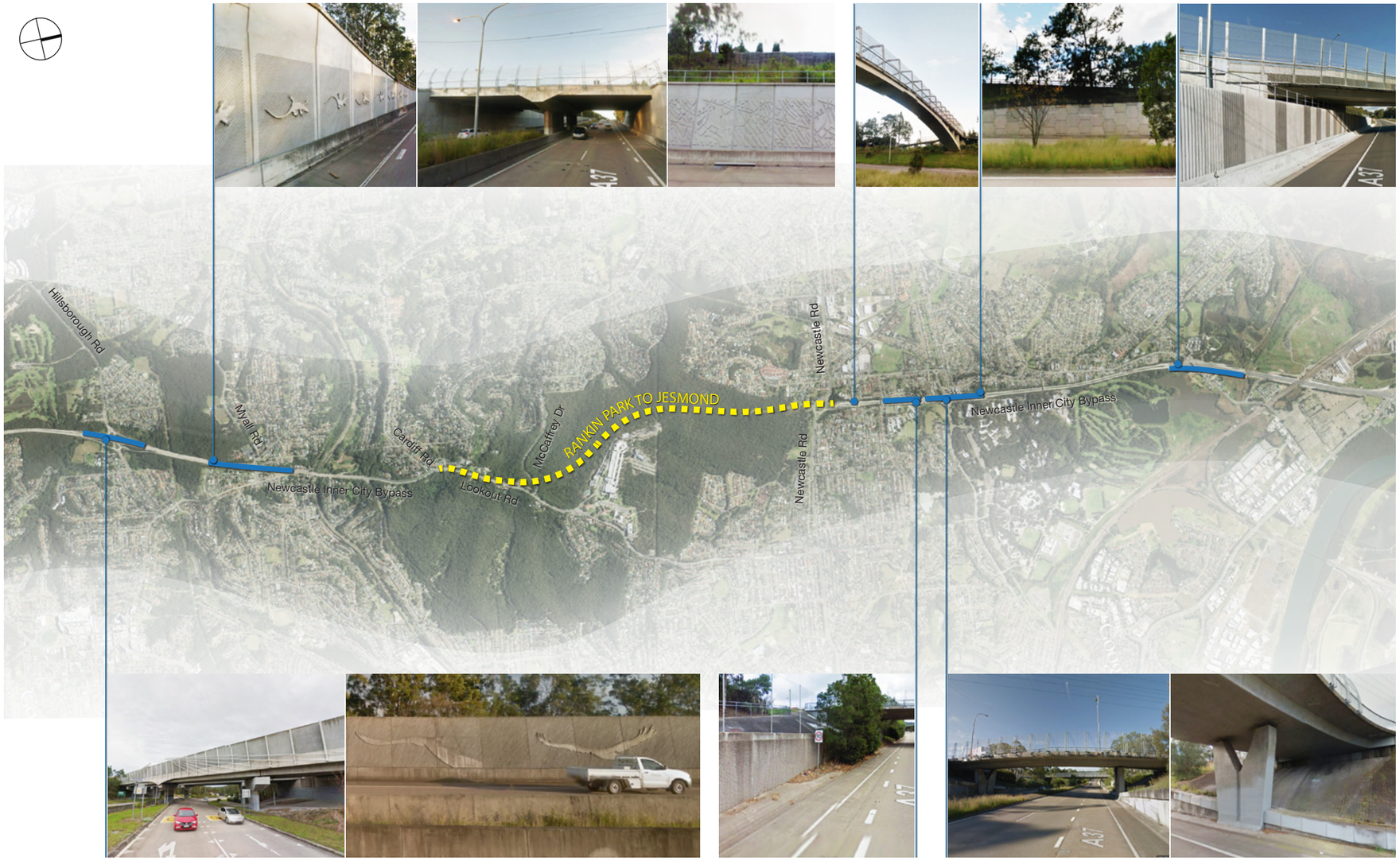


Figure 2.20 A number of distinctive treatments and themes have been applied to built form elements along the overall bypass, leading to some visual discontinuity between the various sections of the roadway.

3.0 LANDSCAPE CHARACTER ANALYSIS

3.1 LANDSCAPE CHARACTER ZONES

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

This section also discusses the sensitivity values for each landscape character zone. The sensitivity assessment has been based on RMS's Environmental Impact Assessment Practice Note - Guidelines for Landscape Character and Visual Impact Assessment No. EIA-N04, Version 2.0 Issue (2013).

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

We have identified a number of sub-zones, each with their distinct qualities which for the purpose of simplicity in this report and in relation to the project have similarities and will be assessed as an amalgamated character zone. This applies in particular to zones F and I. Refer figure 3.2 for the location of these zones.

Figure 3.1 *Indicative 3D view of the project looking north*

Landscape Character Zones

A - Bushland
B - Grandview Road residential / High ridge
C - Water resevoirs
D - Lookout Road residential clusters
E - Kingsway Avenue housing / High ridge
F1 - Cambridge Drive residential
F2 - Sygna Close residential
F3 - Elermore Vale residential
G - Hospital Precinct
H - Lambton residential
I1 - Birchgrove Drive high ground residential
I2 - Birchgrove Drive low ground residential
J - Victory Parade - Mordue Parade residential
K - Small scale residential
L - Jesmond Park
M - Coles Street frontage residential
N - Commercial hub
O - Residential North – Low ground
P - Mixed residential North - High ground

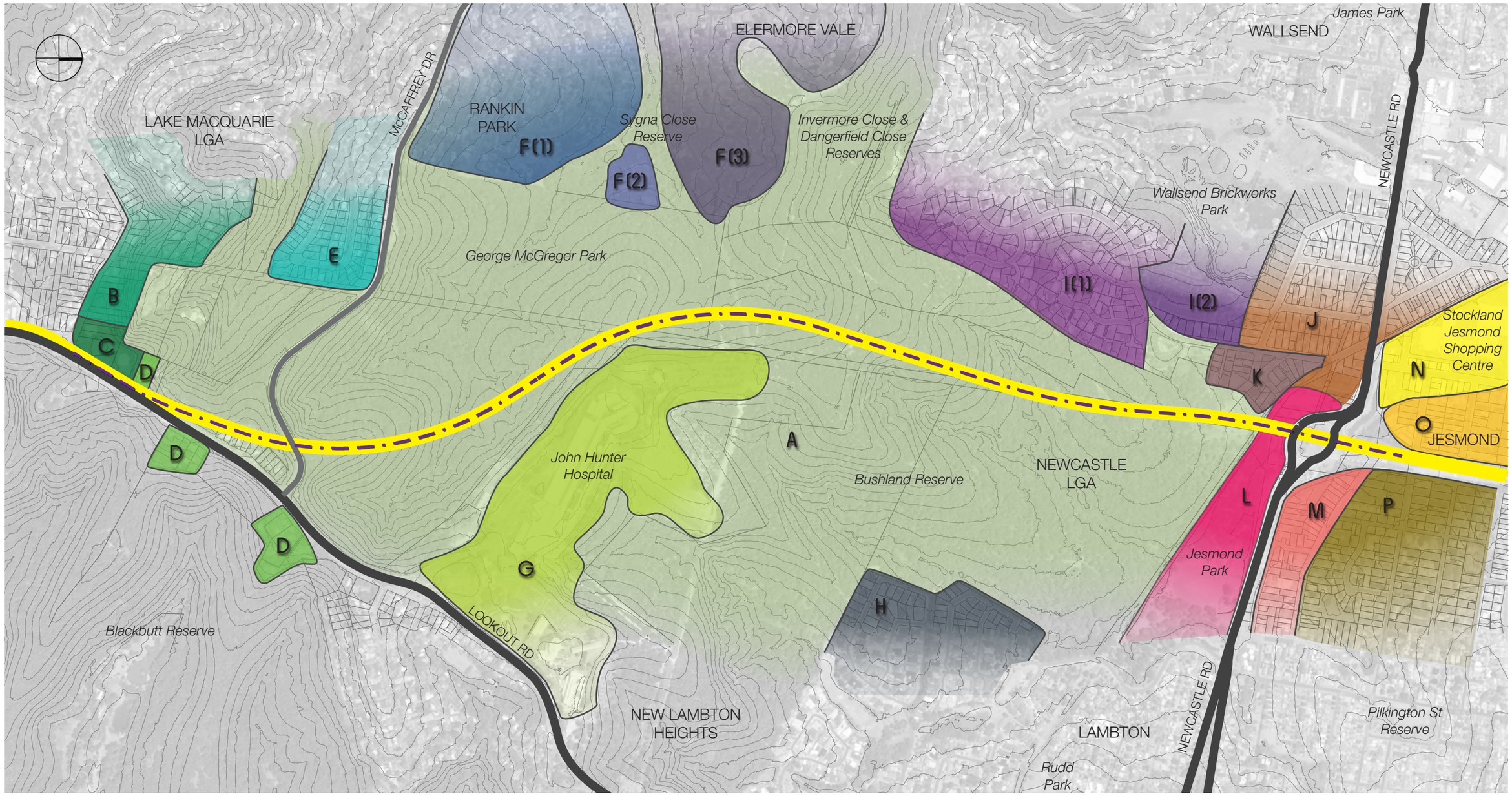


Figure 3.2 *Map illustrating the identified landscape character zones.*

ZONE A – BUSHLAND

Location	East and west of the proposed bypass set in dense bushland. Surrounded by built environment, mostly residential but also by medical and research facilities. Situated approximately 10km from Newcastle's CBD.
Natural Environment	Undulating topography; ridges and valleys. Undisturbed native bushland area- predominantly Smooth-barked Apple-Red Bloodwood Open Forest, Spotted Gum-Grey Ironbark open forest and Lower Hunter Spotted Gum Ironbark forest. (refer to section 2.6, Vegetation Communities). Various threatened species and an endangered ecological community (EEC) occur in this area (refer to section 2, Contextual Analysis).
Built Environment	This continuum of vegetation, comprised of different parks and reserves interfaces with a number of residential areas and the Hospital Precinct.
Spatial Character	Highly undulating, rugged terrain with dense bushland. Visually enclosed with limited views and vistas creating a rather confined and intimate character.
Infrastructure	A number of unsealed tracks, both for recreation and maintenance (fire tracks) traverse this area.
Sensitivity	**The sensitivity of this area is considered high due to the high quality of the bushland setting, the presence of threatened flora and fauna, and that it is a relatively large area of bushland set in the middle of an urban environment.**

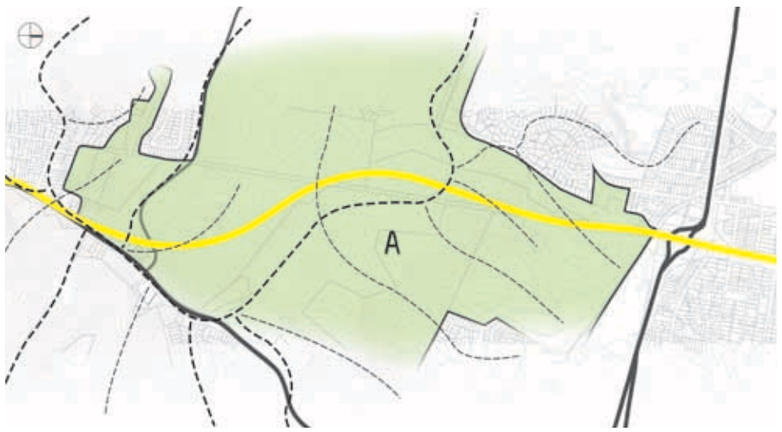


Figure 3.3 View of Lower Hunter Spotted gum Ironbark Forest vegetation community is the most dominant of this zone to the north of the project.

Figure 3.4 Smooth-barked Apple-Red Bloodwood Open Forest, with its rich orange brown tree trunks dominates the lower areas of undulating topography towards the north of the project.

Figure 3.5 View from Jacaranda Drive (Hospital Precinct) looking north overlooking tree canopies illustrating the significant scale of this character zone.

Figure 3.6 Unsealed track through bushland, in the vicinity of Birchgrove Drive residences, to the north west of the project.

ZONE B - GRANDVIEW ROAD RESIDENTIAL / HIGH RIDGE

Location	Part of the suburb of New Lambton Heights and west of Lookout Road.
Natural Environment	Situated on an east/west ridge line. Lush, green suburban landscape with pockets of remnant indigenous vegetation, mature evergreen street trees- some indigenous- and manicured gardens.
Built Environment	Comprised of mostly single storey residences, with a variety of architectural styles, houses composed of both weatherboard and brick with contemporary constructions.
Spatial Character	Due to its location on a ridge line, a number of residences enjoy panoramic views to the north/north-west.
Infrastructure	Local road with overhead power lines to the north.
Sensitivity	**The sensitivity within this zone is considered high due to the land use and the panoramic views some residences enjoy.**

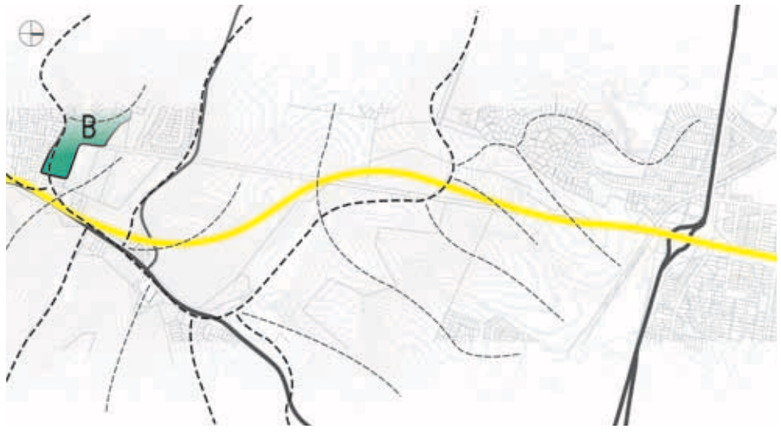


Figure 3.7 *The streetscape is of a high quality with predominantly evergreen/indigenous trees, with adjacent gardens having a mixture of evergreens and deciduous. Powerlines to the north limit any large street trees.*

Figure 3.8 *Residences are well set back from the road allowing generous greening within the front yards, which contribute to the quality of the streetscape.*

Figure 3.9 *A variety of quality architectural styles define the built form along the street, reinforcing its sense of place.*

Figure 3.10 *Most residences along the northern verge of Grandview Road enjoy panoramic views overlooking the bushland setting (Landscape Character Zone).*

ZONE C - WATER RESEVOIRS

Location	Situated at the eastern end of Grandview Road and adjacent the Landscape Character Zone B, this small pocket has been identified as a separate zone due to the nature of its land use.
Natural Environment	Situated on a major ridge line. Informal parkland character with scattered mature Eucalypts within mown lawns. Shrubs beside Lookout Road provide some screening. Interfaces with bushland area to north and west.
Built Environment	This character zone is comprised of two water tanks and a communications tower, together with other small auxiliary utilities buildings, within an informal open space.
Spatial Character	The presence of large infrastructure elements surrounded by mature trees and areas of dense shrub planting provide some sense of enclosure. Limited panoramic vistas and some visual exposure to Lookout Road.
Infrastructure	Two large water tanks and a communications tower.
Sensitivity	**The sensitivity within this zone is considered low due to the infrastructure land use and limited amenity for the community.**

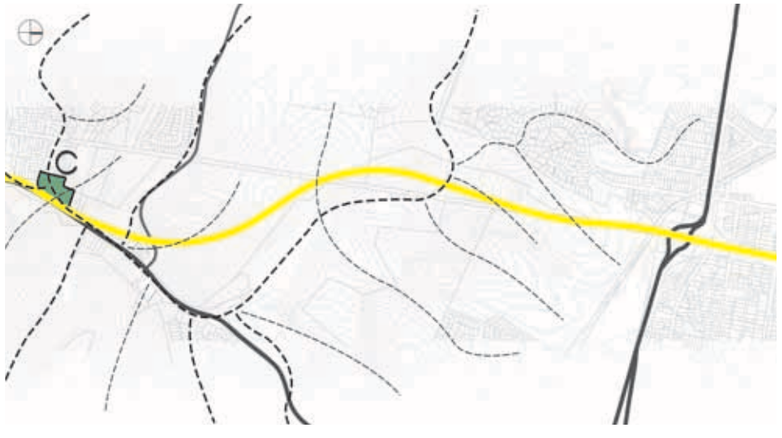


Figure 3.11 Extensive shrubbery defines the perimeter of this zone.

Figure 3.12 The dense vegetation limits any panoramic vistas towards the north, creating a somewhat enclosed spatial sense.

Figure 3.13 The water tanks form a dominant element within this zone. The extensive grassed areas create a park land setting.

Figure 3.14 Trees and lower landscape provides visual mitigation around existing houses.

ZONE D - LOOKOUT ROAD RESIDENTIAL CLUSTERS

Location	East of Lookout Road, in the vicinity of McCaffrey Drive.
Natural Environment	Surrounded by bushland (Blackbutt Reserve) to north, east and south. Ridgeline position with potential panoramic views towards the east (away from the site).
Built Environment	Large, detached predominantly one storey houses, with two storey houses also on generous lots.
Spatial Character	Small residential pockets. Abundant vegetation in extensive established front gardens provide some screening to Lookout Road. Some buildings are situated below road level, and are somewhat spatially isolated from the road.
Infrastructure	Adjacent to a major arterial road (Lookout Road). Powerlines along the western verge of the road.
Sensitivity	**The sensitivity within this zone is considered high due to the residential land use.**

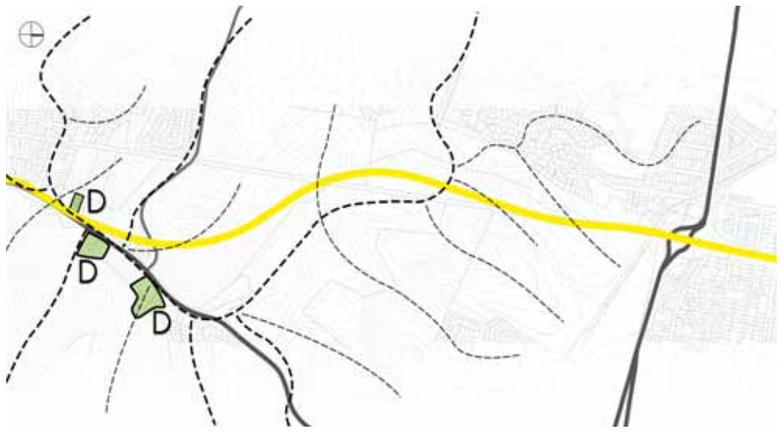


Figure 3.15 *The northern pocket of residences are well set back from the road and set amongst stands of mature trees. These properties have a well established character. Source: Google Streetview*

Figure 3.16 *The homes are of very generous proportions and include single and double storey residences. Source: Google Streetview*

Figure 3.17 *At the southern pocket, some residences are situated below the road level, partially disassociated from the road. Source: Google Streetview*

Figure 3.18 *Some residences have effective screening from the road through fencing elements.*

ZONE E – KINGSWAY AVENUE HOUSING / MCCAFFREY DRIVE SOUTH

Location	Residential pocket around Kingsway Avenue, south of McCaffrey Drive and part of Rankin Park. It also includes the properties on the southern side of McCaffrey Drive, east of Elbrook Drive.
Natural Environment	Situated in the upper and mid-slopes, the topography sharply drops from north to south. Abundant greenery and native trees create a sympathetic setting with the surrounding bushland.
Built Environment	Predominantly two storey brick houses built on steep terrain. The most northern houses are situated along a ridgeline and face both north and south.
Spatial Character	Spatially enclosed with intimate panoramic views towards the bushland. No spatial or visual interaction to the north for most homes due to the topography. However, buildings on the ridgeline face both ways, providing a more extroverted outlook with district vistas. Effective visual screening and topographical features to the east limit any interaction with Lookout Road.
Infrastructure	Local road with powerlines alongside the road verge. Interface with major road (McCaffrey Drive) for ridgeline properties.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

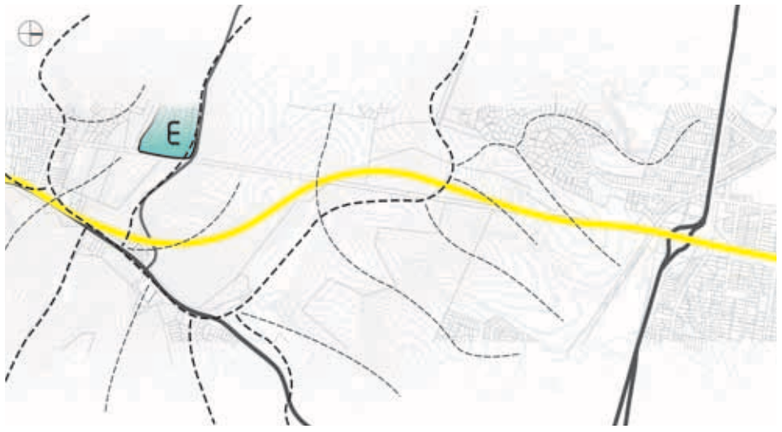


Figure 3.19 *The built form blends with the natural bushland setting, creating the appearance of housing set in bushland. The lack of exotic species contributes to this character.*

Figure 3.20 *The informal streetscape character with strong Eucalyptus canopy contributes to the dominant natural bushland character.*

Figure 3.21 *Residences along Kingsway Avenue, looking north. The steep topography and valley situation contribute to creating an enclosed and spatially isolated setting.*

Figure 3.22 *The properties facing McCaffrey Drive are positioned on a ridgeline and have views to the north and south.*

ZONE F1 - CAMBRIDGE DRIVE RESIDENTIAL

Location	South of zones F2 and F3, between Cambridge Drive and McCaffrey Drive. Located in the suburb of Rankin Park. 10km from Newcastle CBD
Natural Environment	Topography gently drops south to north from the ridge at McCaffrey Drive towards Sygna Close. Bushland to the north and east.
Built Environment	Residential area mostly comprised of modest single storey weatherboard houses. Generous setbacks provide a sense of some openness.
Spatial Character	Traditional residential suburb with a relative open character and strongly demarked by the adjacent bushland setting and McCaffrey Drive ridgeline. Limited views albeit the mid-slope position due to the dominance of the bushland setting.
Infrastructure	Local streets with overhead powerlines along the verges.
Sensitivity	**The sensitivity within this zone is considered high due to the residential land use.**

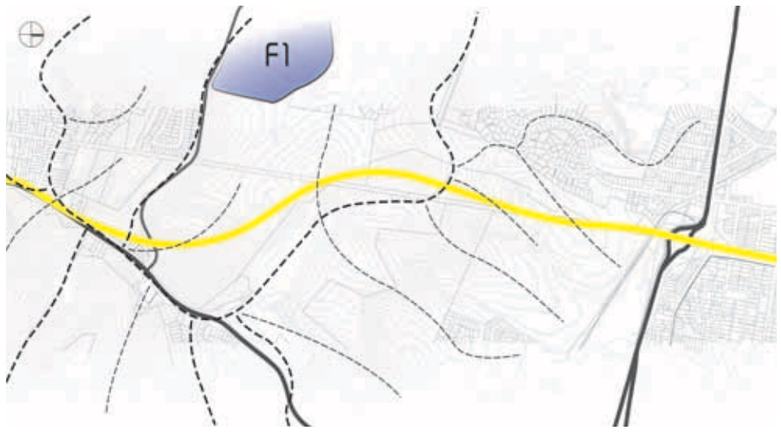


Figure 3.23 This well established neighbourhood of predominantly single storey weatherboard residences, presents a uniform character with a pleasant streetscape quality.

Figure 3.24 View looking along Cambridge Drive towards McCaffrey Drive. The rising topography towards the south, combined with the bushland dominance, create a somewhat enclosed setting.

Figure 3.25 The adjacent bushland (Landscape Character Zone A) to the left of the photograph strongly defines the edge of this zone to the east.

Figure 3.26 Manicured gardens and the lack of front yard fencing contributes to the streetscape. Some residences are double storey homes. Powerlines restrict street tree planting on eastern verge.

ZONE F2 – SYGNA CLOSE RESIDENTIAL

Location	Small and isolated residential pocket around Sygna Close. Located in the suburb of Rankin Park. 10km from Newcastle CBD
Natural Environment	Surrounded by bushland (Sygna Close Reserve and George McGregor Park). Valley / lower slopes position.
Built Environment	Homogeneous cul-de-sac type development of twelve residences surrounded by bushland. Mostly single storey (some double) generous brick houses with manicured gardens on large land blocks.
Spatial Character	Intimate character due to the limited size of the development and cohesive character. The lower slope position, combined with the surrounding bushland setting provide a sense of enclosure and identity.
Infrastructure	Local road with no overhead powerlines.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

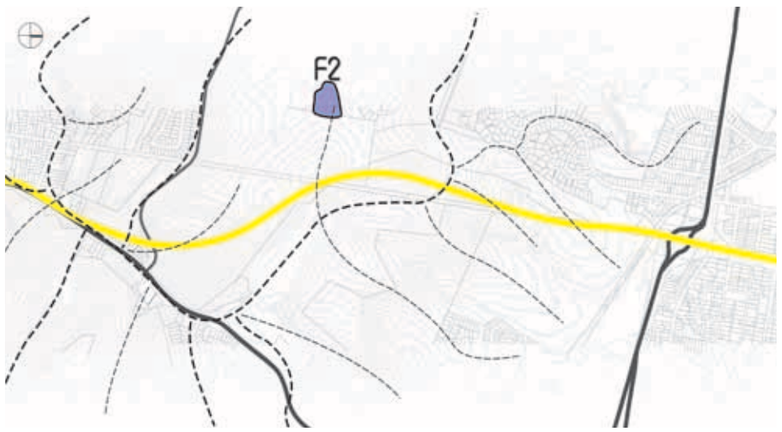


Figure 3.27 The strong bushland backdrop provides an enclosed character to this development. Generous grassed areas and the homogeneous built form contribute to the streetscape setting.

Figure 3.28 View from the bushland at the cul-de-sac looking towards one of the residences. The green setting, created by a Eucalyptus tree canopy amongst green lawns is a key quality of this development.

Figure 3.29 This landscape character zone has a strong interface with the dense bushland of Landscape Character zone A, strongly contributing to the sense of place.

ZONE F3 - ELERMORE VALE RESIDENTIAL

Location	Residential area around Dangerfield Drive. Located in the suburb of Elermore Vale. 10km from Newcastle CBD
Natural Environment	Mid-slopes. Surrounded by bushland (Invermore Close, Dangerfield Drive and Sygna Close Reserves).
Built Environment	Mixed of single and two storeys brick houses with manicured gardens and a mix of exotic and native vegetation.
Spatial Character	Generally self contained residential area with bushland interface.
Infrastructure	Local road with no overhead powerlines.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

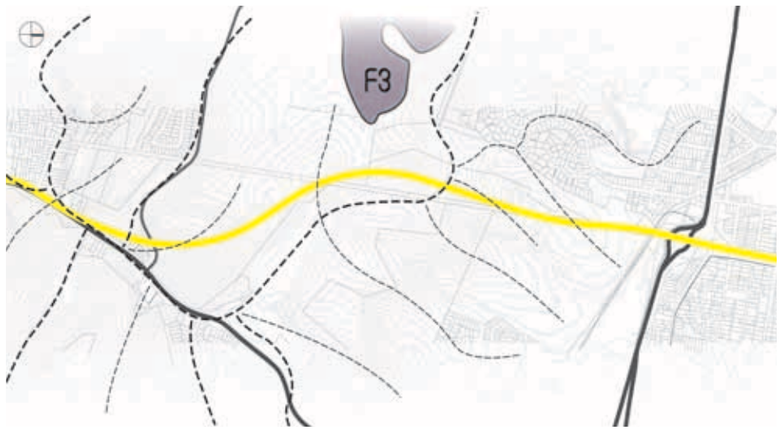


Figure 3.30 *The bushland setting is a dominant feature along Dangerfield Drive and the undulating topography contributes to the sense of place.*

Figure 3.31 *The are a group of houses that directly interface with the bushland along the lower slopes.*

Figure 3.32 *Most buildings are clad in brick, providing a uniformity to the built form fabric. The elevated position along the upper mid-slopes allows some homes to enjoy district views. Note lack of street trees on housing side verge.*

Figure 3.33 *Trails leading into the bushland contribute to the character and sense of place of this zone.*

ZONE G – HOSPITAL PRECINCT

Location	Situated between Lookout Road and the new section of the Newcastle Inner City Bypass.
Natural Environment	This area is on the top of a prominent ridge line, and surrounded by bushland: George McGregor Park and Bushland Reserve.
Built Environment	This medical complex is comprised of different medical facilities such as the John Hunter Hospital, and Hunter Medical Research Institute, together with other administration buildings, access roads and carparks. Although there are a few heritage items within the complex, none of them would be directly impacted by the project.
Spatial Character	Due to it high ground location, this area enjoys panoramic views of the bushland that surrounds it.
Infrastructure	A new access will be created at the north-west end of the complex, connecting it with the new bypass, and therefore improving the connectivity to the campus.
Sensitivity	**The sensitivity within this zone is considered moderate due to the land use.**

Figure 3.34 View looking north adjacent to the John Hunter Hospital overlooking the tree canopies of the bushland setting. As a medical complex, the surrounding bushland strongly contributes to the sense of place and provides a tranquil outlook.

Figure 3.35 Rankin Park Centre is an older building with a distinct architectural facade that contributes to the varied building styles of the complex.

Figure 3.36 The Hunter Medical Research Institute is a contemporary building occupying the northwestern side of the overall complex.

Figure 3.37 The Hospital Precinct is a large complex with a contemporary architectural style dominating the site and enjoying views towards the bushland.

ZONE H - LAMBTON RESIDENTIAL

Location	Situated in the suburb of Lambton, 8km from Newcastle CBD. Residential area north of the John Hunter Hospital.
Natural Environment	Situated on the lower slopes and surrounded by bushland. The topography is gently undulating. The visual presence of the bushland setting (Landscape Character Zone A) contributes to the character and sense of place.
Built Environment	Mostly single storey brick houses, mixed with some larger and more modern two storey residences. Generous setbacks and front gardens of lawn with few indigenous street trees, define the neighbourhood character.
Spatial Character	Surrounded by bushland reserve predominantly to the west, this zone is visually self-contained with an enclosed character, partially contributed by its relatively low lying position.
Infrastructure	Local streets with telecommunication and powerlines underground.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

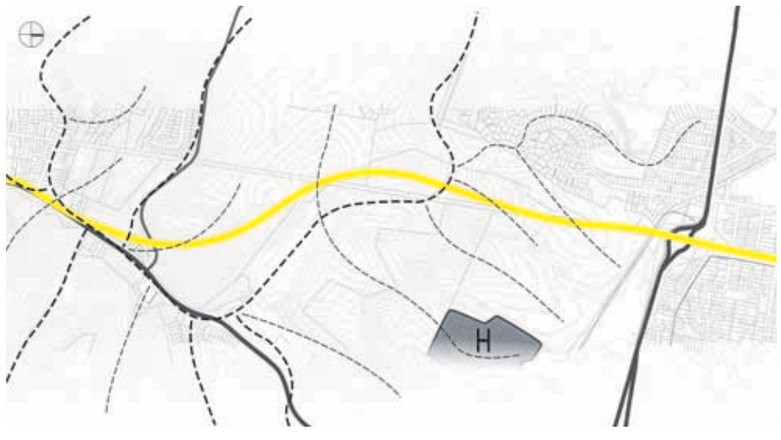


Figure 3.38 *The bushland setting is a key contributor to the landscape character of this zone. Its presence is felt throughout the neighbourhood contributing to the sense of place.*

Figure 3.39 *The topography gently rises towards the southeast, generous setbacks with grassed forecourts devoid of fencing are typical.*

Figure 3.40 *The segregated street layout of the neighbourhood contributes to creating a somewhat isolated and enclosed character. This character is underpinned by its low lying position and enclosure of the bushland.*

Figure 3.41 *Some of the residences are of a more generous and modern character. Native street trees are sympathetic to the bushland setting and reinforce its presence.*

ZONE 1-1- BIRCHGROVE DRIVE HIGH GROUND RESIDENTIAL

Location	Western verge of Landscape Character Zone A. Located in the suburb of Wallsend, 10km from Newcastle CBD. Positioned on high ground.
Natural Environment	Generally high ground; topography rises from north to south along Birchgrove Drive and Bellinger Close. Extensive exotic vegetation within residence's gardens.
Built Environment	Single and double storey villas of various architectural styles. Generous with manicured gardens and a lack of street trees define the streetscape which allows for district views from various vantage points.
Spatial Character	Positioned on high ground, this zone opens up to the north with panoramic district and long distant views. The bushland to the southeast provides a strong visual backdrop that demarks the suburb's perimeter. This backdrop reinforces the green quality of the neighbourhood.
Infrastructure	Local roads with footpaths and undergrounded utilities.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

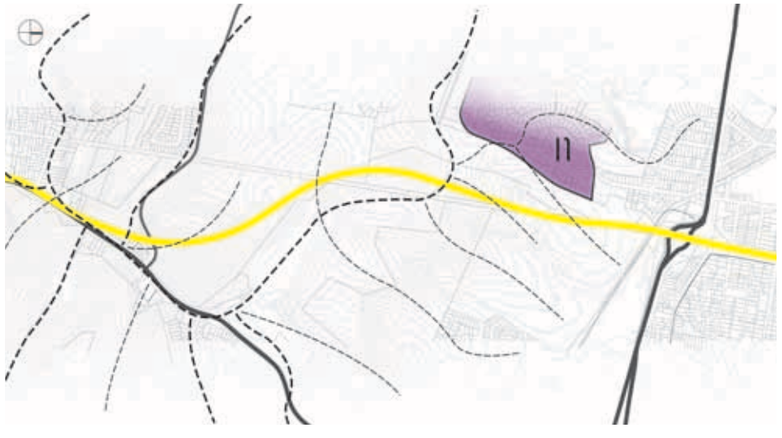


Figure 3.42 Extensive vistas from the higher grounds create an open character to this neighbourhood. The quality urban built form and position makes this area a highly sought after suburb.

Figure 3.43 The strong bushland backdrop reinforces the green quality of the area, visually settling the built form.

Figure 3.44 View looking south at the intersection of Birchgrove Drive and Minimbah Close. The rise in the topography allows numerous homes to enjoy panoramic views.

Figure 3.45 Residents enjoy access to the bushland via informal tracks, adding to the attractiveness of the area.

ZONE I-2 - BIRCHGROVE DRIVE LOW GROUND RESIDENTIAL

Location	Western verge of Landscape Character Zone A. Located in the suburb of Wallsend. Positioned on low ground.
Natural Environment	Low ground. Open space with pond east of Birchgrove Road.
Built Environment	Mostly single storey brick houses.
Spatial Character	Partial sense of enclosure due to its low position. Informal park and bushland to the east contribute to this and reinforce the green setting.
Infrastructure	Local roads with footpaths and under grounded utilities.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

Figure 3.46 View looking along Birchgrove Drive, looking south towards Landscape Character Zone I1. The topography and bushland contribute to the partial spatial enclosure of this area.

Figure 3.47 Many residences enjoy a green outlook, reinforcing the bushland character and identity of the area.

ZONE J – VICTORY PARADE – MORDUE PARADE RESIDENTIAL

Location	Situated within the low ground and directly west of Jesmond, both north and south of Newcastle Road. This residential area is part of the suburb of Wallsend.
Natural Environment	The topography gently rises from north to south and drops towards the east. Grassed areas along the verges and within private properties define the streetscape character. A combination of native and exotic vegetation provides a mixed character.
Built Environment	Comprised predominantly of single storey residences with a an array of architectural styles, including weatherboard single storey houses. This zone includes the Jesmond Executive Villas adjacent to the Northern Interchange.
Spatial Character	Generally open character, partially due to the gentle topography, lack of significant greenery and wide street verges with grassed areas. The eastern edge of this zone enjoys views towards Jesmond Park.
Infrastructure	Local street with overhead utilities.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

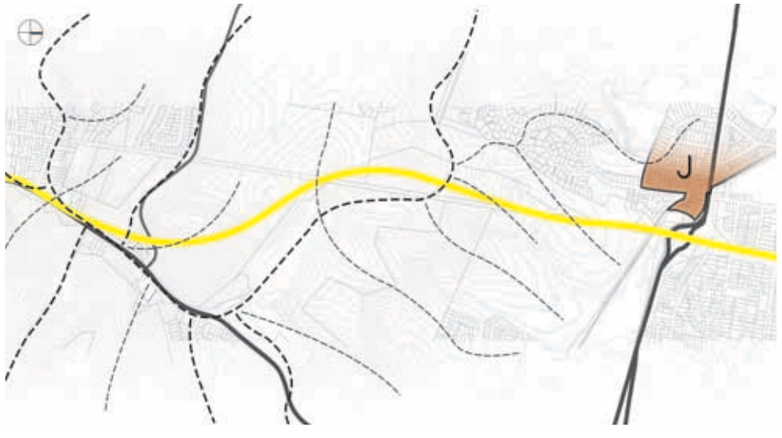


Figure 3.48 View through Mordue Parade looking north. Single storey brick and weatherboard houses and grassed areas define the streetscape.

Figure 3.49 View through Illoura Street, looking north. The extensive grassed areas and limited large scale vegetation create an open character.

Figure 3.50 View through the open space towards the Jesmond Executive Villas, looking south. The existing shared path connects this area with Jesmond Park.

Figure 3.51 View from Illoura Street near Victory Parade looking east. The vegetation at Hugo Reserve provides welcomed greenery that also provides visual screening beyond.

ZONE K - SMALL SCALE RESIDENTIAL

Location	Small pocket of residences situated just east of Landscape Character Zone J and south of the Northern Interchange. This residential area is part of the suburb of Wallsend.
Natural Environment	This area is surrounded by vegetation: Jesmond Park to the east, bushland to the southeast, and informal park/pond to the south. Hugo Reserve, a small pocket of open space with stands of trees, is also included in this character zone.
Built Environment	Single storey brick and weatherboard houses of various styles and ages.
Spatial Character	This character zone is currently dominated by the greenery surrounding it, with many residents enjoying bushland and parklands vistas. Due to the strong interface with the bushland and generous land blocks, this zone enjoys a rather semi-rural character.
Infrastructure	Modest local street with overhead powerlines.
Sensitivity	**The sensitivity within this zone is considered high due to the land use and its rather unique character within an urban environment.**

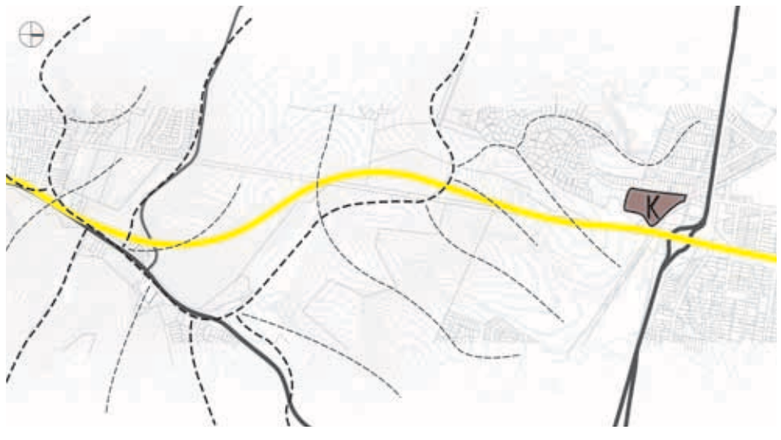


Figure 3.52 *Properties overlook the bushland setting (Landscape Character Zone A) where the proposed bypass will cross.*

Figure 3.53 *Extensive greenery and grassed areas provide a semi-rural character to this zone.*

Figure 3.54 *Large blocks of land with grassed areas contribute to the somewhat informal character.*

Figure 3.55 *The informality of the setting, positioned in a gully, creates an intimate and self-enclosed character. Note the horse paddock in the mid-ground, contributing to the semi-rural character.*

ZONE L - JESMOND PARK

Location	This area is situated directly south of Newcastle Road, comprised of Jesmond Park, a major urban park with a variety of facilities.
Natural Environment	Parkland setting with extensive native bushland vegetation, and park area with mown grassland.
Built Environment	Built form is limited to Jesmond Park facilities such as shelters, picnic areas and playgrounds, as well as sports fields at the eastern end. The current shared use path follows the historical alignment of the tramway, the former Newcastle-Wallsend Tram Line.
Spatial Character	A scenic shared path among trees goes through the park, connecting it with the commercial and residential areas of Jesmond, north of Newcastle Road.
Infrastructure	Paved walking trails through the park and a shared use path. playground, picnic and BBQ facilities, public toilets, cricket and soccer facilities and storm water drainage channel.
Sensitivity	**The sensitivity within this zone is considered high due to its scenic qualities and recreational value.**

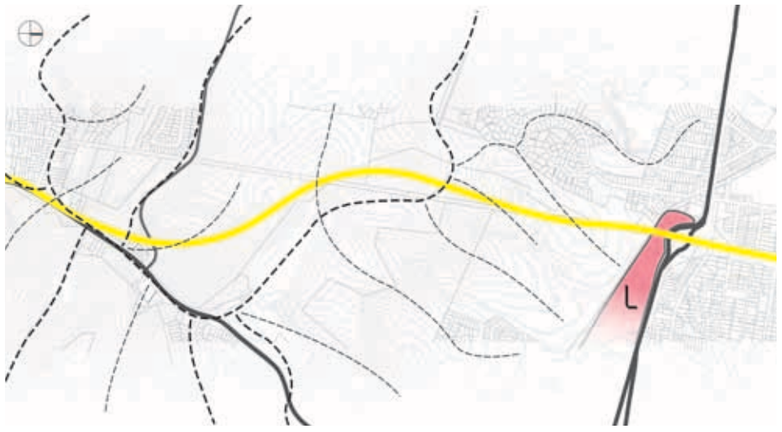


Figure 3.56 The shared use path runs along the southern verge of this zone, interfacing with the bushland setting (landscape Character Zone A), creating a high quality facility which is a major east/ west connector. The path follows the historic tramline alignment.

Figure 3.57 Native stands of trees compliment the bushland character of Landscape Character Zone A, creating a visual continuity of the landscape. The clear tree trunks within the predominant carpet of mown grass provides good visibility within the park and a sense of safety.

Figure 3.58 Extensive woodland trees within a grassed understorey create a high quality setting, ideal for the community.

Figure 3.59 Sportfields with their open grassed character contribute to the recreational and visual amenity of the park and underpin it as an important destination for the community.

ZONE M - COLES STREET FRONTAGE RESIDENTIAL

Location	East of the Newcastle Inner City Bypass and north of Newcastle Road. Part of the suburb of Jesmond.
Natural Environment	Situated on low ground/lower slopes. The topography rises steeply to the north. Extensive grassed areas and a moderate streetscape quality with limited greenery.
Built Environment	Modest single storey weatherboard and brick veneer homes, with some apartment buildings occurring on the western end.
Spatial Character	Strong linear buffer of trees west of this character zone provides screening to the existing section of the Newcastle Inner City Bypass and roundabout. Coles Street is highly exposed to Newcastle Road, thereby limiting its streetscape appeal.
Infrastructure	Local streets with overhead utilities.
Sensitivity	**The sensitivity within this zone is considered high due to the residential land use.**

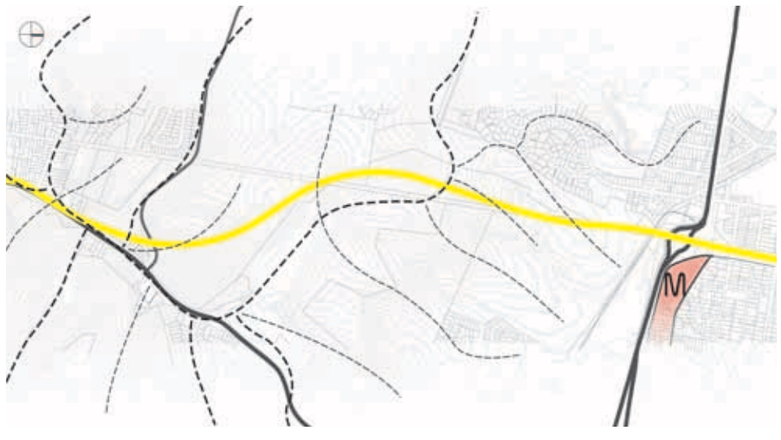


Figure 3.60 Residences along Coles Street face Newcastle Road, which as a major arterial road detracts from the setting. Further beyond, Jesmond Park provides visual relief as a vegetated background.

Figure 3.61 An apartment block occupies the southwestern corner of this zone. This is the only larger complex in the area and is heavily screened from Northern Interchange due to stands of Casuarinas framing the intersection.

Figure 3.62 View along Robert Street, modest single storey brick veneer and weatherboard clad residences define the built form. Streetscape devoid of street tees.

Figure 3.63 View from Coles Street looking towards Jesmond Park, across Newcastle Road. The park contributes to the sense of place of this character zone.

ZONE N - COMMERCIAL HUB

Location	The commercial hub forms the commercial centre of Jesmond, situated on Blue Gum Road, north west of the intersection of Newcastle Road and the Newcastle Inner City Bypass.
Natural Environment	This area 'sits' low within the overall landscape setting and is devoid of greenery, allowing built form elements and car parking to dominate this urban setting.
Built Environment	The centre is defined by a number of mixed businesses and a large shopping mall, Stockland Jesmond Shopping Centre. The area serves Newcastle with a district centre function for the surrounding residential neighbourhoods.
Spatial Character	The streetscape character is of a moderate quality and the disarray of parking lots, driveways and built form elements contributes to the incohesive character. This result in a lack of spatial definition.
Infrastructure	Local streets with overhead powerlines. Commercial hub.
Sensitivity	**The sensitivity within this zone is considered moderate due to its function as a commercial hub and partially transient nature.**

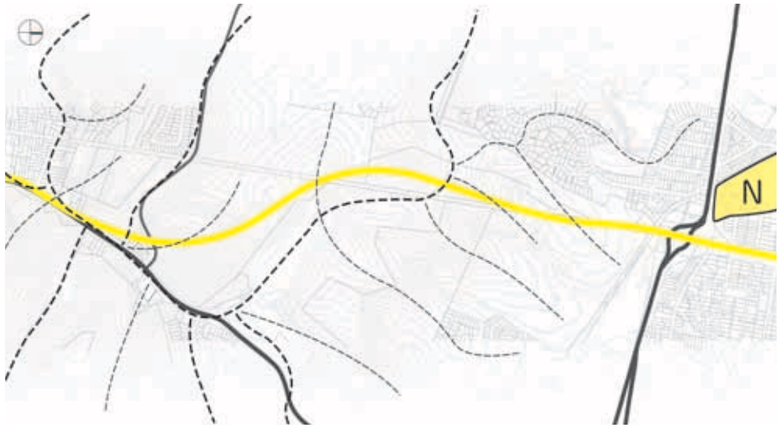


Figure 3.64 Car parks are a dominant feature within this character zone. Lack of greenery and dominant built form elements such as the Stockland Jesmond Shopping Centre define the sense of place.

Figure 3.65 Commercial properties with wide driveways, limited grassed verges devoid of street trees and a variety of building setbacks diminish the streetscape quality.

Figure 3.66 Areas of the commercial centre of Jesmond comprise of a combination of single storey and double storey smaller properties that strongly contrast with the uniform built form of the Stockland Jesmond Shopping Centre.

Figure 3.67 The built form along Blue Gum Road has a minimal setback compared to other ares within this zone.

ZONE O - RESIDENTIAL NORTH - LOW GROUND

Location	Wedged between the Commercial Hub (Zone N) to the west and the Inner Newcastle Bypass to the north.
Natural Environment	The topography gently rises from west to east and extensive grassed areas along the verges and within private properties define the streetscape character.
Built Environment	A multi-storey modern apartment complex defines the southeast corner of this zone and contrasts from the otherwise single storey weatherboard and brick veneer detached homes of the area.
Spatial Character	Towards the west of this zone, the visual interface with the existing Newcastle Inner Bypass is limited due to vegetative screening along the road verges, and limited fenestration of the residences towards the roadway and fencing.
Infrastructure	Local streets with overhead powerlines. Nearby a pedestrian overpass crosses the Newcastle Inner Bypass, linking to Landscape Character Zone P.
Sensitivity	**The sensitivity within this zone is considered high due to the land use.**

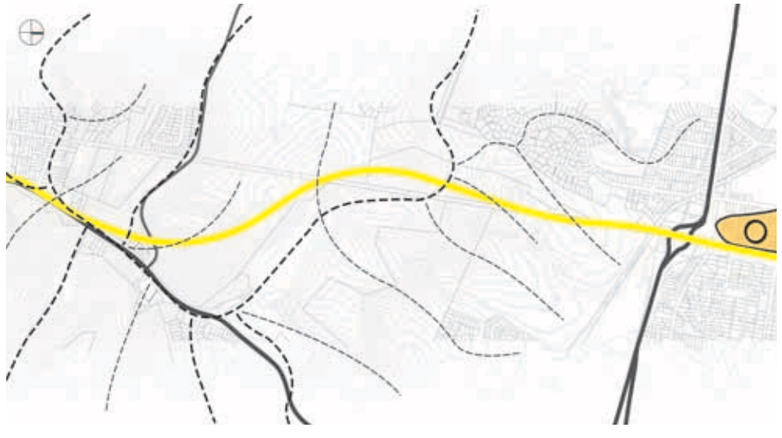


Figure 3.68 An apartment complex defines the southeast corner of this zone and interfaces with the existing Inner Newcastle Bypass and Jesmond Interchange. Note the Casuarinas to the right of the photograph providing effective screening to the interchange.

Figure 3.69 Single storey residences dominate the built form and give the streetscape some cohesion.

Figure 3.70 View of the pedestrian overpass linking Landscape Character Zone O and P and creating an important pedestrian link to the commercial centre of Jesmond.

Figure 3.71 Modest size homes on large block of land with generous backyards are typical in this zone. Built elements dominate, as there is a lack of mature trees.

ZONE P – MIXED RESIDENTIAL NORTH – HIGH GROUND

Location	East of the Newcastle Inner City Bypass and north of zone M. Part of the suburb of Jesmond, 9km from Newcastle's CBD.
Natural Environment	Topography sharply rises from west to east and south to north. Combination of exotic and native vegetation within manicured gardens provide some visual relief to the built form.
Built Environment	The mix of three storey apartment blocks, townhouses and single storey detached homes provide a varied streetscape character.
Spatial Character	Numerous homes/apartments enjoy vistas towards the south where the topography drop towards Newcastle Road. The generous setbacks give the streetscape an open character.
Infrastructure	Local streets with overhead powerlines. Nearby a pedestrian overpass across the Newcastle Inner Bypass, linking to Landscape Character Zone O.
Sensitivity	**The sensitivity within this zone is considered high due to the land use and the potential panoramic views some residences enjoy.**

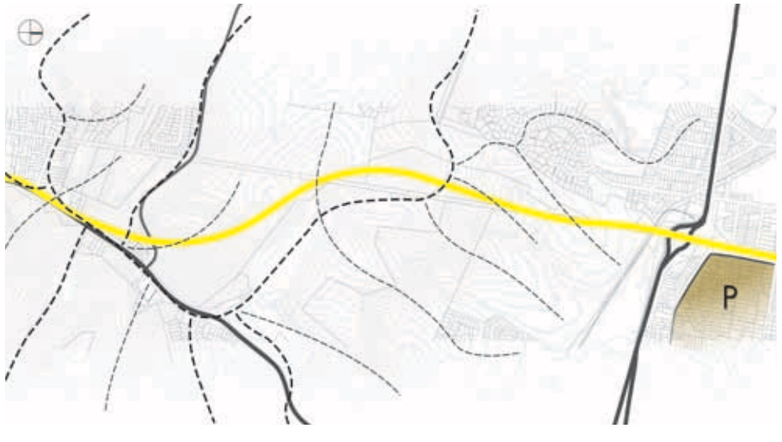


Figure 3.72 Residence at Michael Street showing the interface with the Inner Newcastle Bypass to the right of the photograph.

Figure 3.73 Numerous three storey high apartment complexes define the built form of this zone. Note lack of street trees.

Figure 3.74 Generous setbacks and grassed areas provide a somewhat open character. Note lack of street trees.

Figure 3.75 Numerous properties enjoy vistas to the south, towards the bushland setting of Landscape Character Zone A.

4.0 URBAN DESIGN OBJECTIVES AND PRINCIPLES

4.1 INTRODUCTION

The Roads and Maritime Publication “Beyond the Pavement” demonstrates their commitment for projects to improve outcomes for people, communities and for the built and natural contexts through which the project passes. The publication outlines over arching urban design policy and principles to guide the design and delivery of road transport infrastructure projects.

PRINCIPLE ONE
Contributing to urban structure and revitalisation

PRINCIPLE TWO
Fitting into the built fabric

PRINCIPLE THREE
Connecting modes and communities

PRINCIPLE FOUR
Fitting with the landform

PRINCIPLE FIVE
Responding to natural pattern

PRINCIPLE SIX
Incorporating heritage and cultural contexts

PRINCIPLE SEVEN
Designing an experience in movement

PRINCIPLE EIGHT
Creating self-explaining road environments

PRINCIPLE NINE
Achieving integrated and minimal maintenance design

These nine principles have informed the development of the urban design objectives and principles for this project. For further information refer to the RMS publication “*Beyond the Pavement”* RMS urban design policy, procedures and design principles, Section 3-”*Overview of urban design principles.”*

Figure 4.1 *Indicative 3D overview looking north towards the Hospital Interchange.*

4.2 URBAN DESIGN OBJECTIVES & PRINCIPLES

The project specific urban design objectives and design principles are outlined:

Figure 4.2 Looking west down an electricity easement, through steeply undulating terrain, just north of the John Hunter Hospital.

Figure 4.3 Looking east along the former tram line, now a popular recreational cycle path, Jesmond Park area.

1. TO FIT SENSITIVELY WITHIN THE BUSHLAND SETTING AND STRONGLY UNDULATING TOPOGRAPHY

Principles:

- Minimise the heights of cuttings and of embankments and visually integrate these slopes with the surrounding landform.
- Maximise opportunities for the alignment to respond sensitively to the varied topography of incised valleys and steep slopes.
- Minimise heights of interchanges and bridge structures to reduce visual and landscape character impacts.
- Minimise vegetation clearing and consider construction methodologies that minimise the construction footprint.
- Consolidate design of construction access tracks to minimise the impact of temporary works.
- Minimise disturbance to drainage lines and creeks and utilise these as crossing points for fauna and recreational permeability.
- Visually reinforce the natural bushland landscape, for example review strategies to bring the bushland closer to the roadway, to reinforce the quality for user experience, e.g. bring frangible vegetation closer to the roadway.
- Reinforce the indigenous vegetation patterns as part of re-vegetation works.
- Use the colours of the site geology and soils as inspiration for built form colours and materials.
- Limit impacts to views of the bushland setting from the hospital grounds.
- Carefully integrate the earthworks and access requirements for water quality treatment elements with the landscape, and maximise using already disturbed areas.

2. TO ENSURE CONNECTIVITY AND PERMEABILITY FOR COMMUNITIES IS ENHANCED

Principles:

- Enhance urban permeability and travel experience by completing the Newcastle Inner City Bypass.
- Improve travel time to enhance local and regional productivity.
- Minimise disturbance to the connectivity of existing roads, tracks, cycleways and pedestrian paths throughout the site corridor.
- Enhance where possible, the east - west pedestrian/cycle connectivity through the project area, between residences to the west, recreational zones, and the Hospital Precinct to the east.
- Re-establish the connectivity of fire trails.
- Plan with awareness of the CPTED (Crime Prevention Through Environmental Design) principles.
- Investigate opportunities to enhance connectivity and operational efficiency to the Hospital Precinct.

3 TO DESIGN BUILT FORM ELEMENTS THAT FIT WELL IN THEIR SETTING AND MINIMISE DISTURBANCE TO EXISTING CONNECTIVITY

Principles:

- Ensure the scale of interchanges is well integrated with connecting roads and built form character, and enhance road safety and user experience.
- Make the interchanges clear markers along the journey. Bridge structures should have a distinctive quality and the transition of elements needs to be smooth, and well integrated.
- Ensure the interchange and road footprints are minimised to limit impacts to the surrounding context, landuse and provide effective landscape strategies to settle the structures into the setting. Minimise fragmentation of the bushland setting.
- Integrate landscaped zones in front of retaining walls to reduce the dominance of these elements.
- Relate architectural language to overall bypass existing built form elements in the road corridor, as appropriate, and ensure that noise walls and retaining walls have smooth horizontal and vertical alignments.
- To retain a simple and clean bridge appearance minimise the number of piers used for bridges.
- Integrate headstocks with piers into a single composition.
- Introduce transparent noise walls at creek crossings to open views towards the bushland setting.
- Consider utilising natural materials or dark materials that help recede structures in the landscape.
- Evaluate the introduction of some colour to enhance the identity and legibility of the project, where appropriate.

4. TO DESIGN THE ROADS AS AN EXPERIENCE IN MOVEMENT & CREATE SELF-EXPLAINING ROAD ENVIRONMENTS

Principles:

- Create a legible road corridor with clear interchanges that are user friendly and legible.
- Create a flowing design with clear spatial definition related to the speed of the traveller by providing continuity of built form language project wide.
- Integrate the bypass with its greater setting by respecting sensitive receivers.
- Enhance the view from the road, and provide visual stimuli within the road corridor. For example, allow mature vegetation close to the road verges to express the bushland.
- Utilise landscape strategies to reinforce the setting and change of character across the route, as well as changing speed environments and to enhance key journey points along the way for ease of wayfinding.
- Introduce feature landscape strategies to highlight key areas such as interchanges.

5. DESIGN TO RESPOND TO NATURAL PATTERNS, CULTURAL CONTEXTS & MINIMISE VISUAL IMPACTS FOR COMMUNITIES

Principles:

- Identify opportunities for the incorporation of site related themes within the built form elements such as retaining and noise walls.
- Use the natural heritage site patterns such a vegetation and geology as inspiration for landscape and urban design themes.
- Minimise impacts to local residences along the project and consider landscape screening strategies.
- Situate corridor away from residences as much as possible to minimise impacts including noise.
- Ensure a landscaped buffer zone is retained between the project and the Hospital Precinct site.

Figure 4.4 Existing bushland of the project site

6. ACHIEVE INTEGRATED DESIGN AND MINIMAL MAINTENANCE

Principles:

- Consolidate the various elements to create a unified composition- bridge, throw screens, retaining walls, and noise walls.
- Use materials for built form and landscape purposes that require minimal maintenance, and enhance the visual amenity of the area.
- Strategically locate the alignment so that built form elements such as retaining walls, and noise walls are minimised.
- Design for anti-graffiti as an integrated design process. This is particularly important within the bushland setting where self surveillance is limited.
- Ensure operational water quality treatment structures are designed integrally with the bushland setting and/or landscape context, and that they have adequately considered maintenance requirements.
- Utilise existing fire trails as maintenance access to access sedimentation basins, where feasible.

5.0 CONCEPT DESIGN

5.1 URBAN DESIGN PLAN

The integrated urban design concept design is illustrated on the following pages, with plans and relevant sections. The design has progressed, based on the project's Objectives and Principles as earlier identified.

Proposed treatments for the following are shown:

- revegetation, using methods of bushland regeneration, and mass planting beds in higher priority areas, and for areas away from bushland areas;
- built form elements, including retaining walls, potential noise walls, maintenance tracks and shared paths; and
- other incidental elements are shown.

ALIGNMENT REFINEMENT

The alignment has been refined to limit impacts to residences to the west, to consolidate bushland areas as far as practical and to mitigate visual and landscape character impacts. The refined alignment would also limit noise impacts to residences further to the west, and avoid or minimise impacts on threatened species.

At the Hospital Interchange, the two options identified in the strategic design have been assessed and a half interchange is proposed with north facing ramps only. The northbound on-load ramp is configured as a loop to allow for safe merge distance between the Hospital Interchange and the Northern Interchange for northbound traffic.

At the Northern Interchange and Southern Interchange, a number of options were considered and assessed, with the proposed design chosen as it provides the best value for money with substantial benefits for traffic flow, both on the bypass and surrounding road network.

CONNECTIVITY

The concept design has considered the connectivity opportunities across the new road corridor for fauna, pedestrians and cyclists (refer to Figure 2.14) . The project has been refined to maintain fauna movement across the new road corridor and also to maintain the informal east west connectivity for pedestrians and cyclists through the bushland for recreational purposes and to access the John Hunter Hospital precinct.

The project will result in a number of the existing bushland tracks used for informal access between the John Hunter Hospital precinct and residential areas to the west being permanently severed. To mitigate this impact, access across the bypass in the bushland area would be provided at the hospital interchange where a bridge (Bridge 3) over the bypass would include a shared path for pedestrians and cyclists (refer to Figure 5.7), and from an informal crossing north of the hospital interchange under Bridge 4 (refer to Figure 5.11a).

During detailed design, Roads and Maritime will investigate the facilitation of an additional pedestrian access point across the road corridor in consultation with adjacent landowners, in order to provide improved connectivity.

The concept design severs the existing shared path through Jesmond Park along the old tram line (refer section 2.4). This shared path currently links to the pedestrian crossings across Newcastle Road at Blue Gum Road intersection, which provides connections to the north to both the on-road cycleway and the retail outlets at Jesmond including Stockland Jesmond Shopping Centre.

These connections are proposed to be maintained by the project via a new shared path connecting to the traffic lights at the northern interchange. Pedestrian crossings for east-west movements will provide a safe option to enable pedestrians and cyclists to continue to use this existing shared path route.

To further mitigate the impacts on the Jesmond Park shared path, a new shared path bridge (Bridge 7) would be provided over Newcastle Road to the west of Steel Street. This would be linked to existing shared path facilities on either side of Newcastle Road. These works would provide additional connections to the existing shared paths in the study area and enhance options for walking and cycling. The shared path bridge would also improve safety for pedestrians and cyclists crossing Newcastle Road.

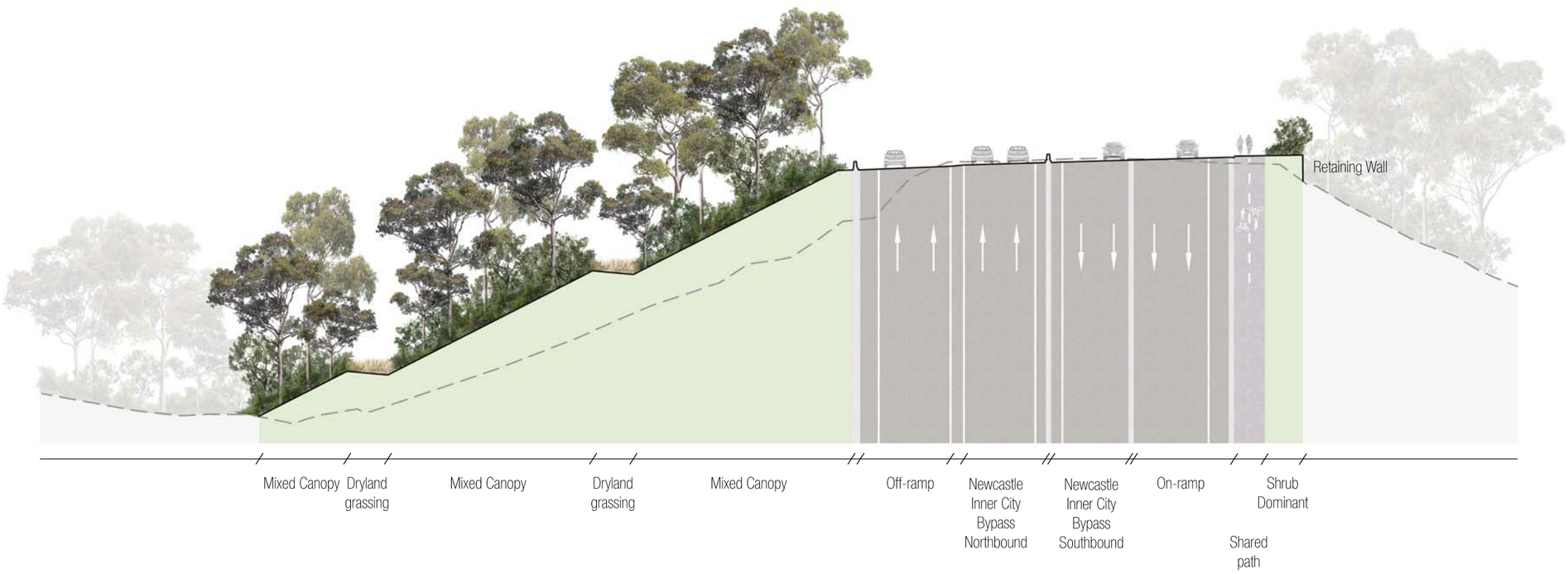
The provision for pedestrian and cyclist connectivity is consistent with the on-road and off-road routes through the study area proposed in the Newcastle Cycling Strategy and Action Plan (The City of Newcastle 2012). Fencing of the project to exclude people and animals from the areas of road where connectivity is not provided would be included for safety reasons.

A range of mitigation measures would be implemented to reduce impacts to fauna connectivity where possible. These include the preparation and implementation of a fauna connectivity strategy to identify terrestrial and arboreal fauna crossings across the project. Proposed crossings include a dedicated fauna culvert for terrestrial fauna (refer Figure 5.5); fauna passage beneath bridge 4; rope bridges for arboreal fauna established at two separate locations along the alignment; and fencing to guide fauna to the crossing infrastructure. The fencing would be established as close as possible to the final road formation, which maximises available habitat for fauna, and includes fauna escape points.

BUILT FORM

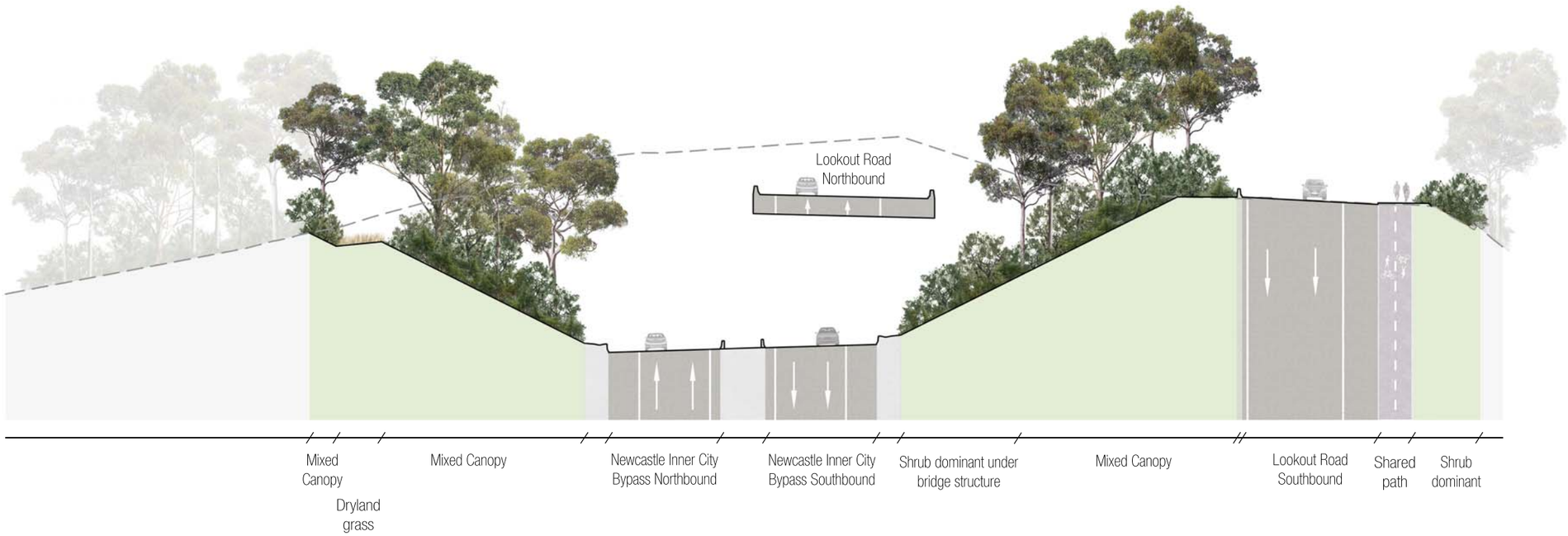
The concept design has considered the visual integration of the project with the adjacent sections of the Newcastle Inner City Bypass to reinforce the identity and continuity of the bypass corridor. This strategy has been applied particularly to retaining and noise wall structures and are further discussed in Section 5.2 and 5.3 of this report.

Figure 5.1 Plan of the southern end of the project.



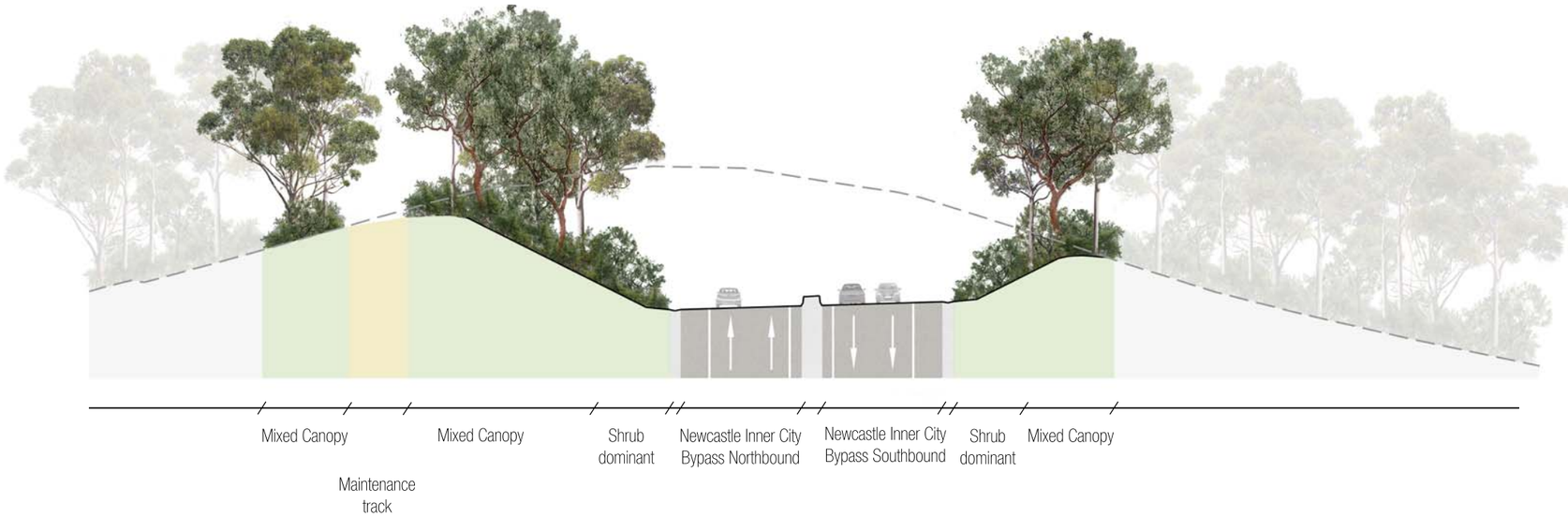
Note: Revegetation with Spotted Gum / Grey Ironbark Open Forest species

Figure 5.2 *Section at chainage 7340*



Note: Revegetation with Spotted Gum / Grey Ironbark Open Forest species

Figure 5.3 *Section at chainage 7580*



Note: Revegetation with Smooth-Barked Apple / Red Bloodwood Open Forest species

Figure 5.4 *Section at chainage 7860*

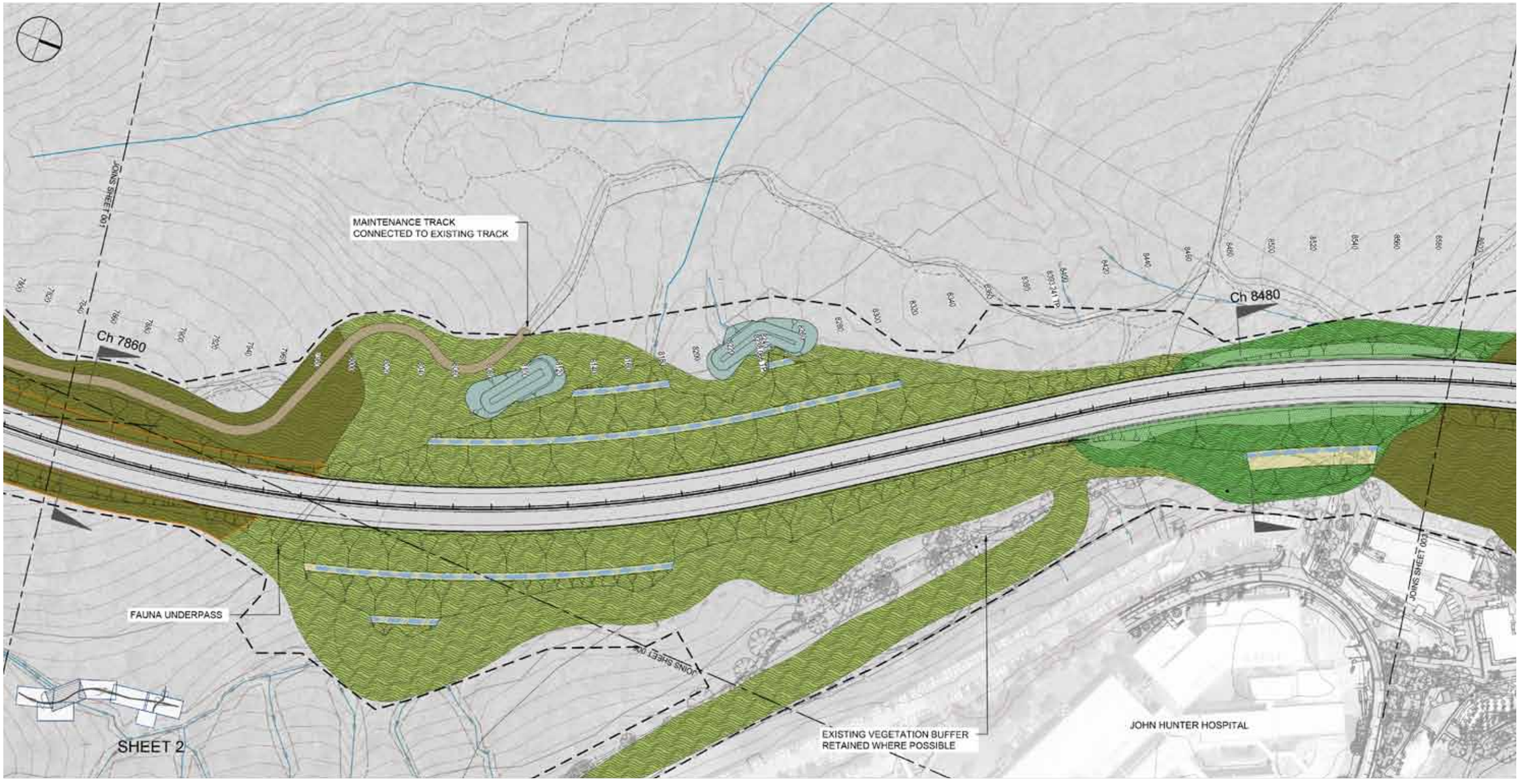


Figure 5.5 Plan north of McCaffrey Drive and south of the Hospital Precinct.

Note: Revegetation with Smooth-Barked Apple-Sydney Peppermint-Turpentine Forest species

Figure 5.6 *Section at chainage 8480*

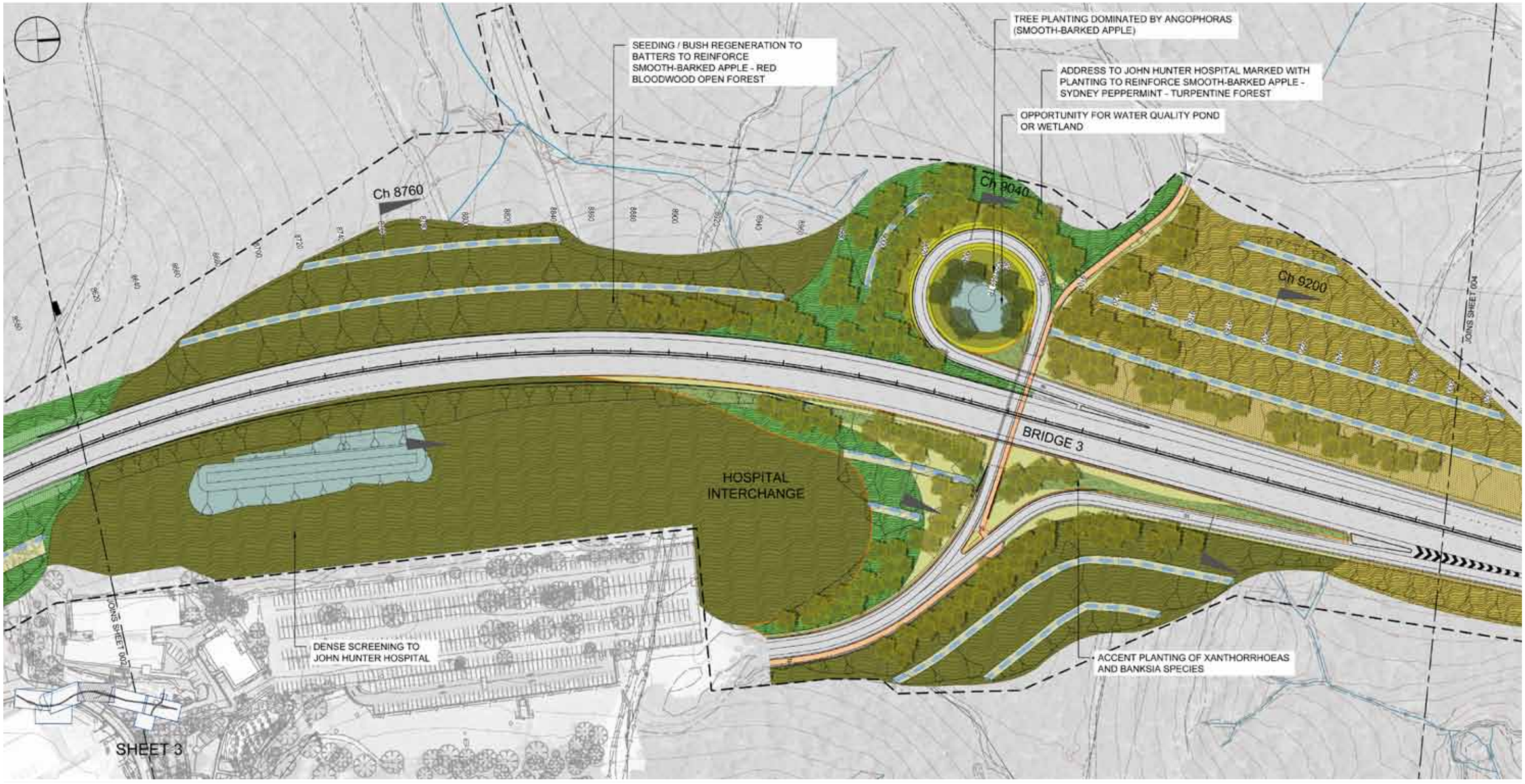
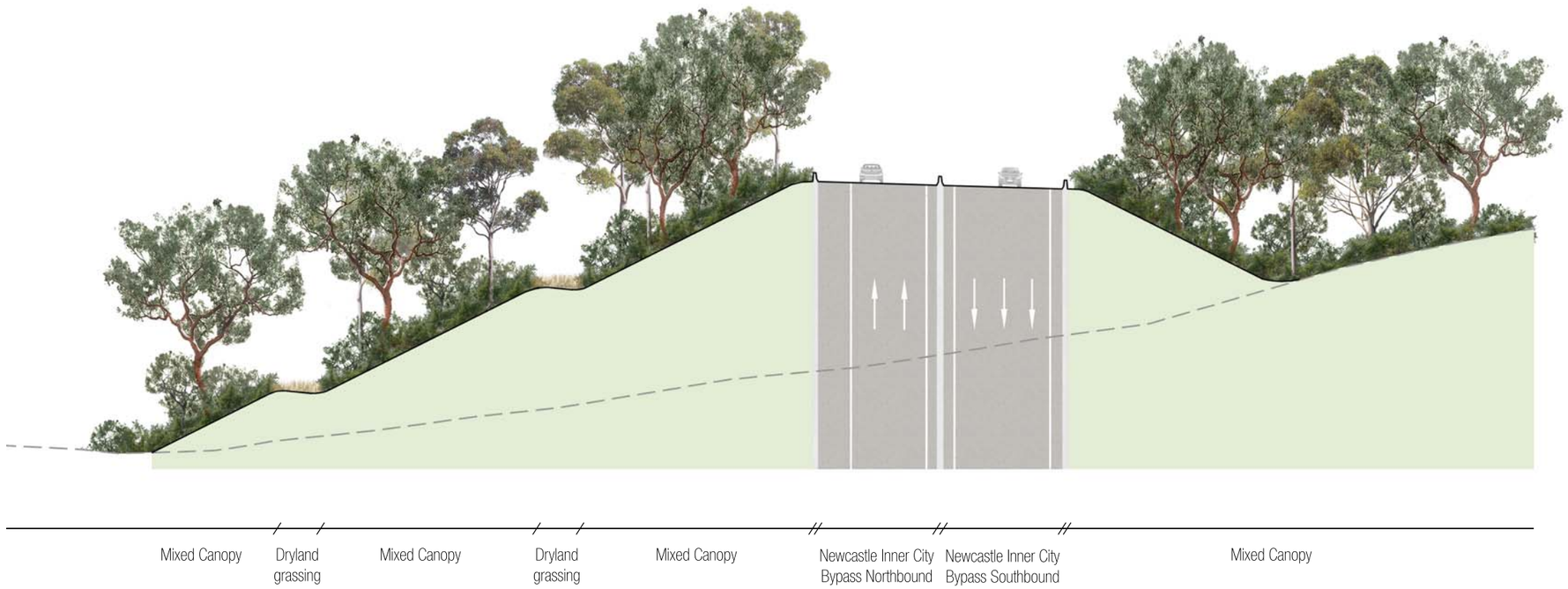
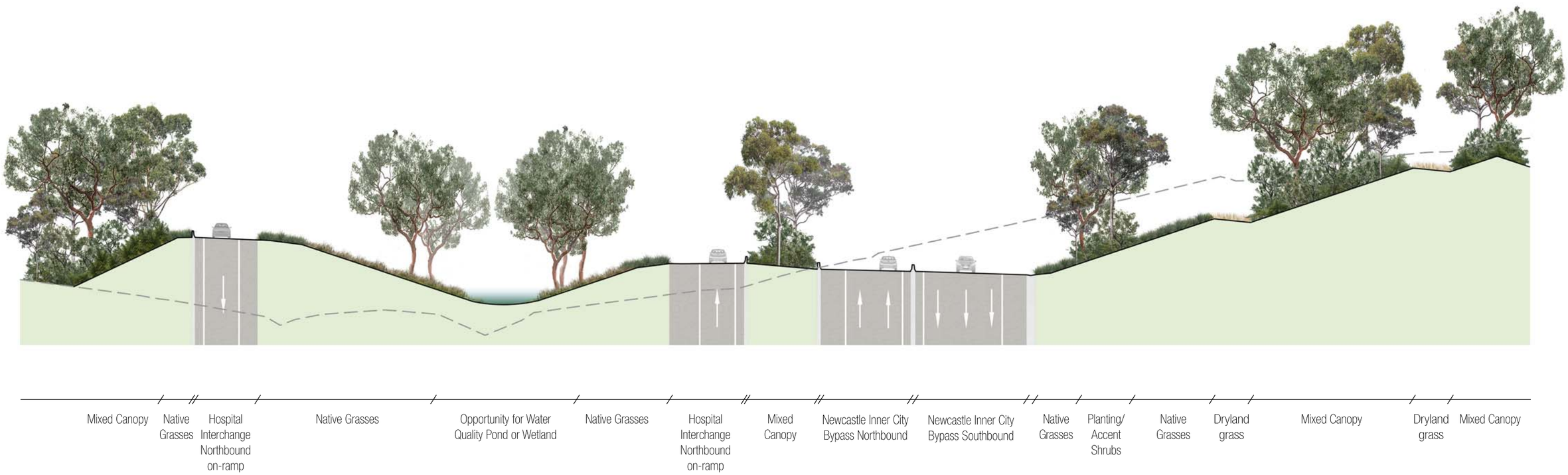


Figure 5.7 Plan at the Hospital Interchange.



Note: Revegetation with Smooth-Barked Apple / Red Bloodwood Open Forest species

Figure 5.8 *Section at chainage 8760*



Note: Revegetation with Smooth-Barked Apple-Sydney Peppermint-Turpentine Forest species

Figure 5.9 *Section at chainage 9040*

Note: Revegetation with Smooth-Barked Apple-Red Bloodwood Open Forest species to east verge and Spotted Gum-Broad-Leaved Ironbark Grassy Open Forest species to west verge.

Figure 5.10 *Section at chainage 9200*

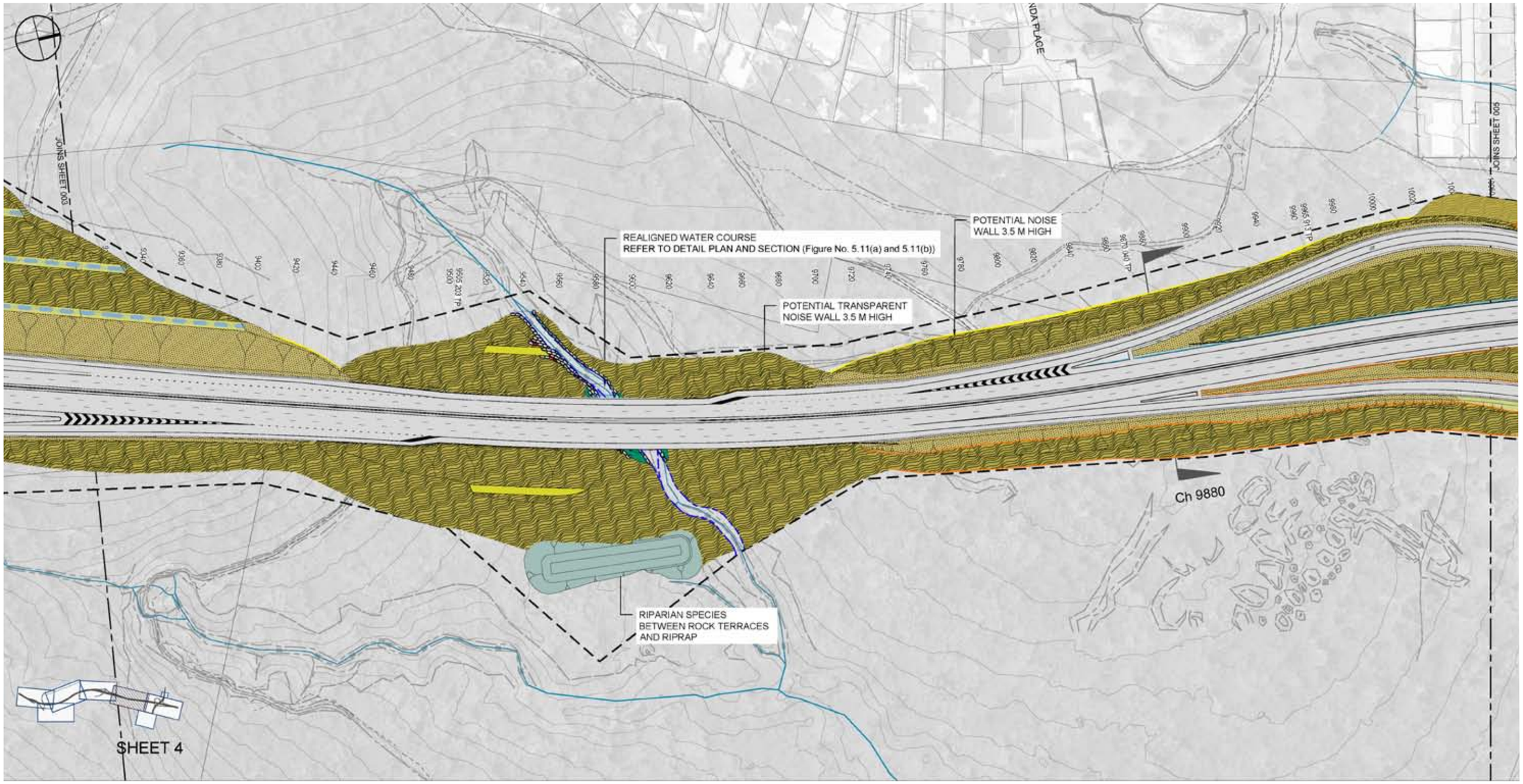


Figure 5.11 Plan north of the Hospital Interchange.

Note: Revegetation with Spotted Gum-Broad-Leaved / Ironbark Grassy Open Forest species

Figure 5.12 *Section at chainage 9800*

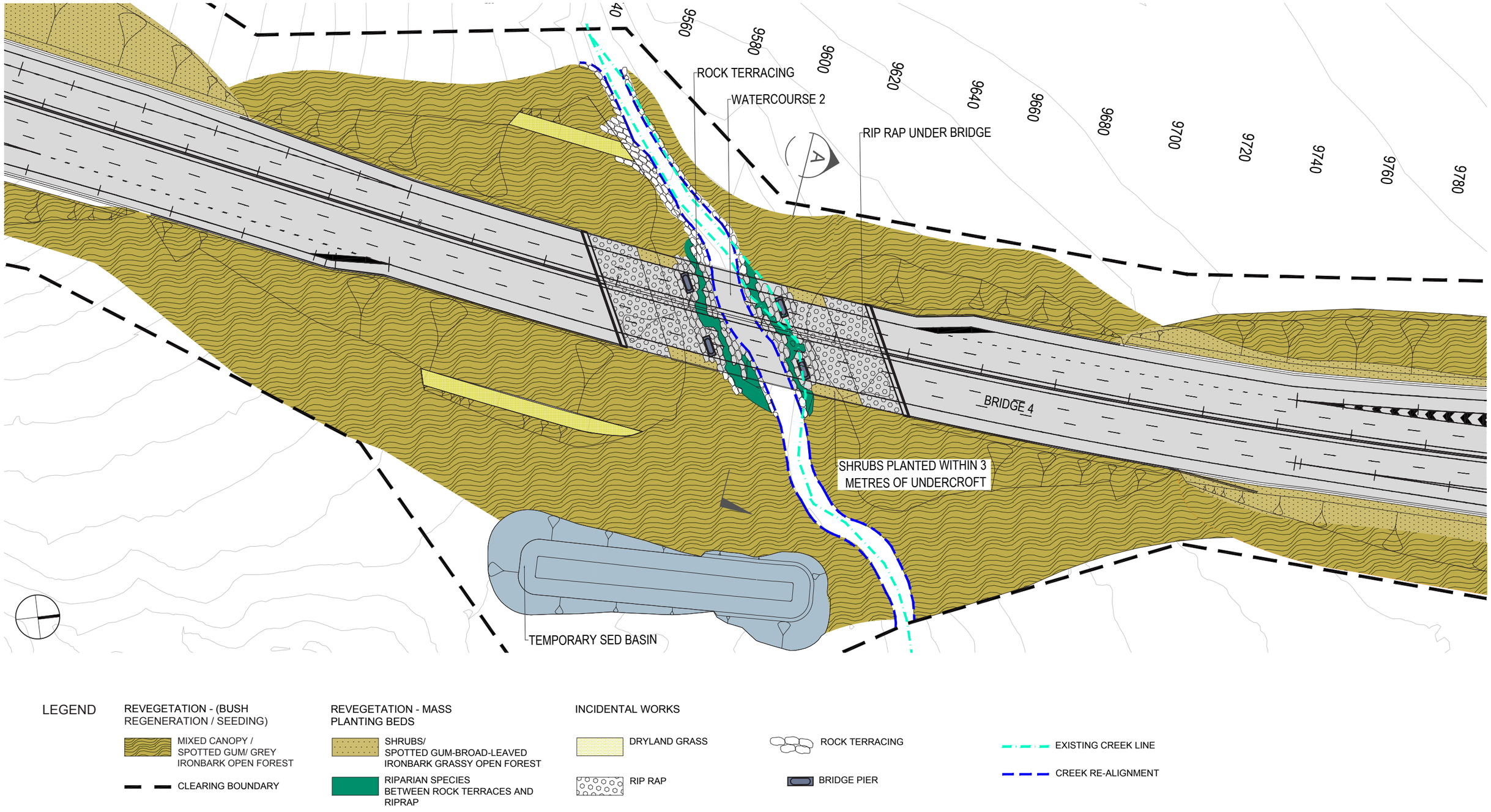
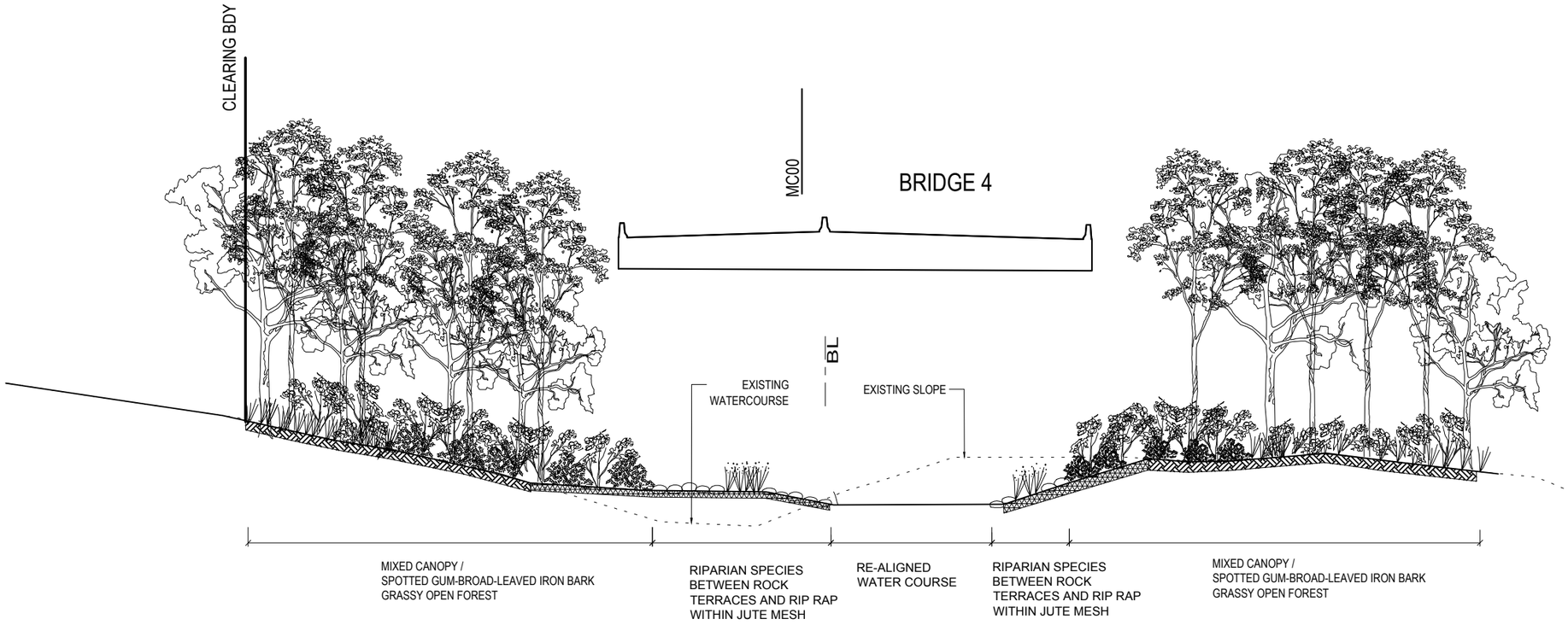


Figure 5.11(a) Detail Plan- showing the re-aligned watercourse 2, under Bridge 4



SECTION A
SCALE 1: 300 -

DETAIL SECTION

Figure 5.11(b) Detail Section- showing the realigned creek crossing 2, under Bridge 4

Figure 5.13 Plan of the Northern Interchange.

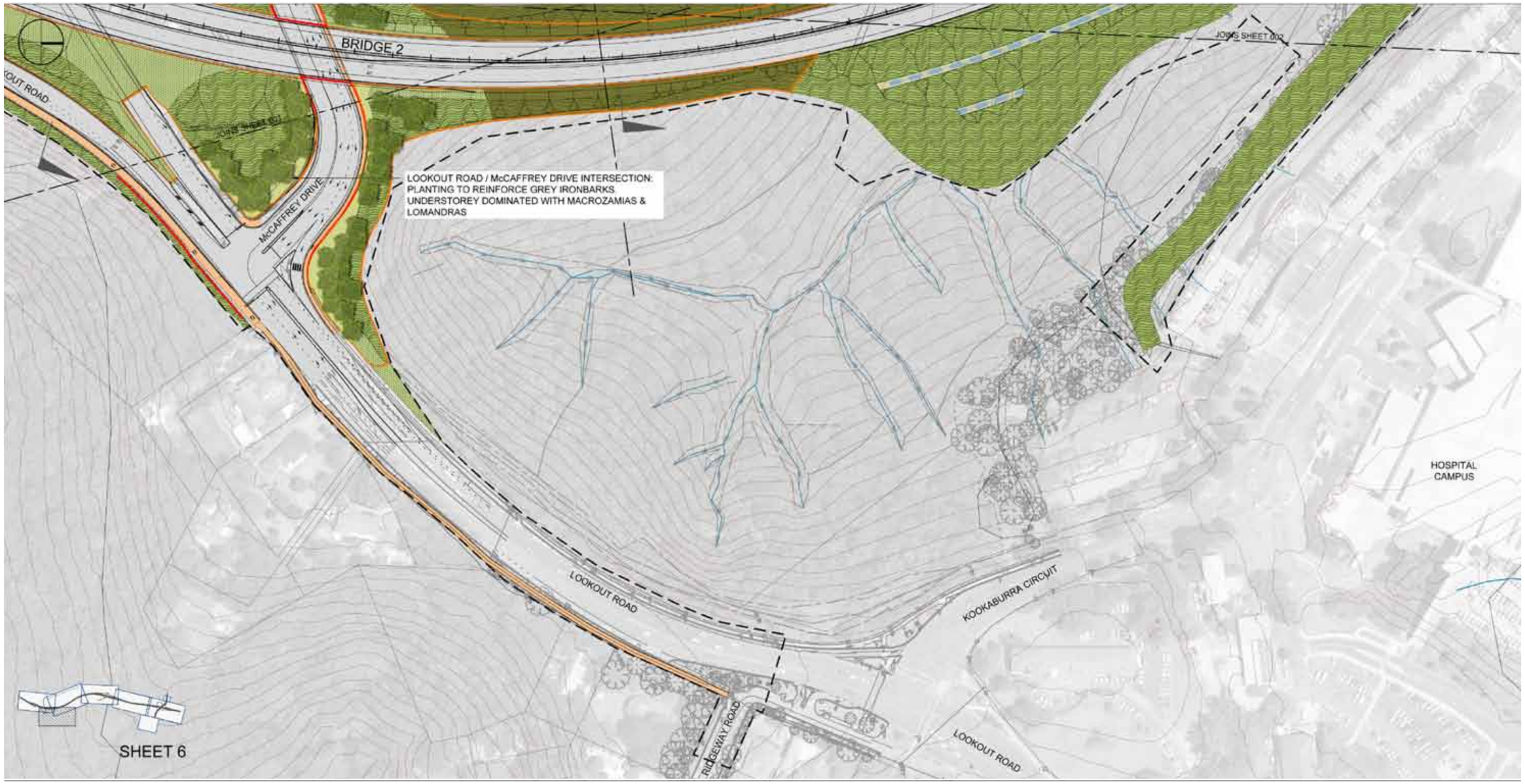
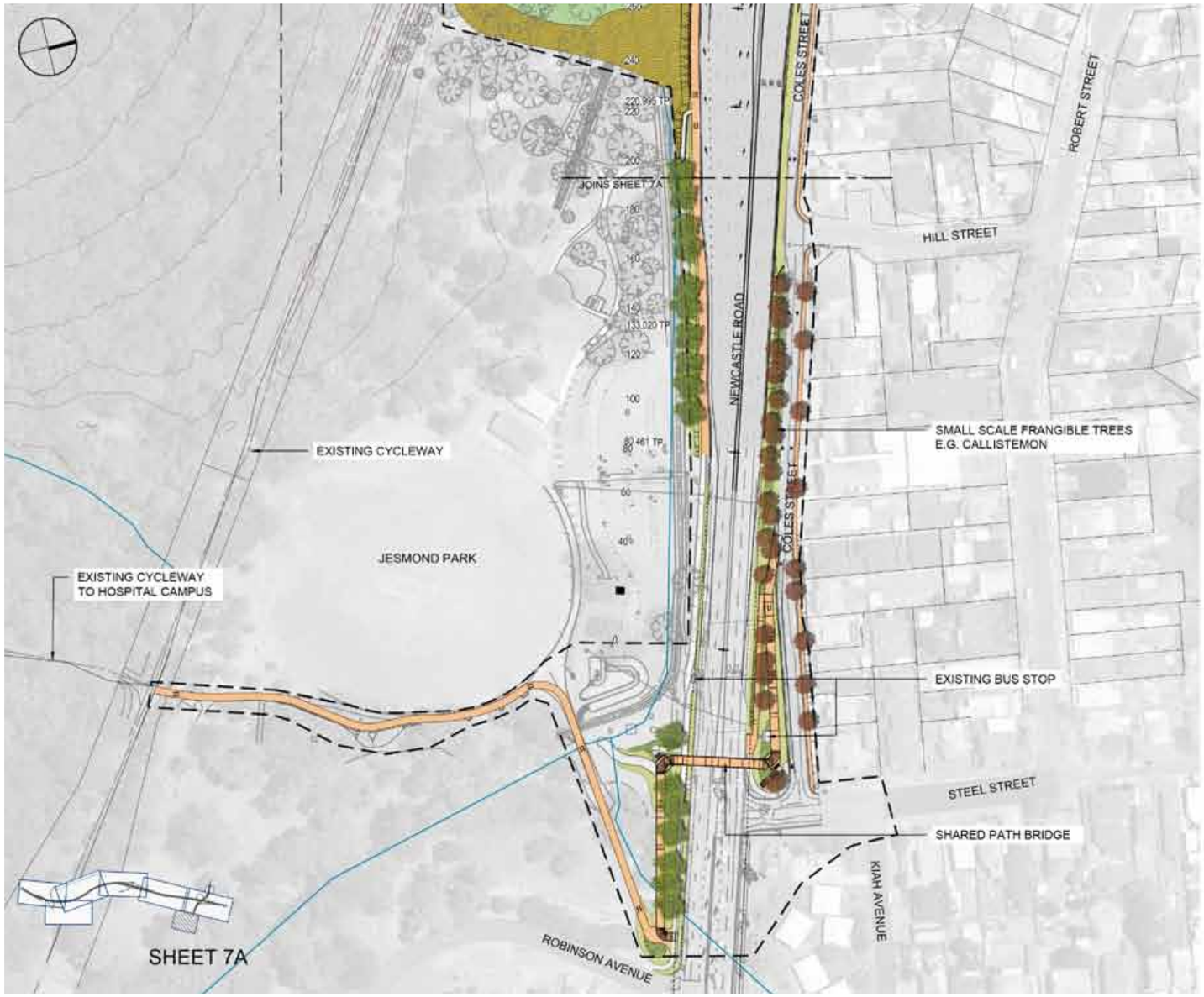


Figure 5.14 Plan of the Lookout Road area.



SHEET 7B

LEGEND

EXISTING ELEMENTS
- EXISTING TREES PROTECTED & RETAINED
- CONTOURS
- EXISTING TRACKS
- WATER COURSES

REVEGETATION - SHRUB DOMINANT (BUSH REGENERATION / SEEDING)
- SPOTTED GUM/ GREY IRONBARK OPEN FOREST
- SMOOTH-BARKED APPLE-SYDNEY PEPPERMINT-TURPENTINE FOREST
- SPOTTED GUM-BROAD-LEAVED IRONBARK GRASSY OPEN FOREST
- SMOOTH-BARKED APPLE-RED BLOODWOOD OPEN FOREST

REVEGETATION - MIXED CANOPY (BUSH REGENERATION / SEEDING)
- SPOTTED GUM/ GREY IRONBARK OPEN FOREST
- SMOOTH-BARKED APPLE-SYDNEY PEPPERMINT-TURPENTINE FOREST
- SPOTTED GUM-BROAD-LEAVED IRONBARK GRASSY OPEN FOREST
- SMOOTH-BARKED APPLE-RED BLOODWOOD OPEN FOREST

REVEGETATION - MASS PLANTING BEDS
- SHRUBS & MIXED CANOPY
- NATIVE GRASSES
- PLANTING / ACCENT SHRUBS

GRASSING
- DRYLAND GRASS
- TURF / MOWN GRASS

ACCENT PLANTING
- SPOTTED GUM DOMINANT *(Corymbia maculata)*
- EUCALYPTUS PIPERITA DOMINANT *(Sydney Peppermint)*
- SMOOTH-BARKED APPLE DOMINANT *(Angophora costata)*

BUILT ELEMENTS
- GRAVEL / MAINTENANCE TRACK
- SHARED PATH / FOOTPATH
- RETAINING WALL
- POTENTIAL NOISE WALL (SOLID)
- POTENTIAL NOISE WALL (TRANSPARENT)

OTHER
- CLEARING BOUNDARY
- WATER QUALITY STRUCTURE (OPERATIONAL)
- VEGETATED SWALE
- CONCRETE CHANNEL

Figure 5.15 Plans west and east of the Northern Interchange.

5.2 RETAINING STRUCTURES

The retaining walls are inspired by two elements- the bushland setting and the visual integration with other retaining walls of the adjacent sections of the Newcastle Inner City Bypass. The walls are conceived as precast concrete panels with an irregular pattern that echoes the texture of the bushland setting by introducing a variety of vertical ribbing with different lengths and widths. The vertical ribbing is sympathetic to the existing retaining walls of the Newcastle Inner City Bypass to the north of Northern Interchange, whilst the filigree and random character complements the textured wall panels that represent mine shafts to the south of the project. Hence, the project provides a transition with its own thematic.

The layered effect of the pattern, also abstractly represents the complex multi-layered geology of the area.

The top of the walls would follow a smooth vertical alignment to visually recede this elements. In various locations, the walls are strategically situated to minimise the extent of batters mitigating impacts to the bushland setting. These walls are incorporated towards the top of batters to minimise loading and construction footprints, avoiding impacts to creeks and required clearing for construction access.

The pattern is based on a combination of two alternating panels and the vertical ribbing would act as a graffiti deterrent mitigating maintenance requirements.

Two type of retaining walls are proposed, precast fascia panels used in piled wall situations and reinforced soil walls used in fill situations. The proposed design illustrated in figures 5.16 to 5.19 are of an indicative nature and demonstrate the applications of key urban design principles. These include:

- Introduce a strong texture that acts as an anti-graffiti measure
- Introduce movement to the texture and relate it visually to the bushland setting
- consider vertical or diagonal ribbing to visually relate to other sections of the bypass
- use durable materials such as concrete that are vandal resistant and require minimum maintenance
- ensure the top of walls follow a smooth top edge

For locations of walls refer urban design plans in section 5.1.

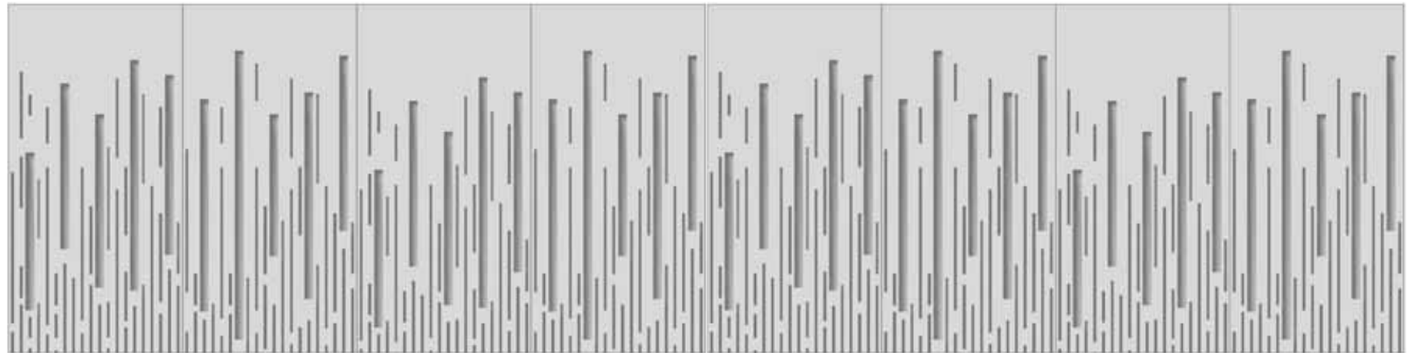


Figure 5.16 *The pattern for retaining structures echoes the bushland setting and layered geology of the area.*

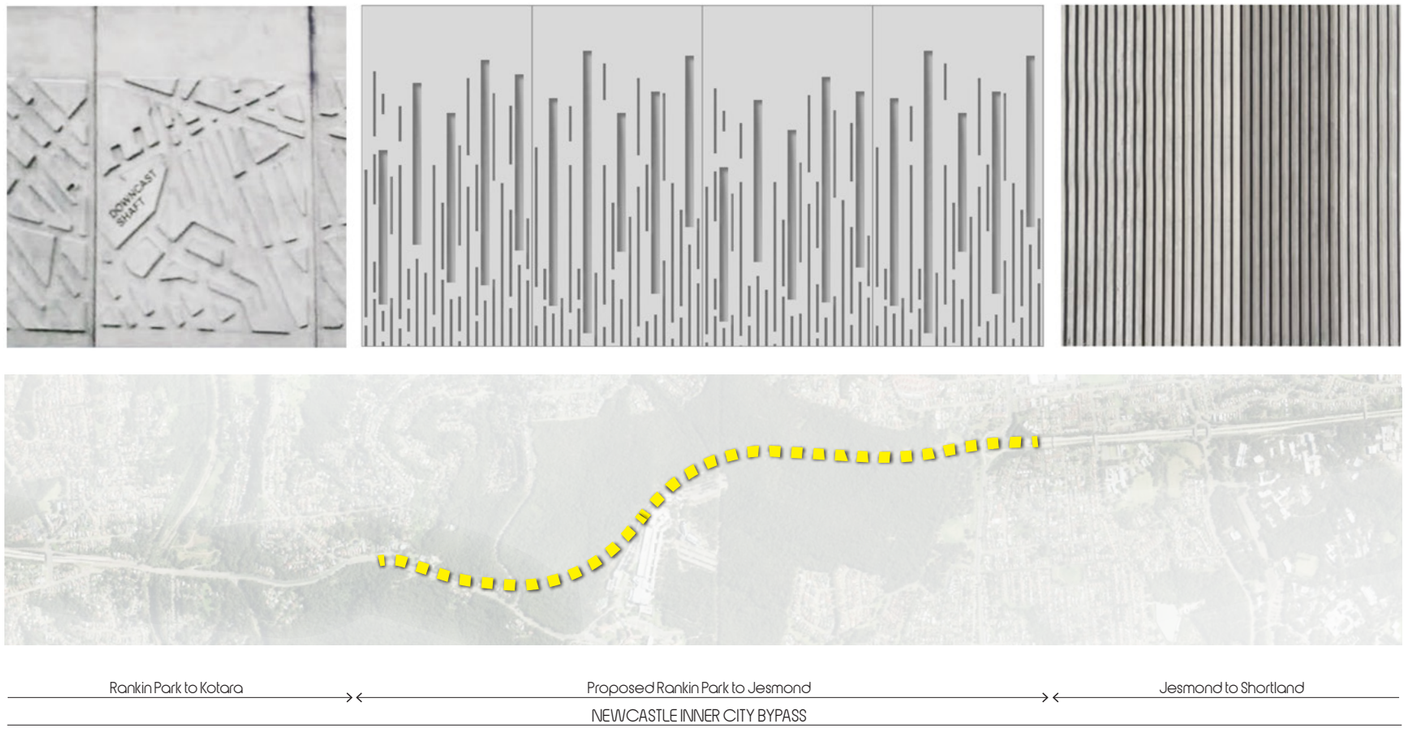


Figure 5.17 *The above figure illustrates the pattern of the adjacent sections of the bypass and the proposed pattern of retaining walls for the Rankin Park to Jesmond section. The pattern attempts to create a transition between the two already built sections whilst presenting its own thematic.*

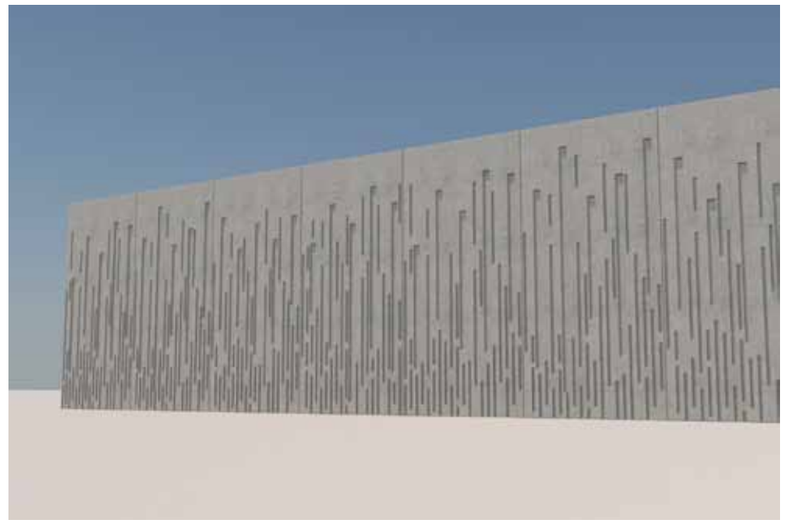
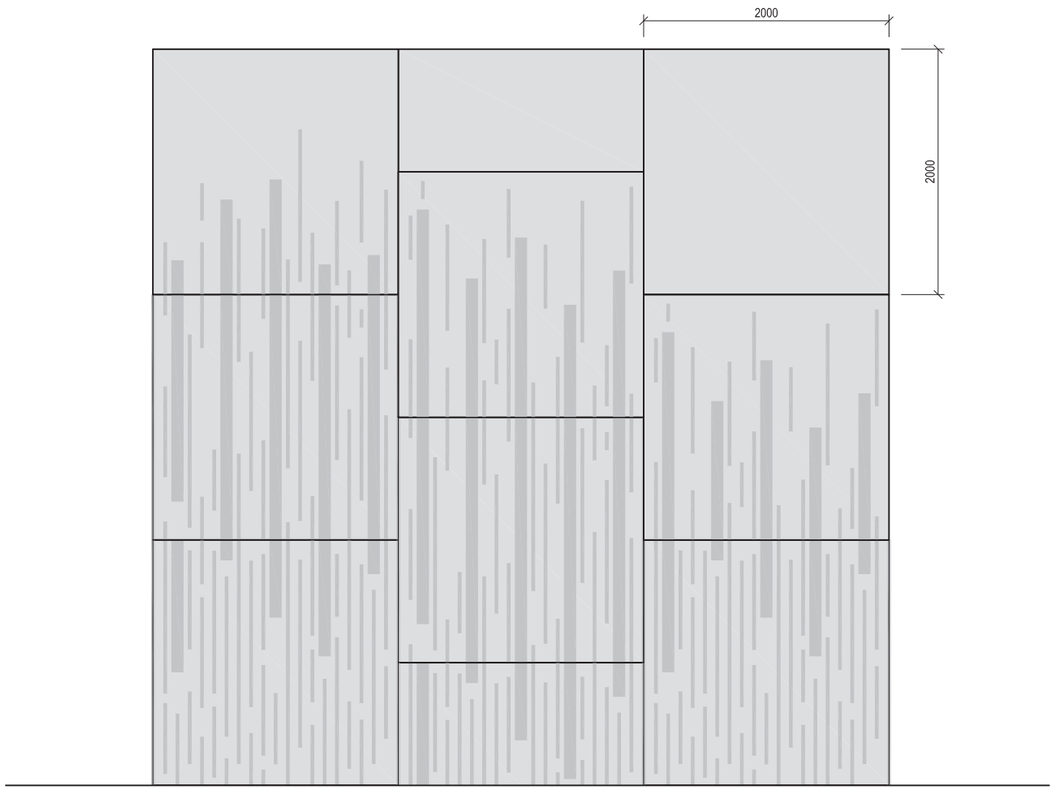
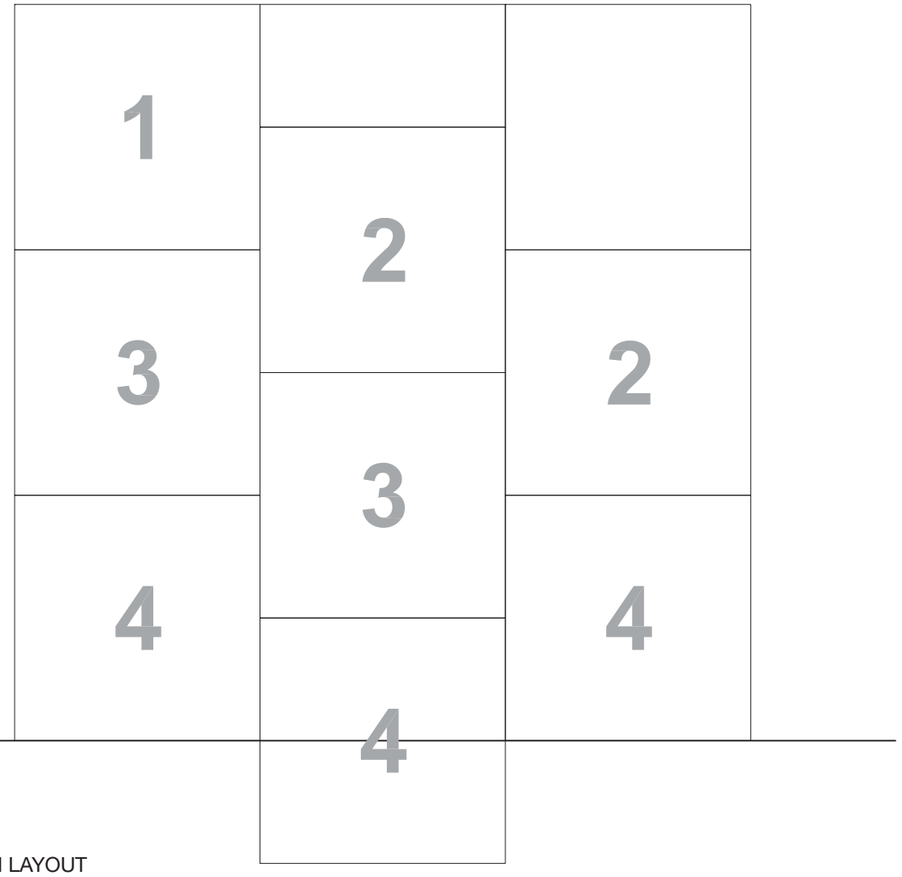


Figure 5.18 *Abstract 3D study of the proposed pattern for the retaining walls.*



ELEVATION



PATTERN LAYOUT

Figure 5.19 Indicative elevation and pattern layout of a reinforced soil wall using 2m x 2m panels. Panel type 4 would be always at the ground line, with plain panels located in the upper sections of the wall.

5.3 NOISE WALLS

A noise and vibration assessment has been prepared - Technical Paper 3 Noise and Vibration Assessment, 2016, identifying the areas impacted by the project. Based on this information, potential locations for noise walls have been identified and their height and location would be further investigated during detail design.

Two noise wall types are proposed for the project depending on their location (refer figure 5.20):

- Transparent noise walls on bridge structures
- Precast concrete panels, set both adjacent to the road's verge, and set back from the road's verge.

The proposed designs are of an indicative nature and demonstrate the applications of key urban design principles. These include:

- Introduce a strong texture that acts as an anti-graffiti measure
- Retain consistency with the retaining walls to create a unified composition
- Use durable materials such as concrete that are vandal resistant and require minimum maintenance

For locations of walls refer urban design plans in section 5.1.

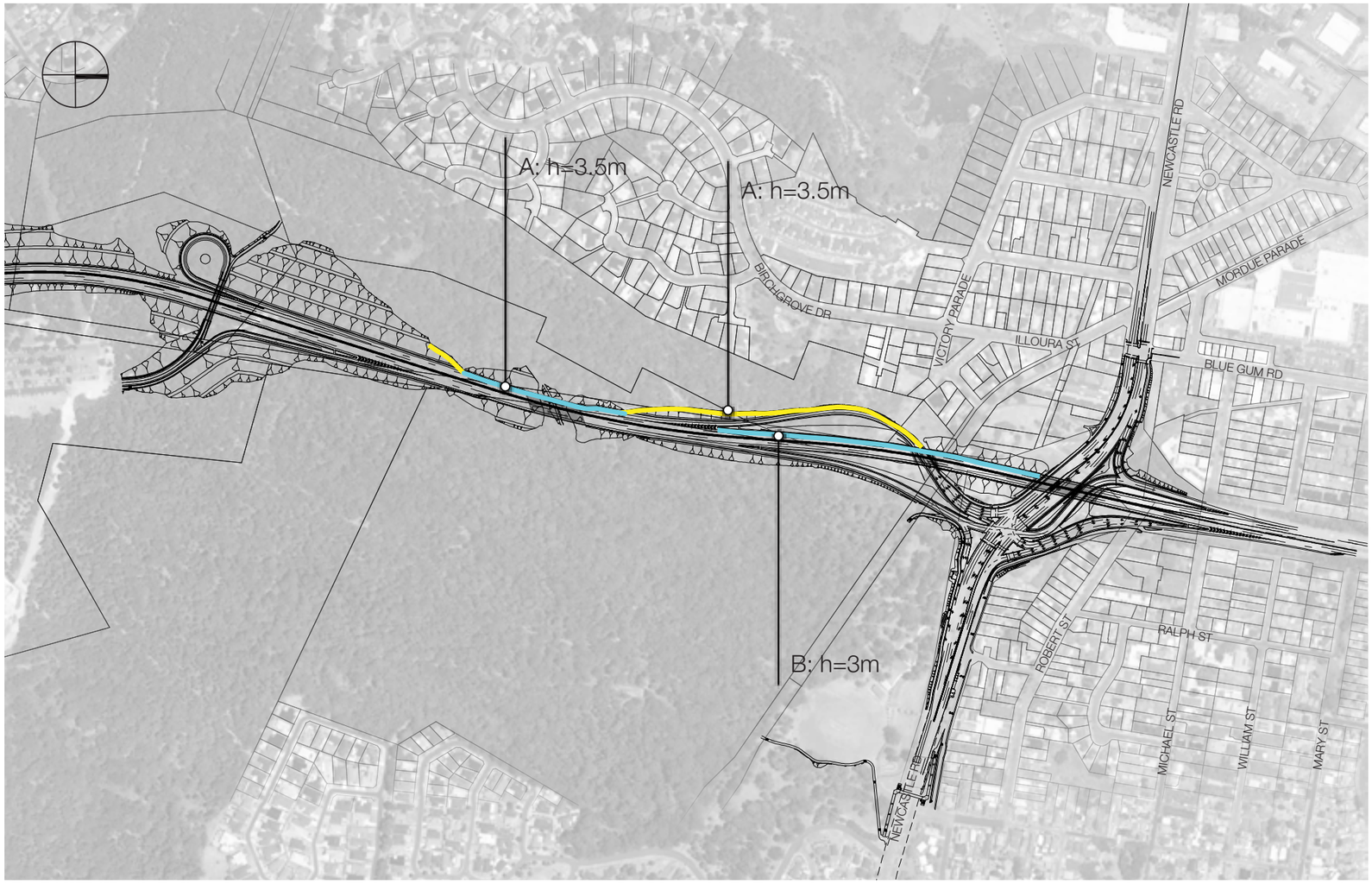


Figure 5.20 *Plan illustrating the location and type of potential noise walls.*

TRANSPARENT NOISE WALLS

Transparent noise wall are proposed along bridge number 4 at the creek crossing and along the approach to the Northern Interchange overpass. These noise walls are conceived as tilted transparent acrylic panels with horizontal threads for bird protection. The 10 degree tilt responds to the required vehicular envelope, provides a more open character from the roadway, creates a more dynamic appearance and allows for a seamless transition between the bridge safety screens and the noise wall.

The top of the noise walls would present a smooth top edge and the terminations are tapered to create a fluid and elegant transition. In situations where the transparent walls interface with solid noise walls, the termination would be vertical in elevation to limit any overlap and maintenance issues at the interface refer figures 5.21 to 5.23).

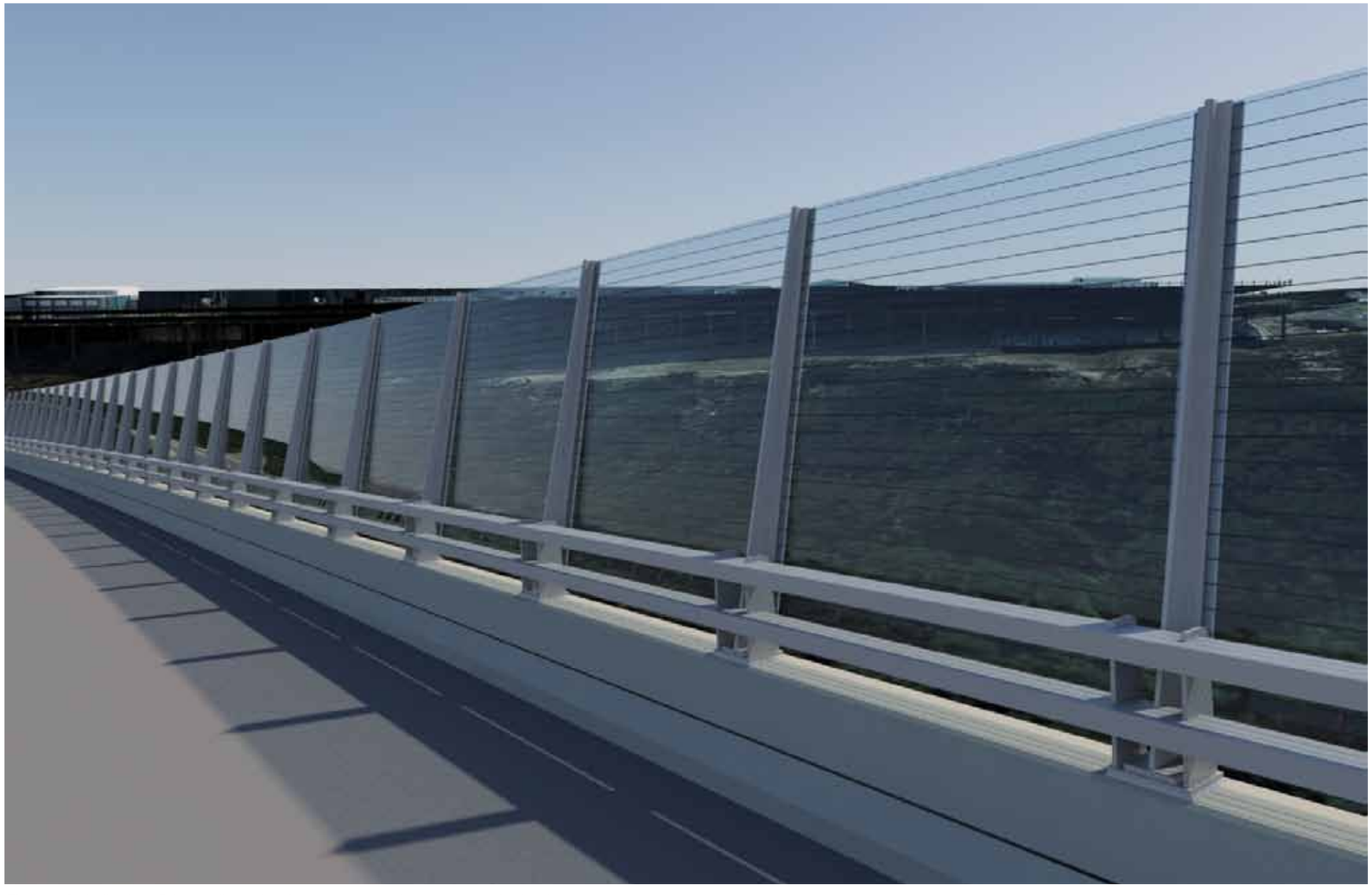
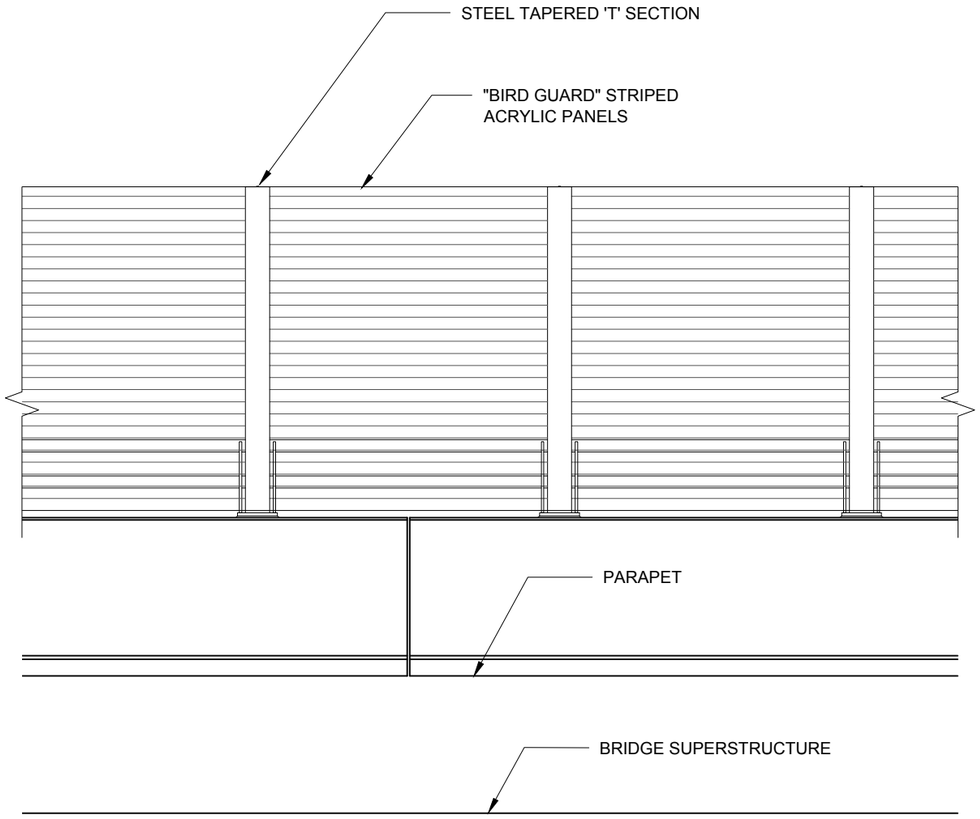
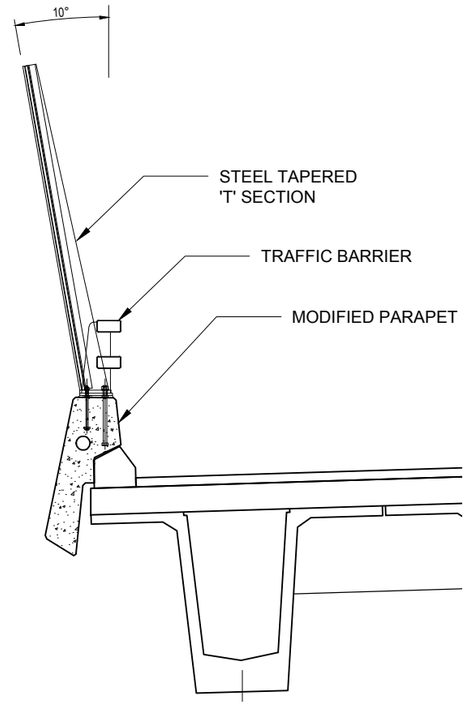


Figure 5.21 *Indicative 3D image illustrating the appearance of transparent noise barriers.*



ELEVATION

Figure 5.22 Indicative elevation illustrating key components of the wall.



SECTION

Figure 5.23 Indicative cross section of the proposed transparent noise wall.

SOLID NOISE WALLS ADJACENT TO THE ROAD

Noise walls adjacent to the road's verge would be in the form of precast concrete panels that replicate the ribbed theme of the retaining walls to ensure a consistent form language that reinforces the legibility of the road. These walls are conceived as vertical elements to accommodate various situations along the corridor.

The rear of the walls will be kept in plain concrete finish as this portion of the wall would not be visible to private property owners due to the screening effect of the dense bushland setting. This would allow a cost effective production of the panels. Consideration could be given whether to paint the backside of the panels in a charcoal grey colour to visually recede these elements and aid in any potential graffiti maintenance. However, it is considered unlikely that graffiti would be a major issue due to the limited visual exposure of the back side of these walls.

The walls would follow the road's gradient with a gentle stepping of the top edge.

SOLID NOISE WALLS SET BACK FROM THE ROAD

In a some situations, the noise walls would be set back from the road, following the edge of a cutting. These walls would also be conceived as precast concrete panels with the afore-mentioned thematic. Terminations are tapered when seen in elevation to create an elegant transition.

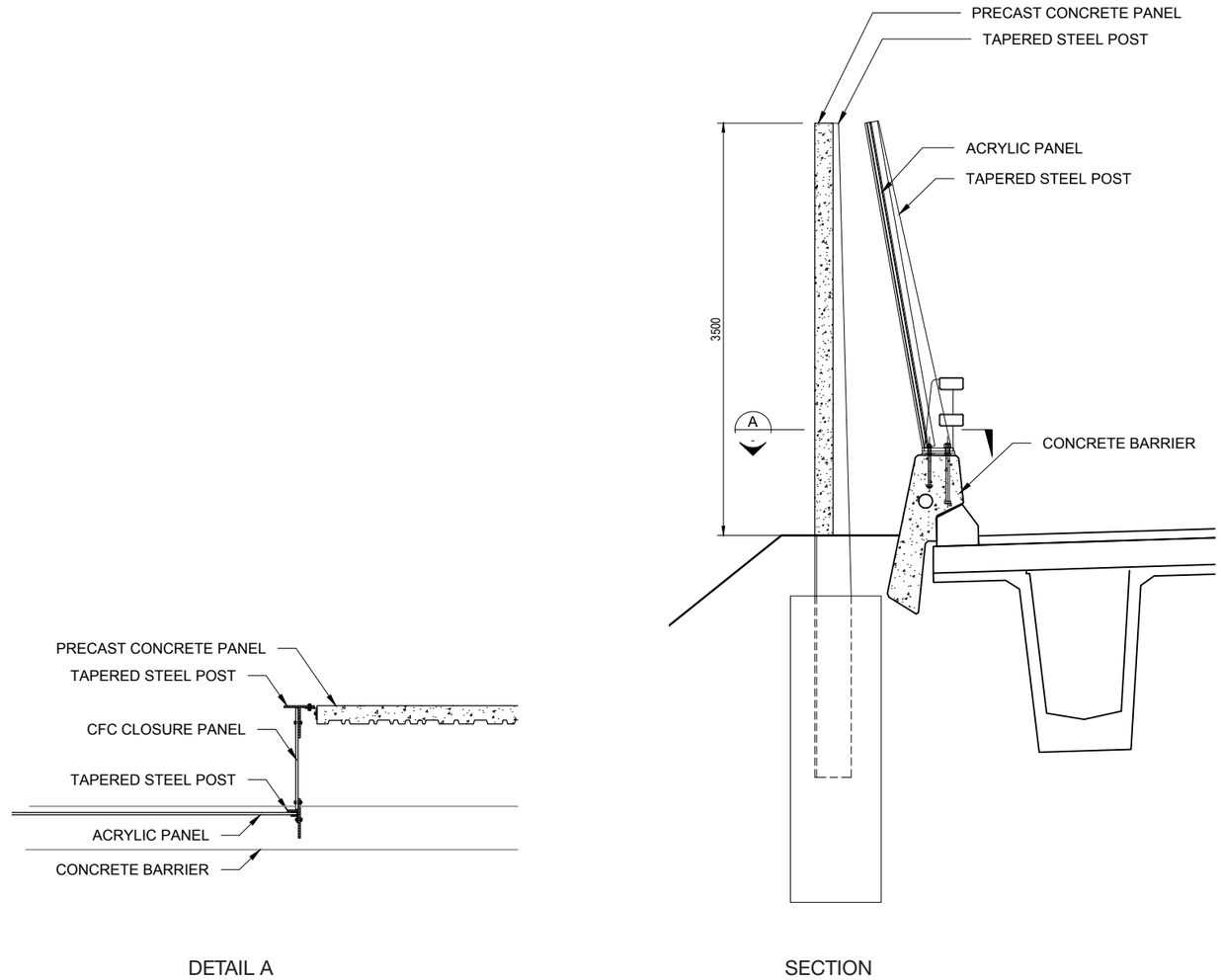
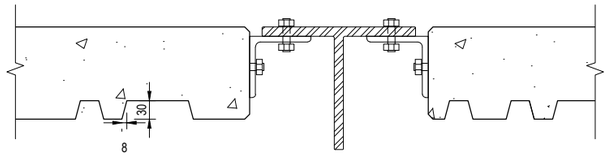
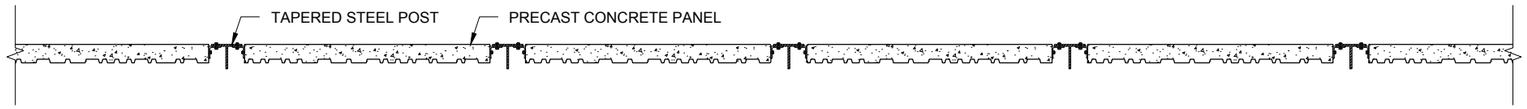


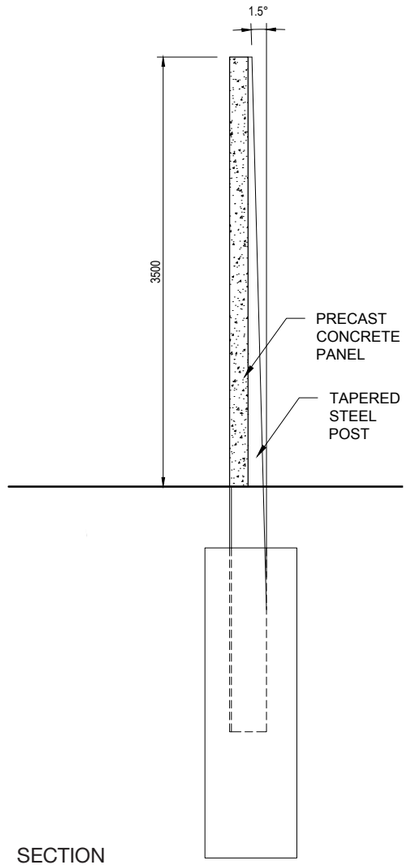
Figure 5.24 *Indicative detail and section of the transition between a solid and a transparent noise wall.*



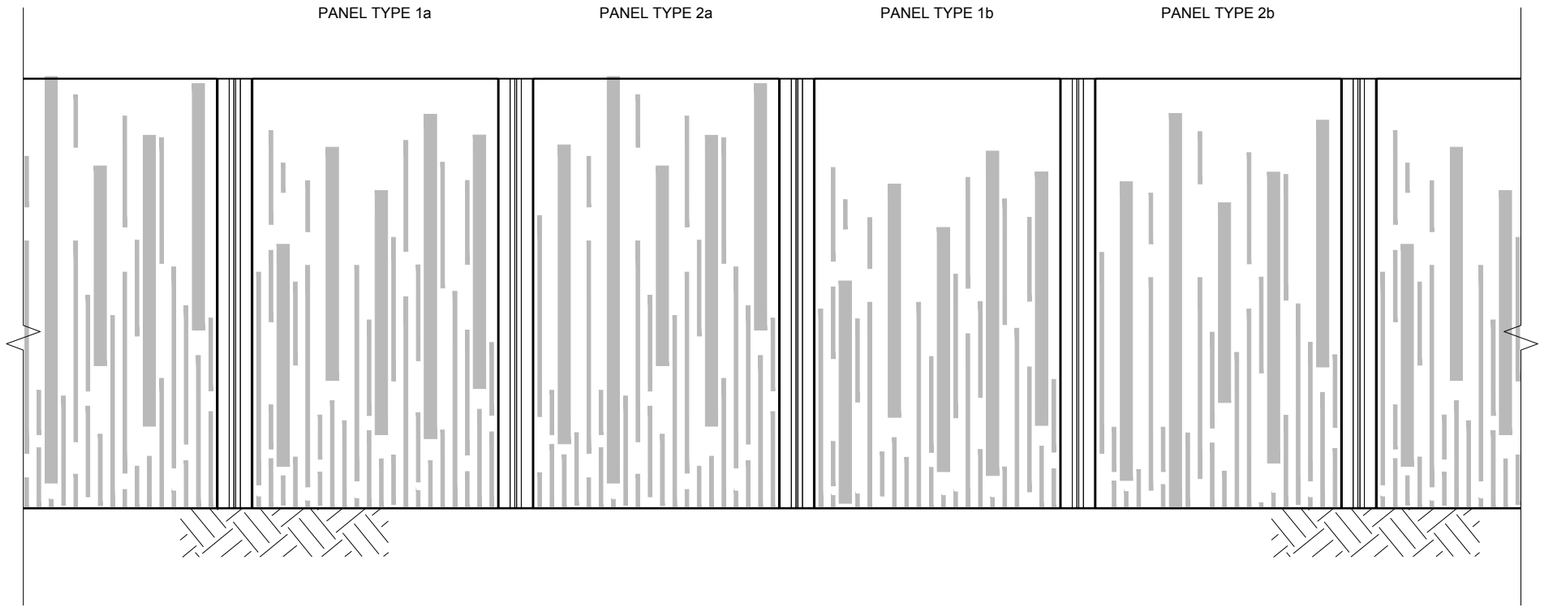
DETAIL



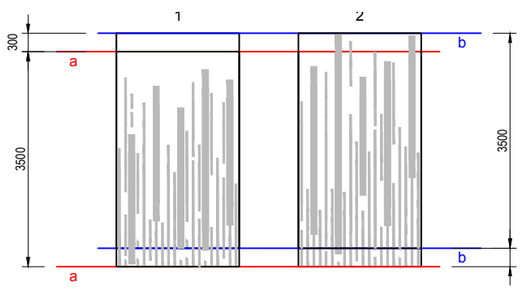
SECTION



SECTION



ELEVATION



NOTE:

PANELS SHARING A NUMBER (e.g. 1a & 1b)
INTENDED TO BE CAST FROM SAME MOULD

Figure 5.25 *Indicative details of the proposed solid noise wall.*

5.4 BRIDGES

There are six bridges proposed along the project alignment that have been designed as a family of components. These bridges use precast concrete elements for the superstructure and distinctive piers. For locations of bridges, refer urban design plans in section 5.1.

BRIDGE 1 - LOOKOUT ROAD NORTHBOUND

This bridge services the northbound off-load ramp to Lookout Road and the structure would be composed of precast concrete super T members. This multi span bridge crosses the bypass at a skew angle with one of the piers situated within a narrow median.

Due to this situation, the piers are designed as a circular element with a headstock that allows a radial configuration in plan. The six span bridge allows for laid-back batters, providing the opportunity to reinforce the bushland environment.

The headstock has a rounded tilted end to disguise the skew and provide a more interesting appearance that visually relates to the rounded pier whilst providing a softer appearance sympathetic to the bushland setting of the corridor.
Parapets would be kept simple and with clean lines, tilted outwards to catch the sun and be self-cleansing.

Safety screens have been incorporated with posts tilted outwards, visually integrating with the form language of the transparent noise walls (refer figure 5.26).

Figure 5.26 *Indicative 3D image of Bridge 1 - Lookout Road northbound, looking north.*

BRIDGE 2 - MCCAFFREY DRIVE OVERPASS

Conceived as a dual span over the bypass with a central pier and abutment return walls. Although spill batters would be desirable to open views towards the bushland setting for northbound traffic, construction phasing and geometric constraints limited such an opportunity. Hence, the proposed bridge would act as a portal instead, demarking the entry/exit to the bushland setting, visually reinforcing the journey experience of the unique natural environs within this urban area.

The central pier is conceived as a blade pier that reflects the rounded form language of the headstocks in Bridge 1. Safety screens, parapets and other bridge components would echo a similar configuration as described in Bridge 1.

Abutment walls, including the abutment return walls, would be clad with feature concrete panels (refer figure 5.27).

Figure 5.27 *Indicative 3D image of Bridge 2 - McCaffrey Drive Overpass, looking north.*

BRIDGE 3 – HOSPITAL INTERCHANGE

A new interchange would be proposed servicing the Hospital Precinct. The interchange would cater for traffic to and from the north. Traffic from the south or going south from the hospital would use the current hospital entrance at Lookout Road.

The asymmetric layout of the interchange provides the opportunity of a three span structure with two piers and spilled batters, framing the view towards the bushland and acting as a gateway for northbound traffic prior to reaching Northern Interchange.

The spill batters, under the bridge, would vary from one abutment to the other to create a more symmetric layout of the overall structure by using 2 in 1 batters along the eastern abutment and 1 in 1.5 at the western abutment.

The piers, are conceived as blade elements, retaining a consistent form language used in the other bridges along the project. Parapets and screen elements would be kept consistent with other bridges (refer figure 5.28).

Figure 5.28 *Indicative 3D image of Bridge 3 - Hospital Interchange, looking north, with accent planting of Grass Trees to mark the turn off to the John Hunter Hospital.*

BRIDGE 4 - NORTHERN CREEK CROSSING

This three span structure crosses a waterway and allows for fauna movements and recreational permeability. Piers are conceived as blade elements with circular ends. The top of piers include headstocks with a similar shape as described in Bridge 1, and retaining a consistent character that reinforces the identity of this section of the bypass. This bridge introduces skewed piers and abutments to mitigate its footprint and minimise impacts to the existing creek.

A transparent noise barrier would be integrated along the parapet of the western verge, as outlined in section 5.3 of this report, allowing views towards the adjacent bushland (refer figure 5.29).

Figure 5.29 *Indicative 3D image of Bridge 4 - creek crossing, looking west from within the bushland setting.*

BRIDGE 5 - NORTHBOUND OFF RAMP - NORTHERN INTERCHANGE

As part of the Northern Interchange, the northbound off ramp crosses beneath the bypass as a single span underpass structure. Abutment walls would be clad with feature concrete panels and the return wall would be executed as a reinforced soil wall extending the feature motif as outlined in section 5.2 of this report. The noise wall would directly interface with the abutment wall, creating a unified composition (refer figure 5.30).

Figure 5.30 *Indicative 3D image of Bridge 5 - Northbound off ramp at Northern Interchange, looking north.*

BRIDGE 6 - NORTHERN INTERCHANGE

Northern Interchange, as one of the most significant intersections in Newcastle is an important junction on the way into Newcastle's CBD. The bridge servicing the interchange would be conceived as a three span structure with precast concrete girders.

The interchange layout, locates the main intersection to the east of the bypass, allowing for a simpler construction staging and smaller intersection, minimising the required span of the bridge. To achieve this configuration, a small bridge would be introduced for the northbound off-ramp (Bridge 5), whilst the northbound on-load ramp would be integrated with the main three span structure (Bridge 6), passing under the northern span.

This situation would require the introduction of a screen element to avoid headlight glare issues in the form of a concrete barrier between eastbound traffic along Newcastle Road and the northbound on-load ramp.

The bridge piers follow a consistent form language as the other bridges, in this case providing a combination of a portal type pier with integrated headstock. Also in this instance, the rounded headstocks help disguise the skew between the bypass alignment and Newcastle Road (refer figure 5.31).

Careful consideration has been given to the construction methodology to minimise any disruption of traffic during construction .

Figure 5.31 *Indicative 3D image of Bridge 6 - Northern Interchange, looking east on Newcastle Road.*

SHARED PATH BRIDGE

A shared path bridge is proposed over Newcastle Road to the west of the intersection with Steel Street, and would replace the existing at grade mid-block pedestrian crossing to the west. To limit the overall height of the deck level, the structure is conceived as an arched form. The ramps have been oriented to take advantage of topographical features, thereby minimising their length.

Ramps would be provided on both sides of the bridge and be suitable for both cyclists and pedestrians, including mobility impaired. Access stairs would also be provided on each side. Works would be undertaken to connect to the shared path to the south through Jesmond Park, and to the west to the shared path situated on the Jesmond to Shortland section of the Newcastle Inner City Bypass.

Existing bus stops on Newcastle Roas at this location will be retained with the bridge and associated connection improving access to these bus stops.

It is proposed to paint the arched structure in an ochre colour to reflect the steel industry heritage of Newcastle, creating a feature element along the journey. Other steel elements of the structure would be painted in a dark grey colour to accentuate the different components. Safety screens would be provided along the length of the main span.

Planting proposals would integrate the bridge into the setting with simple swathes of native grasses and tussocks, and areas of low shrub planting to mitigate the stairs, and the height of the bridge structure.

Figure 5.32 Plan illustrating the location of the proposed shared path bridge over Newcastle Road.

Figure 5.33 Indicative photomontage of the shared path bridge, looking west on Newcastle Road.

Figure 5.34 Existing situation.

5.5 LANDSCAPE DESIGN

PLANTING STRATEGIES

Planting Themes

The revegetation /planting design aims to reinforce the suitable species from the indigenous vegetation communities already present on the site.

These associations would adapt well to the site conditions, improve biodiversity and support fauna, and visually mitigate the proposed works in the overall landscape. The essence of the vegetation associations that would be reinforced with the proposed design are illustrated in the adjacent coloured strips, and summarised below.

In more urban areas such as at the northern interchange with Newcastle Road, spatial, safety and service constraints would effect placement of the larger tree species and the planting design accommodates other species to complement the indigenous palette.

In terms of native grasses in particular, use of “cultivars” in broad scale ecological plantings should be limited as they are potentially harmful to the broader landscape and distracting to potential pollinators of wild populations, impacting on the integrity of locally occurring related species reducing the genetic diversity of the bushland over time.

The Integrated Urban Design plans indicate areas for seeding/bushland revegetation and also areas proposed for mass planting beds. The latter are proposed in areas of high visual impact, interchange areas and urban areas, where the public also have more accessibility to adjoining spaces.

The proposed planting mix is preliminary and subject to further refinement during detail design.

Native Grasses
The native grass mix should be robust, self- sustaining and ecologically appropriate. They are used along verges, batters where informal, natural character is proposed. They would be planted as hikos/tubestock and various mixes would be developed to highlight the differing soil landscapes/ vegetation communities.

Native Grasses & Ground Covers mix
(for adjacent intersections)

These species are proposed in areas of high visibility, low maintenance areas, for where people would be lingering, sitting, where more textural contrast is preferred compared to the indigenous, native grass species.

Austrodanthonia fulva	Wallaby Grass
Dianella caerulea“Breeze”	Blue Flax Lily (hybrid)
Dianella caerula	Blue Flax Lily
Lomandra longifolia “Tanika”	Spiny-Headed Mat Rush
Themeda australis	Kangaroo Grass

Accent Native Shrubs
The following species are proposed for wider sections of median, where shown on the drawings near the northern interchange: *Philotheca myoporoides, syn. Eriostemon myoporoides*, *Westringia fruiticosa prostrate*, *Callistemon “White Anzac*, with the native grass/ groundcover mix, and native grasses mix.

The essence of the re-vegetation associations that would be reinforced with the proposed design are summarised and illustrated in coloured strips on the following pages.

Smooth-barked Apple - Red Bloodwood open forest

Trees

Allocasuarina torulosa	Forest Oak
Angophora costata	Smooth-Barked Apple
Corymbia gummifera	Red Bloodwood
Eucalyptus capitellata	Brown Stringybark
Eucalyptus globoidea	White Stringybark
Eucalyptus punctata	Grey Gum
Syncarpia glomulifera	Turpentine

Shrubs

Acacia terminalis	Sunshine Wattle
Acacia ulicitolia	Prickly Moses
Banksia spinulosa	Hairpin Banksia
Leptospermum trinervium	Slender Tea- tree
Lomatia salicifolia	Wild Parsely
Persoonia levis	Broad-Leaved Geebung
Persoonia linearis	Narrow Leaved Geebung
Pittosporum undulatum	Sweet Pittosporum
Pultenaea euchila	Large-flower Bush-pea
Tetratheca juncea	Black-eyed Susan

Grasses / Groundcovers

Entolasia stricta	Wiry Panic
Imperata cylindrica	Blady grass
Lomandra obliqua	Twisted Matrush
Pteridium esculentum	Bracken Fern
Themeda australis	Kangaroo Grass
Xanthorrhoea latifolia	Grass Tree

Trees

Angophora costata 'Smooth Barked Apple' | Corymbia gummifera 'Red Bloodwood' | Allocasuarina torulosa 'Forest She-Oak' | Syncarpia glomulifera 'Turpentine' | Eucalyptus punctata 'Grey Gum'

Shurbs

Persoonia linearis 'Narrow-leaved Geebung' | Banksia spinulosa 'Hairpin Banksia' | Acacia ulicifolia 'Prickly Moses' | Leptospermum trinervium 'Slender Tea-tree' | Pittosporum undulatum 'Sweet Pittosporum' | Pultenaea euchila

Grasses / Ground Covers

Themeda australis 'Kangaroo grass' | Imperata cylindrica 'Blady Grass' | Lomandra oblique | Entolasia stricta 'Wiry Panic' | Pteridium esculentum 'Bracken Fern'

Smooth-barked Apple - Sydney Peppermint - Turpentine Forest

Trees

Allocasuarina torulosa	Forest Oak
Angophora costata	Smooth-Barked Apple
Eucalyptus globoidea	White Stringybark
Eucalyptus piperita	Sydney Peppermint
Syncarpia glomulifera	Turpentine

Shrubs

Acacia myrtifolia	Red-Stemmed Wattle
Banksia spinulosa	Hairpin Banksia
Breynia oblongifolia	Coffee Bush
Daviesia ulicifolia	Gorse Bitter Pea
Dodonaea triquetra	Large-Leaf Hop Bush
Leptospermum polygalifolium	Lemon Scented Tea Tree
Leucopogon lanceolatus	Lance-leaved beared heath
Zieria smithii subsp smithii	

Grasses / Groundcovers

Dianella caerulea var. producta	Blue Flax Lily
Dichondra repens	Kidney Weed
Entolasia stricta	Wiry Panic
Imperata cylindrica	Blady Grass
Microlaena stipoides	Weeping Grass
Pratia purpurascens	Whiteroot
Viola hederacea	Ivy-leaved Violet
Xanthorrhoea latitolia	

Trees

Angophora costata 'Smooth Barked Apple' | Syncarpia glomulifera 'Turpentine' | Eucalyptus piperita 'Sydney Peppermint' | Allocasuarina torulosa 'Forest She-Oak' | Eucalyptus globoidea 'White Stringybark'

Shurbs

Dodonea triquetra 'Hopbush' | Daviesia ulicifolia 'Gorse Bitter Pea' | Breynia oblongifolia 'Dwarfs apple' | Banksia spinulosa 'Hairpin Banksia' | Leptospermum polygalifolium 'Lemon Scented Tea Tree'

Grasses / Ground Covers

Microlaena stipoides 'Weeping Grass' | Dianella caerulea 'Blue Flax Lily' | Imperata cylindrica 'Blady Grass' | Xanthorrhoea latifolia | Entolasia stricta 'Wiry Panic'

Spotted Gum - Broad-leaved Ironbark grassy open forest

Trees

Angophora costata	Smooth-Barked Apple
Corymbia maculata	Spotted Gum
Eucalyptus fibrosa	Broad-leaved Ironbark
Eucalyptus punctata	Grey Gum
Eucalyptus umbra	White Mahogany
Syncarpia glomulifera	Turpentine

Shrubs

Acacia falcata	Sickle Wattle
Acacia ulicifolia	Prickly Moses
Breynia oblongifolia	*Coffee Bush*
Bursaria spinosa	Blackthorn
Daviesa ulicifolia	Gorse Bitter Pea
Dodonaea triquetra	Large-Leaf Hop Bush
Pultenaea villosa	Hairy Pea Bush

Grasses / Groundcovers

Dianella revoluta	Spreading Flax Lily
Entolasia stricta	*Wiry Panic*
Hardenbergia violacea	False Sarsaparilla
Imperata cylindrica	Blady Grass
Lepidosperma laterale	Variable Sword Sedge
Lomandra muftiflora	Many Flowered Mat-Rush
Macrozamia reducta	
Pandorea pandorana	Wonga Wonga Vine
Pratia purpurascens	Whiteroot

Trees

Corymbia maculata 'Spotted Gum' | Eucalyptus fibrosa 'Broad-leaved Ironbark' | Angophora costata 'Smooth Barked Apple' | Eucalyptus punctata 'Grey Gum'

Shurbs

Bursaria spinosa 'Blackthorn' | Acacia falcata 'Hickory Wattle' | Dodonea triquetra 'Hopbush' | Pultenaea villosa 'Hairy Pea Bush' | Breynia oblongifolia 'Dwarfs apple' | Daviesia ulicifolia 'Gorse Bitter Pea'

Grasses / Ground Covers

Imperata cylindrica 'Blady Grass' | Lomandra multiflora 'Many Flowered Mat- Rush' | Dianella revoluta 'Spreading Flax Lily' | Macrozamia reducta

Spotted Gum - Grey Ironbark open forest

Trees

Allocasuarina torulosa	Forest Oak
Angophora costata	Smooth-Barked Apple
Corymbia maculata	Spotted Gum
Eucalyptus acmenoides	White Mahoganny
Eucalyptus fergusonii subsp. dorsiventralis	
Eucalyptus paniculata	Grey Ironbark
Eucalyptus punctata	Grey Gum
Eucalyptus umbra	White Mahogany

Shrubs

Acacia ulicifolia	Prickly Moses
Banksia spinulosa	Hairpin Banksia
Breynia oblongifolia	*Coffee Bush*
Daviesa ulicifolia	Gorse Bitter Pea
Dodonaea triquetra	Large-Leaf Hop Bush
Epacris pulchella	*NSW Coral Heath*
Pultenaea villosa	Hairy Pea Bush

Grasses / Groundcovers

Billardiera scandens	*Apple-berry*
Entolasia stricta	*Wiry Panic*
Imperata cylindrica	Blady Grass
Lepidosperma laterale	Variable Sword Sedge
Lomandra longifolia	Spiny-Headed Mat-Rush
Lomandra muftiflora subsp. multiflora	Many Flowered Mat-Rush
Macrozamia communis	Burrawang
Microlaena stipoides	*Weeping Rice Grass*

Trees

Corymbia maculata 'Spotted Gum' | Eucalyptus paniculata 'Grey Ironbark' | Eucalyptus acmenoides 'White Mahoganny' | Angophora costata 'Smooth Barked Apple' | Eucalyptus umbra 'White Mahogany' | Eucalyptus punctata 'Grey Gum'

Shurbs

Daviesia ulicifolia 'Gorse Bitter Pea' | Dodonea triquetra 'Hopbush' | Breynia oblongifolia 'Dwarfs apple' | Banksia spinulosa 'Hairpin Banksia' | Epacris pulchella 'NSW Coral Health' | Macrozamia communis 'Burrawang'

Grasses / Ground Covers

Microlaena stipoides 'Weeping Grass' | Lomandra longifolia 'Spiny- headed Mat-rush' | Imperata cylindrica 'Blady Grass' | Entolasia stricta 'Wiry Panic'

WATER SENSITIVE URBAN DESIGN (WSUD) STRATEGY

The site is predominantly bushland, in natural setting with many traversing creek/drainage lines. Water sensitive design approaches are ideally suited to this project, and the more infiltration areas and slowing down of rainfall that can be applied, the fewer temporary sediment basins, or permanent water quality control measures that would be required.

Whilst the engineering plans currently show many concrete drains, some of these may be able to be changed to rock mulched or vegetated swales in the detail design stage, subject to investigation of grades and access requirements. Also in detailed design, the relationship of the shape of the proposed operational water quality structures (as per Technical Paper 7, Water Quality and Watercourse Assessment, 2016) would be further refined.

An opportunity exists for a potential permanent wetland/water quality pond in the middle of the loop associated with the northbound on-ramp at the Hospital Interchange. Such an approach would provide a sustainable water opportunity. In addition it provides a pleasant visual accent/marker (refer figure 5.35). This would be investigated further during detailed design.

Soft engineered approach

Other integrated approaches to drainage, hydrology and landscape would be further coordinated through the detail design process and applied where practicable. The demonstration of practical, sustainable water sensitive design measures will maximise on-site infiltration, reduce piping and kerbs and minimise water table/natural drainage impacts to existing vegetation.

Consideration of the following key WSUD elements would be integrated through the design plans in the next stage, following review by the team:

- vegetated swales (especially in lieu of concrete drains)
- rock mulched swales
- infiltration areas
- wetland filters to fauna underpass areas

Refer to figures 5.35 to 5.38. During detail design further opportunities for water sensitive design would be investigated. Typical integrated landscape approaches to WSUD, along with key elements within the design, are illustrated in the following images.

Figure 5.35 Potential wetland / water quality pond as a feature of the Hospital Interchange.

Figure 5.36 Rock mulched swales could be used where velocities are higher, and would be planted with wetland filter plants, similarly to the vegetated swales.

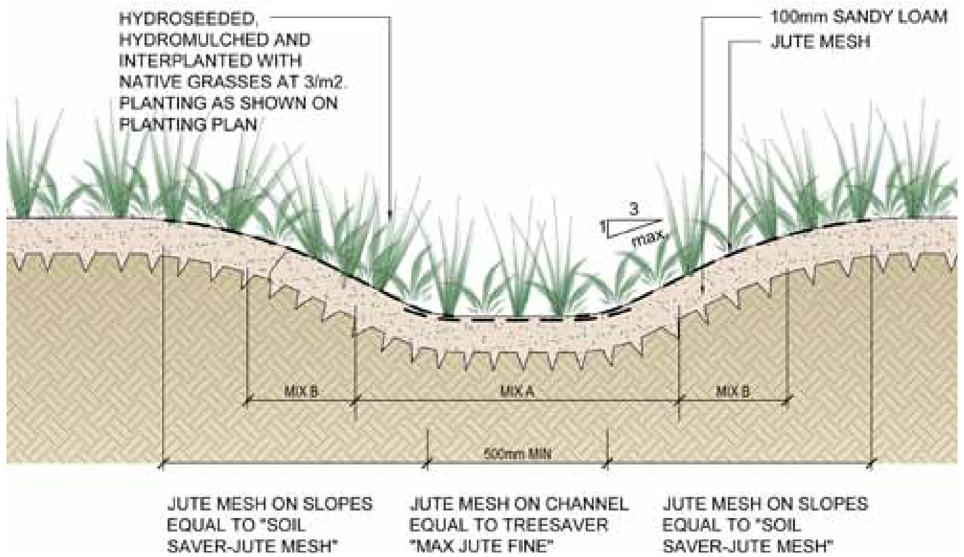


Figure 5.37 Typical detail for vegetated swale- some would be turfed with a native turf, others seeded and inter planted.

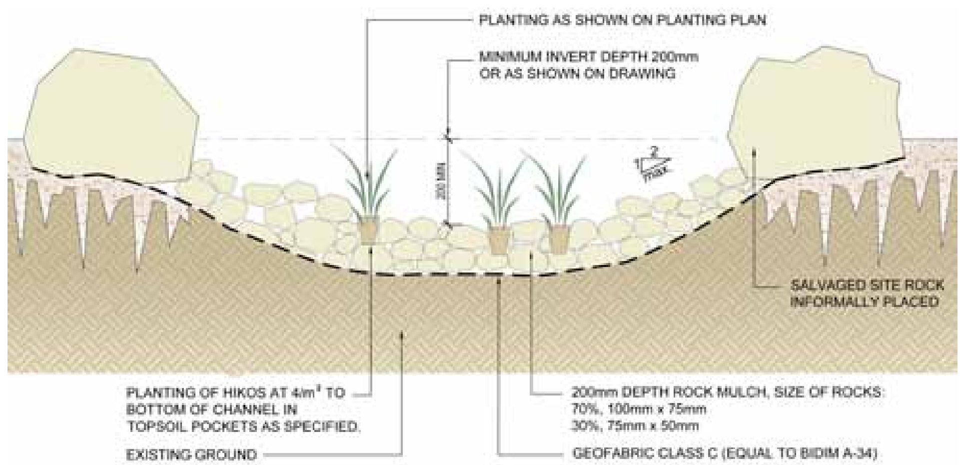


Figure 5.38 Typical detail for rock mulched swale.

6.0 LANDSCAPE CHARACTER ASSESSMENT

Based on the concept design, the following impact has been assessed. The landscape character impact is based on the aggregate of an area's built, natural and cultural character and sense of place. In this regard, it is measured by the combination of the area's sensitivity and the magnitude (scale, character and distance).

Table 6.1 below illustrates how the level of sensitivity and magnitude are combined to achieve an overall level of impact for both the landscape character impact and the visual impact. It should be noted that the ratings are measured relative to each other rather then assigned through an absolute scale. Hence the resulting landscape character impact rating is project specific and identifies those areas with the highest and lowest impacts.

The sensitivity of each landscape character zone has been assessed in Section 03 - Landscape Character Analysis and has been included in the assessment table 6.2 and 6.3 overleaf.

Sensitivity \ Magnitude	high	moderate	low	negligible
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

Table 6.1 Landscape Visual Impacts Rating Table - RMS EIA Guidance Note EIA-N04.

Figure 6.1 *Indicative 3D model of the project.*

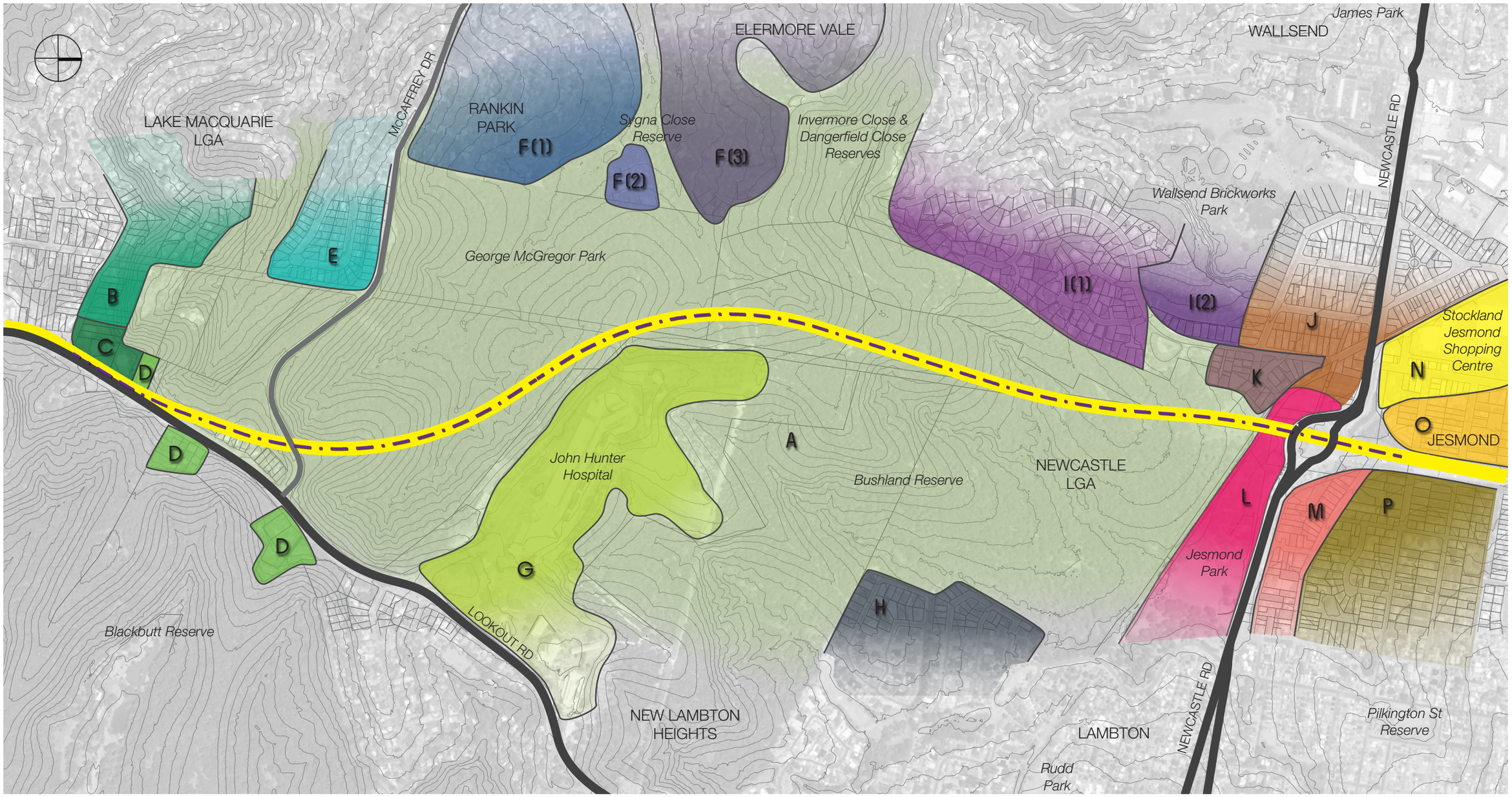


Figure 6.2 Map illustrating the identified landscape character zones.

LANDSCAPE CHARACTER ZONE	SENSITIVITY LEVEL	MAGNITUDE OF IMPACT	LANDSCAPE CHARACTER IMPACT
ZONE A - BUSHLAND	High: sensitive environs with a high visual and environmental quality that provides recreational space for the local community.	Moderate: whilst most areas of the bushland setting would not be disturbed, noise would impact upon the sense of place, and permeability for fauna would be compromised where fill and cut batters are proposed. The recreational value (ie informal trail network) would also be compromised in these areas The presence of a major arterial road through this area would affect its sense of 'quiet' place in some areas.	Moderate to high: the proposed roadway would fragment the bushland setting, compromising its significance and quality. Some connectivity would be retained through the introduction of fauna underpasses and bridges. During detailed design, Roads & Maritime will Investigate the facilitation of an additional pedestrian access point across the road corridor in order to provide improved connectivity.
ZONE B - GRANDVIEW ROAD RESIDENTIAL / HIGH RIDGE	High: established residential area with panoramic views.	Low: the project would impact on the panoramic views with the proposed roadway partially visible within the bushland setting. This would contribute in creating a stronger presence of the urban environs, impacting the character and sense of place for these residences. The distance of the proposed project limits the magnitude of impact.	Moderate: the panoramic vistas contribute to the overall sense of place and identity of these properties. Although these impacts are of a visual nature, the vistas contribute to the perceived value and identity of these properties.
ZONE C - WATER RESERVOIRS	Low: infrastructure elements within a high quality setting.	Negligible: this area would predominantly remain the same.	Negligible: no noteworthy impact identified as a result of the project.
ZONE D - LOOKOUT ROAD RESIDENTIAL CLUSTERS	High: established residential land use.	Low: although these residences interface with the project works, the magnitude of impact is considered low. For the larger parcels on the east side of Lookout Road, the project would contribute in reducing traffic along Lookout Road, which would benefit some of these residences. Also, for these eastern parcels, the demolition of residences across the road would contribute to a stronger sense of isolation for some residences. For the residences adjacent Zone C , while the project would impact foreground views for some of the residences, these residences are highly exposed to the existing roadway and associated traffic noise. This would contribute in creating a stronger presence of the urban environs, impacting the character and sense of place for these residences.	Moderate: for a number of residences, there is a limited interface with the road. The project would likely provide some traffic and noise related benefit for some residences. For the residences adjacent Zone C, closer to the intersection with Newcastle Inner City Bypass, there would be a stronger sense of built form elements and urban setting. Whilst vegetation clearing and earthworks to the north impacts the landscape character, it is envisaged that in the long term the proposed plantings would ameliorate this impact.
ZONE E - KINGSWAY AVENUE HOUSING / MCCAFFREY DRIVE SOUTH	High: established residential land use within a self-enclosed setting.	Negligible: the project would have no effect on the character of this area. Vistas for the properties along the ridgeline may be slightly affected, yet these impacts are considered of a minor nature.	Negligible: no noteworthy impact identified as a result of the project.
ZONE F1 - CAMBRIDGE DRIVE RESIDENTIAL ZONE F2 - SYGNA CLOSE RESIDENTIAL ZONE F3 - ELERMORE VALE RESIDENTIAL	High: established residential land use.	Negligible: the project would not impact this zone. The bushland setting in this area would not be affected, hence no views towards the project would be achievable.	Negligible: no impact identified as a result of the project.
ZONE G - HOSPITAL PRECINCT	Moderate: the position of the complex, enjoying panoramic views from numerous vantage points contributes to the sense of place and quality of the setting.	Low: the sense of place and identity of the complex would not change. Panoramic vistas would be impacted, yet the general nature of these vistas and context would be retained.	Low to moderate: The accessibility to the complex would be improved, enhancing its operations. The overall character of the complex would be retained, although the new entrance from the bypass would partially 'refocus' its access and arrival sequence.
ZONE H - LAMBTON RESIDENTIAL	High: self-enclosed residential land use.	Negligible: the project would not impact this zone. The bushland setting in this area would not be affected, due to the distance of the project and retained bushland between the project and residual development.	Negligible: no impact identified as a result of the project.
ZONE I (1) BIRCHGROVE DRIVE HIGH GROUND RESIDENTIAL ZONE I- 2) BIRCHGROVE DRIVE LOW GROUND RESIDENTIAL	High: established residential area with panoramic views.	Negligible: the project would not impact this zone. The bushland setting in this area would not be affected, with a bushland buffer retained between the bypass and residences.	Negligible: no impact identified as a result of the project. It should be noted, that the recreational value of the adjacent bushland may be slightly compromised (refer Zone A). This would have a minor impact to the quality of living within this zone.

Table 6.2 Landscape Character Assessment table 1

LANDSCAPE CHARACTER ZONE	SENSITIVITY LEVEL	MAGNITUDE OF IMPACT	LANDSCAPE CHARACTER IMPACT
ZONE J - VICTORY PARADE - MORDUE PARADE RESIDENTIAL	High: established residential land use.	Low: the project would have a minor presence on this character zone, reinforcing the urbanity of the general area and diminishing the bushland character.	Moderate: a stronger sense of built form elements and urban setting. The overall character of this zone would not greatly change.
ZONE K - SMALL SCALE RESIDENTIAL	High: established residential land use.	High: the project would have a strong presence to this zone influencing its character and identity. The rather semi-rural character would be compromised with built form elements reinforcing the urbanity of the area.	High: this zone would be adjacent to a major roadway, changing its urban context compared to the existing situation. The recreational value of the adjacent bushland would be compromised and this would have a minor impact to the quality of living within this zone.
ZONE L - JESMOND PARK (note for purposes of landscape character, the Jesmond Park zone also includes areas of existing road reserve)	High: important park/green space for the community.	Low: the functioning and overall character of the park would be retained. Whilst areas to the west and east, adjacent the interchange, (especially the proposed compound area) of the zone would be impacted, it is envisaged that in the long term the proposed plantings would ameliorate this impact. Hence in the long term it is expected to be low. The introduction of a new pedestrian overpass would provide a safer crossing, thereby improving the connectivity to the park.	Moderate, even though the park is already situated adjacent to a major road. Whilst the proposed changes, especially to the areas adjacent the interchange would impact upon park users in the short term, in the long term, the use of the park space and the character of the place would generally remain the same. The introduction of a pedestrian overpass in the vicinity of Steel Street would introduce another built form element, yet the improved connectivity would contribute to the urban permeability and its position adjacent to Newcastle Road limits this impact.
ZONE M - COLES STREET FRONTAGE RESIDENTIAL	Moderate: albeit the residential land use, this zone interfaces with a major road, making it less susceptible to change, due to the strongly urbanised character already present.	Moderate: albeit the residential land use, this zone interfaces with a major road, making it less susceptible to change due to the strongly urbanised character already present. The project would increase the perceived urbanity of the area with major infrastructure elements in the proximity. The loss of trees in the short term to areas in Jesmond park (used for construction compound) would adversely impact views from the residences to the park. The introduction of a new pedestrian bridge would also contribute to the urbanised character of the area, yet provide improve accessibility to Jesmond Park for these residences and contribute to the functioning of the area.	Moderate: the project would increase the perceived urbanity of the area with major infrastructure elements in the proximity. The outlook towards Jesmond Park would be greatly retained, except in the vicinity of Steel Street, where access ramps would impact some residences.
ZONE N - COMMERCIAL HUB	Moderate: due to its importance as a district centre.	Low: the project would improve the accessibility to the centre, contributing to its functioning. The character of the area would not be greatly changed.	Low to moderate: The overall character and functioning of the area would not greatly change. The project is considered to have a positive effect, albeit reinforcing the urbanity of the area.
ZONE O - RESIDENTIAL NORTH – LOW GROUND	High: established residential land use.	Low: the project would likely increase traffic along the existing section of the bypass. Some residences may be affected by noise, reducing the quality of their environs. However, this effect is considered overall minor.	Moderate: a stronger presence of the existing bypass would contribute to a stronger urban character for this area.
ZONE P - MIXED RESIDENTIAL NORTH - HIGH GROUND	High: established residential land use with some residences enjoying district vistas.	Low: the project would likely increase traffic along the existing section of the bypass. Some residences may be affected by noise, reducing the quality of their environs. District vistas for some residences would be impacted, yet these have a moderate importance to the overall sense and character of the properties impacted.	Moderate: a stronger presence of the existing bypass would contribute to a stronger urban character for this area.

Table 6.3 Landscape Character Assessment table 2

SUMMARY OF LANDSCAPE CHARACTER IMPACTS

The adjacent table 6.4, summarises the landscape character impact for each of the identified landscape character zones. Only one zone has been identified with a high landscape character impact, Zone K -Small scale residential.

The high impact is driven by both the diminishing semi-rural quality these properties currently enjoy, and the increased sense of urbanity through the introduction of built form elements impacting their outlook and sense of place. It will be important to introduce effective mitigation measures in the design such as vegetative screening to limit the presence of these built form elements.

A moderate to high impact has been identified for only one zone, Zone A - Bushland. In this case, it is the bushland setting through which the road corridor crosses. The alignment has been carefully chosen to limit the overall impact of the roadworks on the setting and the alignment has been situated further to the east, away from residences, and adjacent to the Hospital Precinct, to maximise consolidation of bushland.

All other character zones would experience a moderate or lower impact as a consequence of the project. The landscape character impacts tend to be more limited towards the south and west, where the undulating topography and distance to the project limits the magnitude of impact.

Character zones		Sensitivity	Magnitude	Impact
A	Bushland	High	Moderate	Moderate-high
B	Grandview Road residential / High ridge	High	Low	Moderate
C	Water Resevoirs	Low	Negligible	Negligible
D	Lookout Road residential clusters	High	Low	Moderate
E	Kingsway Avenue housing / High ridge	High	Negligible	Negligible
F1 F2 F3	Cambridge Drive Sygna Close Elermore Vale	High	Negligible	Negligible
G	Hospital Precinct	Moderate	Low	Low-moderate
H	Lambton residential	High	Negligible	Negligible
I	Birchgrove high ground Birchgrove low ground	High	Negligible	Negligible
J	Victory Parade - Mordue Parade residential	High	Low	Moderate
K	Small scale residential	High	High	High
L	Jesmond Park	High	Low	Moderate
M	Coles Street frontage residential	Moderate	Moderate	Moderate
N	Commercial hub	Moderate	Low	Low-moderate
O	Residential North - Low ground	High	Low	Moderate
P	Mixed residential North - High ground	High	Low	Moderate

Table 6.4 Landscape Character Assessment summary table

7.0 VISUAL IMPACT ASSESSMENT

VISUAL ENVELOPE

In order to assess the visual impact, a Visual Envelope Map of the project's visual catchment from the surrounding area has been prepared. The visual catchment is defined either by topographical features, built form elements or screening vegetation.

Due to the strongly undulating topography and the dense bushland setting, the visual exposure of the overall project is limited. The project would predominantly be exposed to some areas of the Hospital Precinct, as well as to areas at the northern end of the project, at the interface with Newcastle Road. Hence, the visual impact assessment has focussed on these areas, as most other areas would experience a negligible impact (refer figure 7.1).

Eighteen viewpoints have been assessed with photos showing the existing environment. For the five viewpoints with an assessed impact of moderate-high or high, an indicative photomontage with the project has been provided.

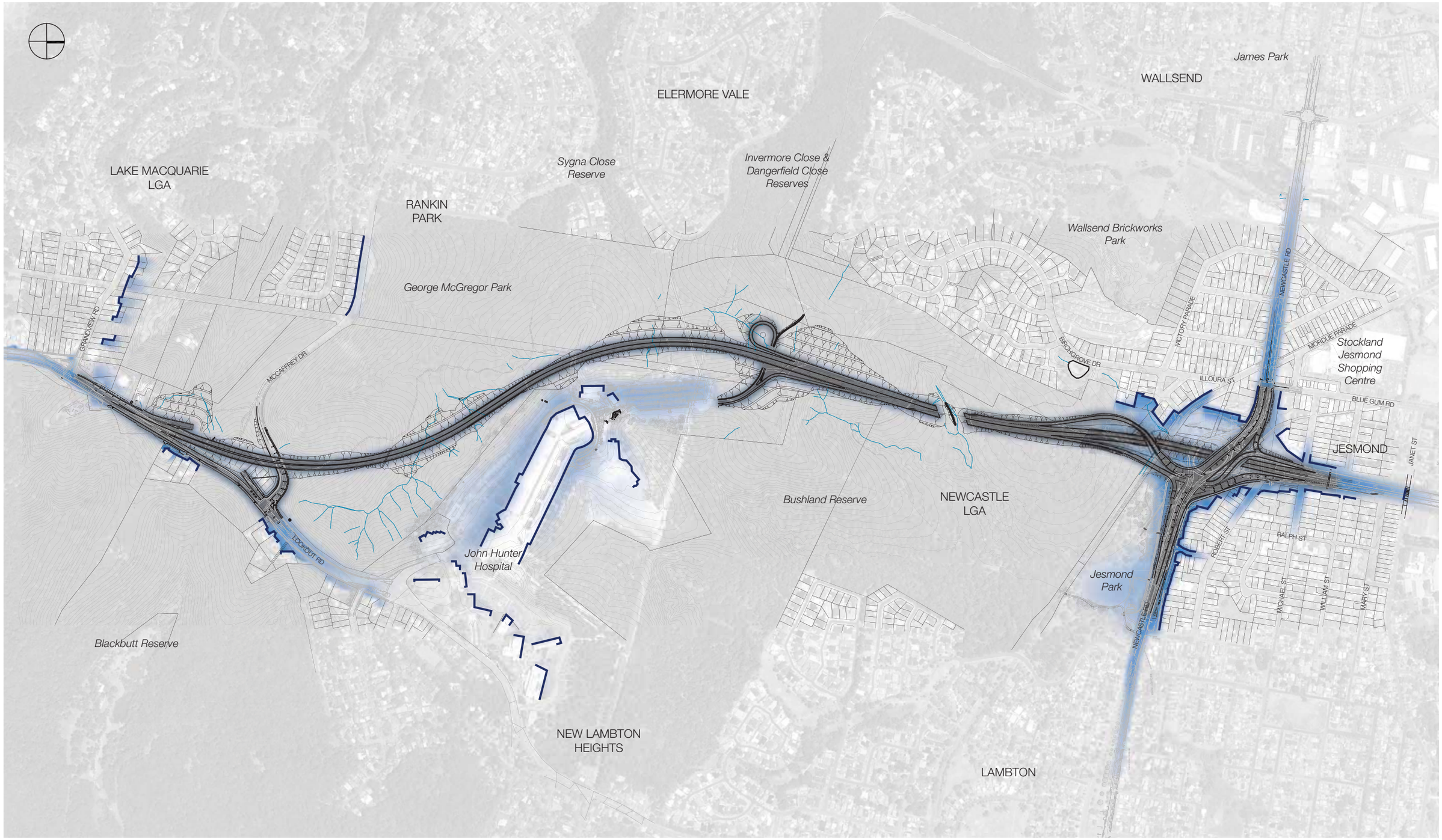


Figure 7.1 *Map illustrating the visual envelope of the project. Note the limited exposure of the project contributing to the overall limited visual impact of the project. The blue lines represent built forms that define the visual catchment.*

Figure 7.2 View from Grandview Road looking north towards the project and hospital.

VIEWPOINT 1	
Description of the setting	Residences overlooking the bushland setting within the suburb of New Lambton Heights.
Element visible of the project	Minor filtered views may be attainable at night time only due to street lighting.
Category of viewer	Residents.
Nature of impact	Adverse.
Visual sensitivity	High due to the viewers enjoying natural bushland/ panoramic views.
Magnitude of impact	Negligible during day time. Low at night time predominantly due to street lighting.
Overall rating of visual impact	Negligible during day time and moderate during night time.
Comment / mitigation measures	It should be noted that the night time visual glare is considered minor in the overall context of the view due to the urban backdrop, particularly considering the hospital setting.

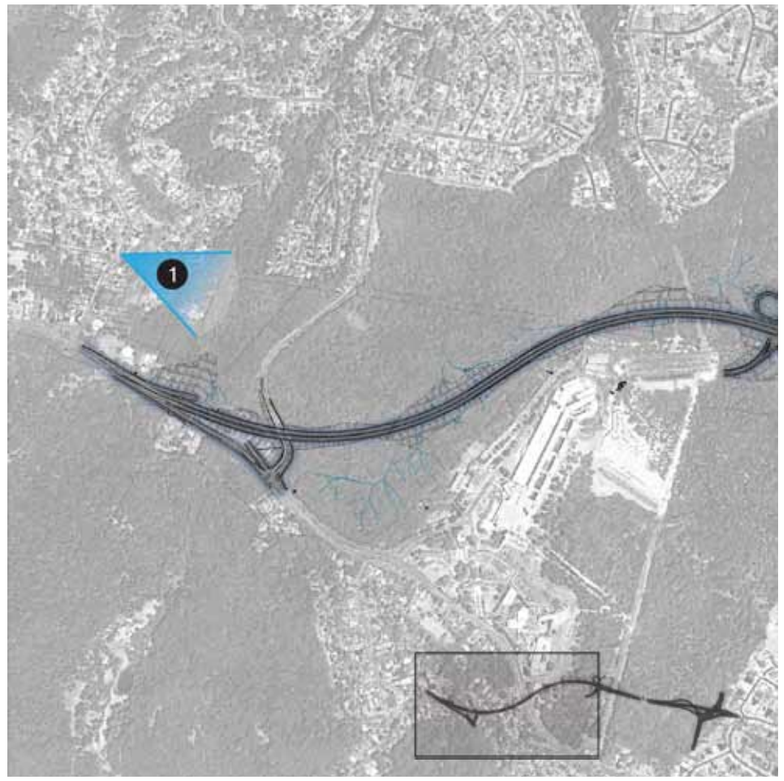


Figure 7.3 Viewpoint location.

Figure 7.4 View from Lookout Road looking west towards the project. (Source: Google Street View)

VIEWPOINT 2	
Description of the setting	Residences situated below Lookout Road, to the east.
Element visible of the project	New shared path impacts eastern verge, yet road's footprint would be reduced.
Category of viewer	Residents.
Nature of impact	Negligible
Visual sensitivity	Moderate due to the limited visual interface from residences towards the roadway.
Magnitude of impact	Negligible as there are currently open views looking up to road above the housing. New plantings on batters will provide a dense visual screen. The reduction in road width is considered an improvement.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	Mitigation plantings include densely planted shrubs that would provide effective vegetative screening on the western batter, as well as plantings on the small batter adjacent to the shared path on the eastern verge.

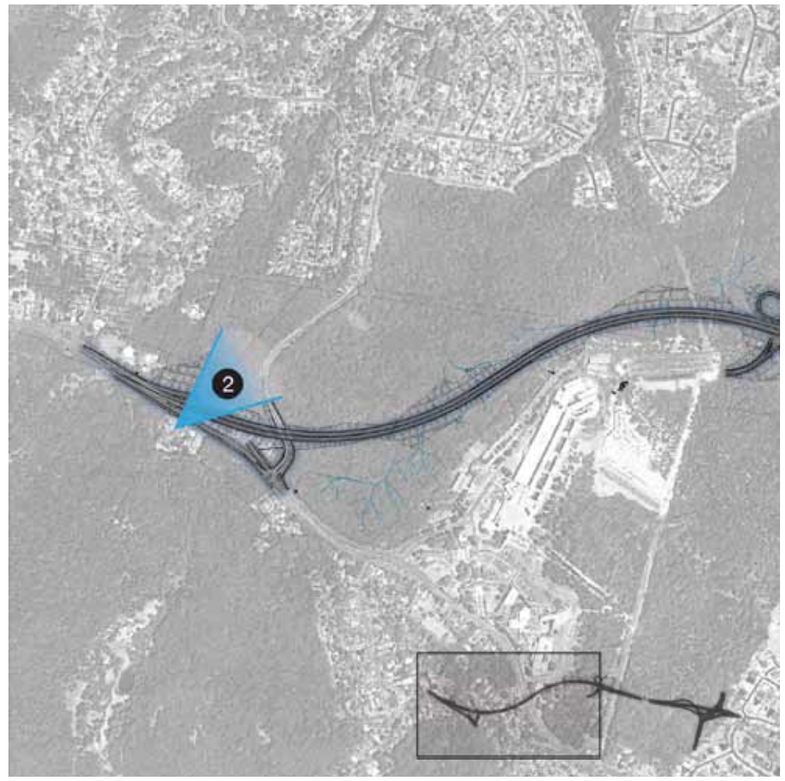


Figure 7.5 Viewpoint location.

Figure 7.6 View from McCaffrey Drive looking north towards the project and hospital.

VIEWPOINT 3	
Description of the setting	Residences overlooking the bushland setting within the suburb of Rankin Park.
Element visible of the project	Minor filtered views may be attainable at night time due to street lighting.
Category of viewer	Residents.
Nature of impact	Adverse.
Visual sensitivity	High due to the viewers nature enjoying panoramic views towards the bushland.
Magnitude of impact	Negligible.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	It should be noted that the night time visual glare is considered negligible in the overall context of the view due to the effective vegetative screening and existing glare of the hospital.

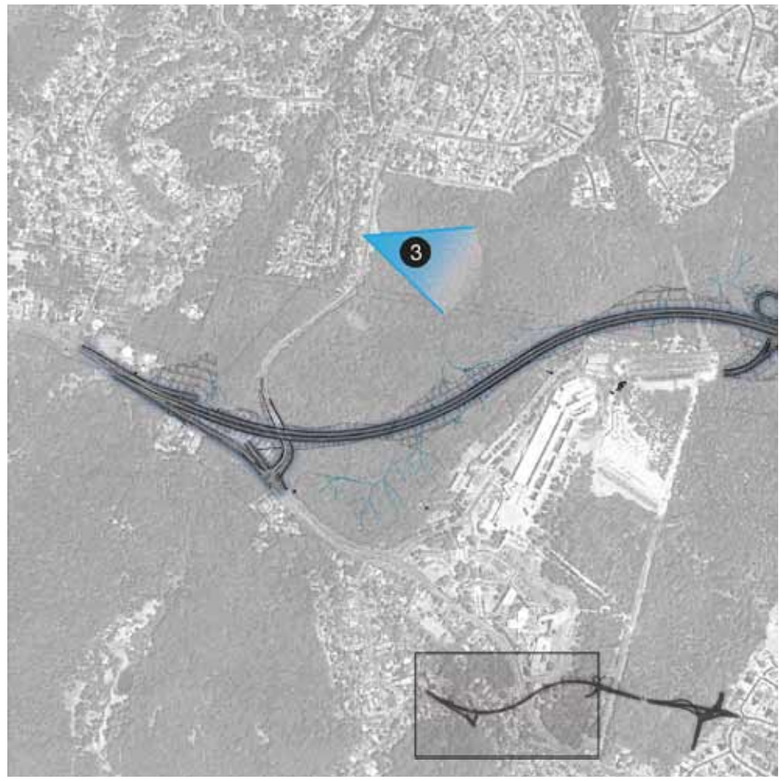


Figure 7.7 Viewpoint location.

Figure 7.8 View from the Royal Newcastle Centre within the Hospital Precinct looking south towards the project.

VIEWPOINT 4	
Description of the setting	Access roads and car park for the hospital overlooking the bushland setting.
Element visible of the project	Minor filtered views may be attainable, particularly from key locations such as the upper storeys of the complex.
Category of viewer	Hospital patients, staff and visitors.
Nature of impact	Adverse.
Visual sensitivity	Moderate. The site's location contributes to the identity of the complex, providing panoramic views from various vantage points.
Magnitude of impact	Negligible. Reinstated green buffer zones with bushland vegetation would provide effective visual screening.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	No mitigation measures identified.

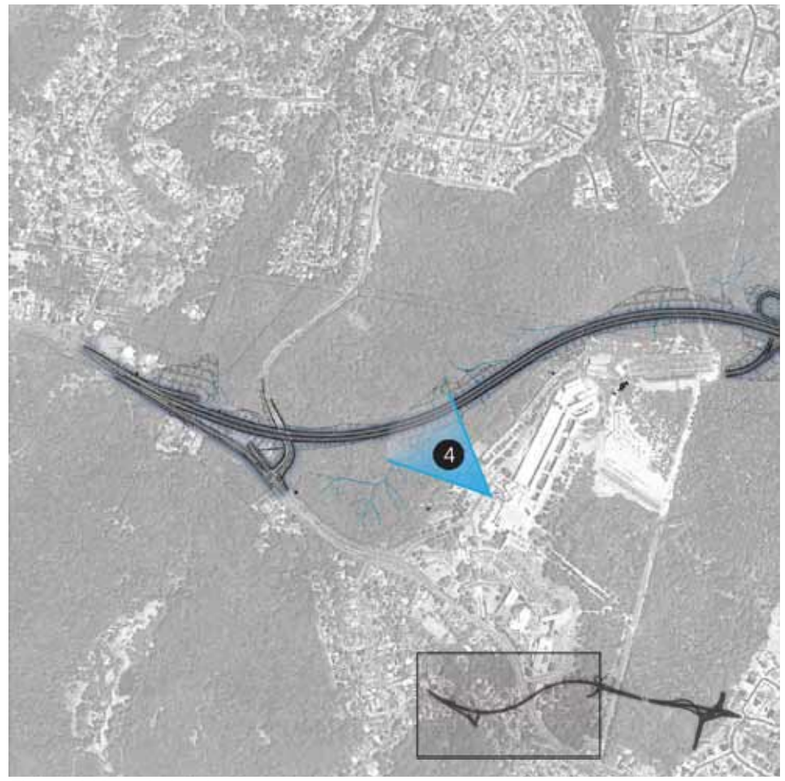


Figure 7.9 Viewpoint location.

Figure 7.10 View from Jacaranda Drive within the Hospital Precinct looking west towards the project.

VIEWPOINT 5	
Description of the setting	Patients, staff and visitors overlooking the bushland setting from the Hospital Precinct.
Element visible of the project	Minor filtered views may be attainable at night time due to street lighting.
Category of viewer	Patients, staff and visitors.
Nature of impact	Adverse.
Visual sensitivity	Moderate. The site's location contributes to the identity of the complex, providing panoramic views from various vantage points.
Magnitude of impact	Negligible during day time. Low at night time predominantly due to street lighting.
Overall rating of visual impact	Negligible during day time and low to moderate during night time.
Comment / mitigation measures	Visual glare at night time would contrast against the bushland setting, yet these views are filtered, thereby limiting the visual effect.

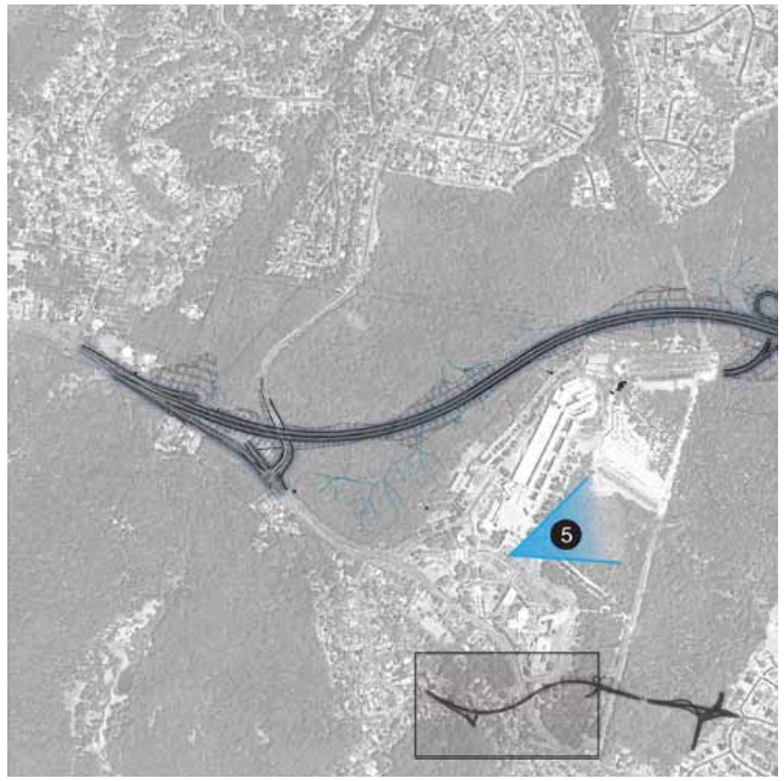


Figure 7.11 Viewpoint location.

Figure 7.12 View from Jesmond Park looking west towards the Northern Interchange intersection.

VIEWPOINT 6	
Description of the setting	High quality park with mature stands of trees and grassed understorey.
Element visible of the project	Limited filtered views towards the Jesmond interchange.
Category of viewer	Pedestrians.
Nature of impact	Adverse.
Visual sensitivity	Moderate due to high visual quality of the setting and recreational value, albeit its transient nature.
Magnitude of impact	Negligible. The project would be mostly screened by existing vegetation. Most of the park would be unaffected except the western end.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	Endemic tree and shrub planting would be proposed to provide effective screening to the interchange.

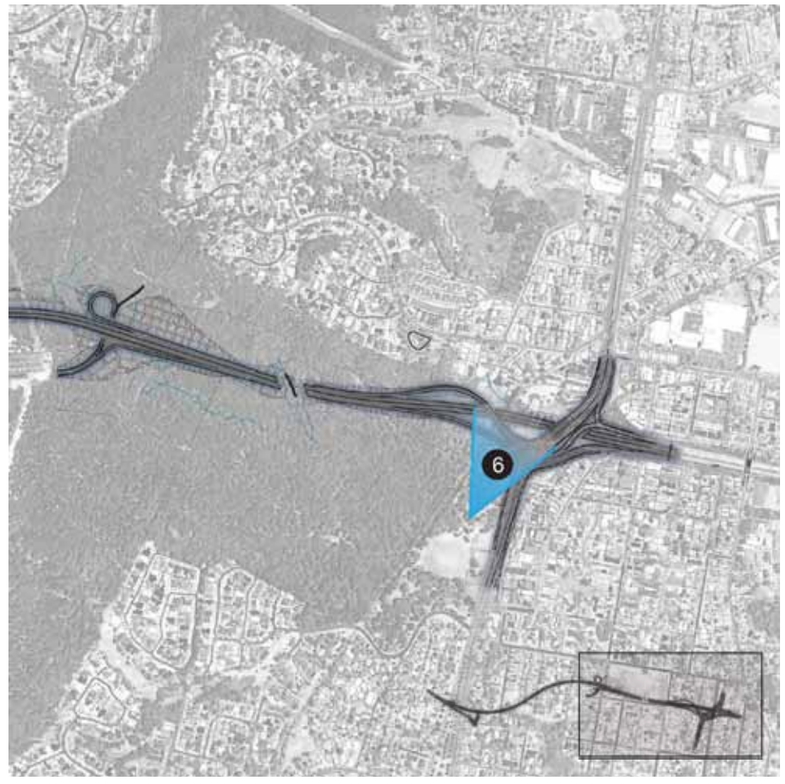


Figure 7.13 Viewpoint location.

Figure 7.14 View looking west along the existing shared use path looking towards the interchange.

Figure 7.15 Indicative photomontage of the same view looking towards the interchange.

VIEWPOINT 7	
Description of the setting	Western end of Jesmond Park showing stands of trees with grassed understorey.
Element visible of the project	The new interchange and overpass would be partially visible, screened by extensive vegetation. Southbound on-load ramp visible in the foreground.
Category of viewer	Pedestrians and cyclists.
Nature of impact	Adverse.
Visual sensitivity	Moderate driven by the recreational, yet transient nature of the viewer.
Magnitude of impact	High, the nature of the setting would strongly change. Some vegetative screening would limit the visual exposure of the overall interchange.
Overall rating of visual impact	Moderate to high. New roadways would dominate the setting. Prominent batters would become a new feature in the landscape.
Comment / mitigation measures	It should be noted that the visual impact would be higher until planting is established. User experience for pedestrians and cyclist would dramatically change as this traffic is diverted towards Newcastle Road and the park like setting would change.

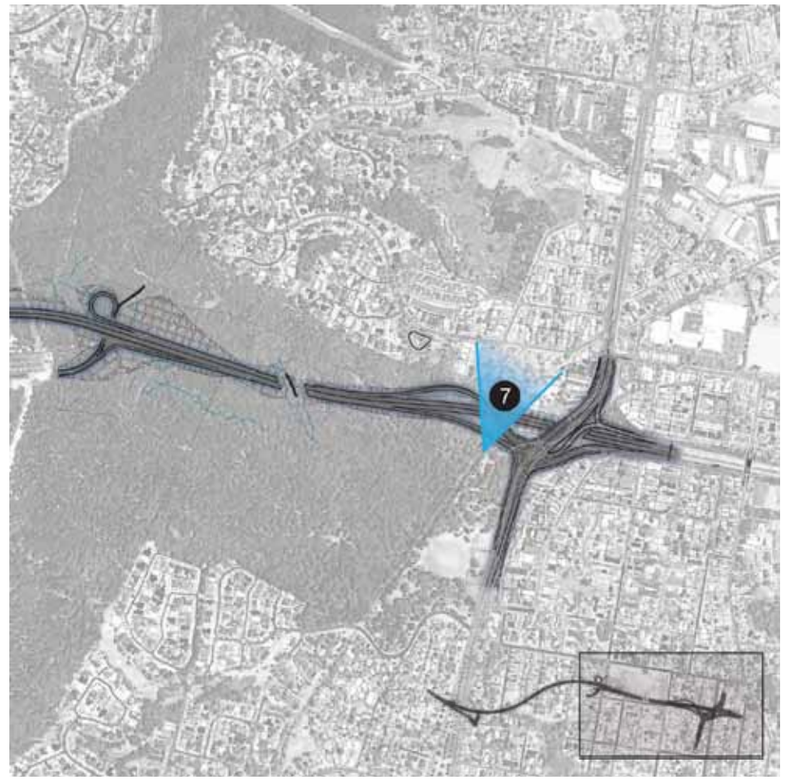


Figure 7.16 Viewpoint location.

Figure 7.17 View looking east from the end of Myall Street.

Figure 7.18 Indicative photomontage of the same viewpoint illustrating planting mitigation.

VIEWPOINT 8	
Description of the setting	Semi-rural character with residences overlooking bushland settings.
Element visible of the project	Northbound off-load ramp and noise wall. Noise wall of main carriageway partially visible behind ramp.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	High, due to the presence of the noise walls.
Overall rating of visual impact	High.
Comment / mitigation measures	The various built form elements would settle below the skyline, visually mitigating their prominence. Dense screen planting is proposed to provide visual mitigation to the new infrastructure forms in this area.

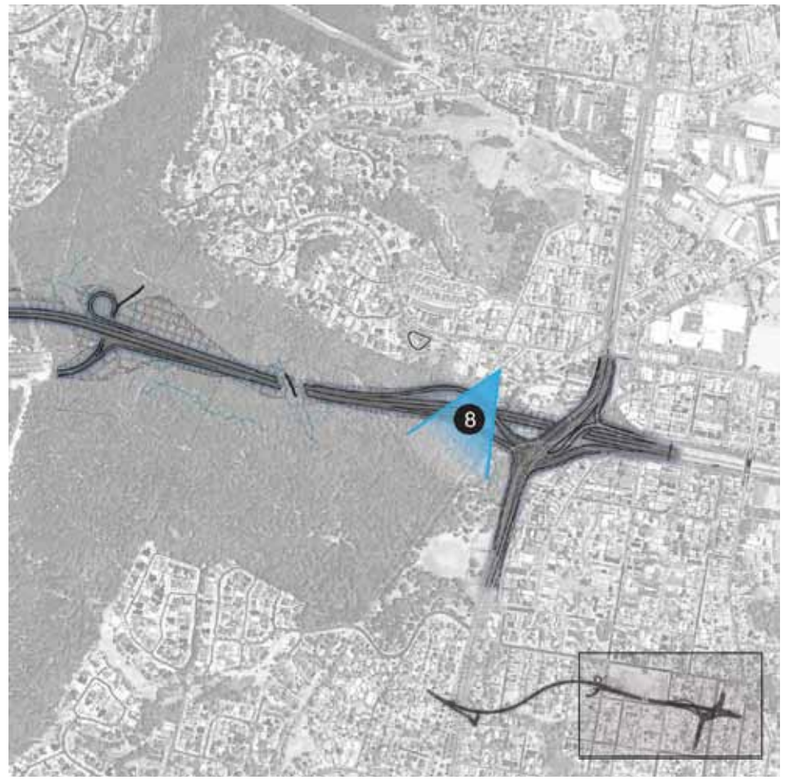


Figure 7.19 Viewpoint location.

Figure 7.20 View looking east from the intersection of Victory Parade and Illoura Street.

VIEWPOINT 9	
Description of the setting	Suburban setting with views to bushland in the distance.
Element visible of the project	Predominantly noise barrier elements.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	Low, The project would predominantly be screened by existing vegetation and built form elements.
Overall rating of visual impact	Moderate.
Comment / mitigation measures	The various built form elements would settle below the skyline, visually mitigating their prominence. Dense screen planting is proposed to visually screen these elements.

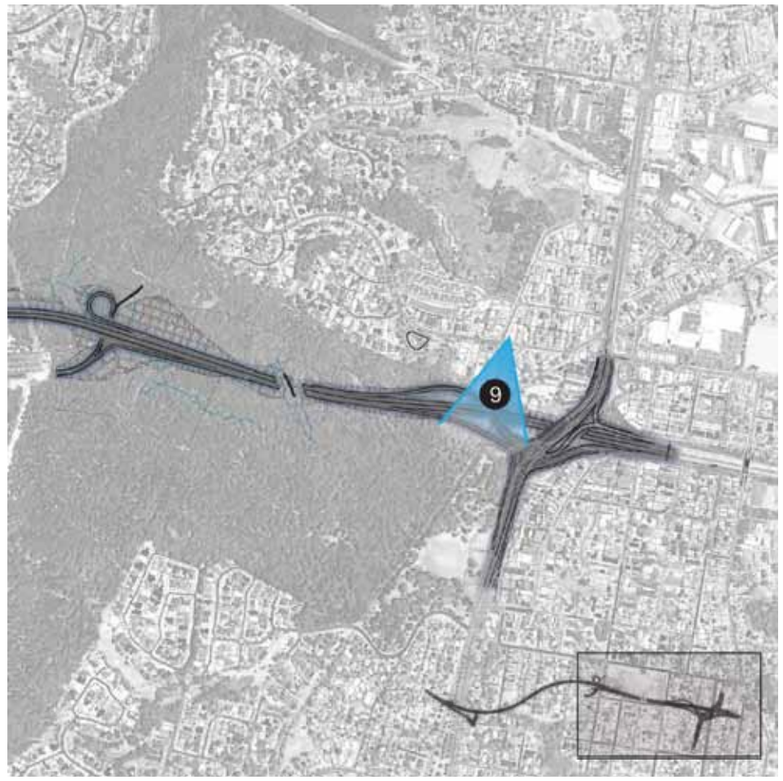


Figure 7.21 Viewpoint location.

Figure 7.22 View looking northeast from the shared path in the vicinity of Victory Parade.

VIEWPOINT 10	
Description of the setting	View looking towards the existing roundabout in the vicinity of Victory Parade.
Element visible of the project	The Northern Interchange would be partially visible, screened by extensive vegetation.
Category of viewer	Residences, pedestrians, cyclist and hotel guests.
Nature of impact	Adverse.
Visual sensitivity	High for residences; moderate for pedestrians, cyclist and hotel guests due to their transient nature.
Magnitude of impact	Low, extensive screening would limit the visual exposure of the project.
Overall rating of visual impact	Moderate for residences. Low to moderate for pedestrians, cyclist and Jesmond Executive Villas guests.
Comment / mitigation measures	It should be noted that the visual impact would be higher until planting is established. User experience for pedestrians and cyclists would dramatically change as this traffic is diverted towards Newcastle Road.

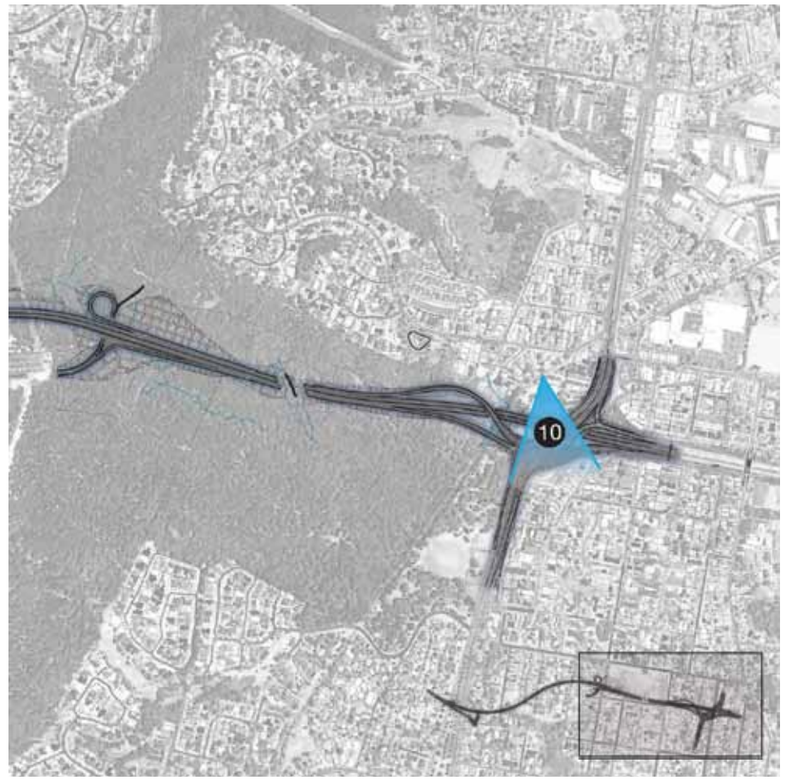


Figure 7.23 Viewpoint location.

Figure 7.24 View along Newcastle Road approaching the intersection with the bypass from the west.

VIEWPOINT 11	
Description of the setting	Major arterial road approaching a major intersection with parklands in the background.
Element visible of the project	Interchange, including overpass and ramps.
Category of viewer	Road users.
Nature of impact	Adverse.
Visual sensitivity	Low due to the transient nature of the viewer.
Magnitude of impact	High. Major infrastructure element visible, defining the interchange.
Overall rating of visual impact	Moderate.
Comment / mitigation measures	Integration of landscape measures to settle structural components within the setting.

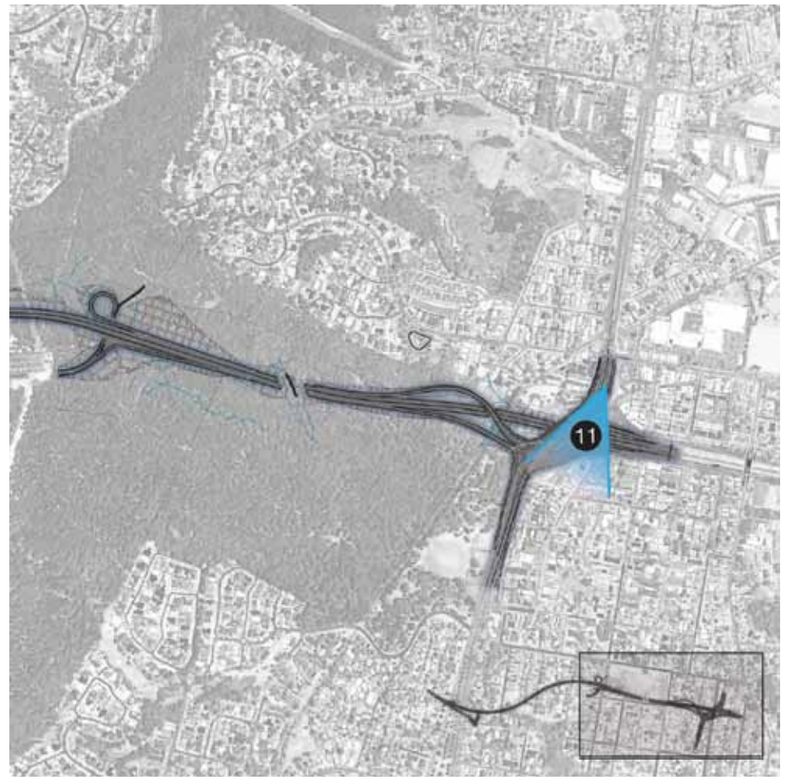


Figure 7.25 Viewpoint location.

Figure 7.26 View from the pedestrian overpass across the bypass at Jesmond looking south, north of Newcastle Road.

VIEWPOINT 12	
Description of the setting	Pedestrian overpass with minor district views.
Element visible of the project	Northern Interchange visible in the foreground with sections of the bypass visible south of Newcastle Road towards the ridgeline where the Hospital Interchange is located.
Category of viewer	Pedestrians.
Nature of impact	Adverse.
Visual sensitivity	Low due to the transient nature of the viewer in context to its setting.
Magnitude of impact	High. The project would become a dominant element. Loss of vegetation would diminish the green character of the setting.
Overall rating of visual impact	Moderate.
Comment / mitigation measures	The bushland setting in the background would be impacted reinforcing an urban character. Endemic tree and shrub planting within the interchange would be proposed to integrate the interchange within the setting.

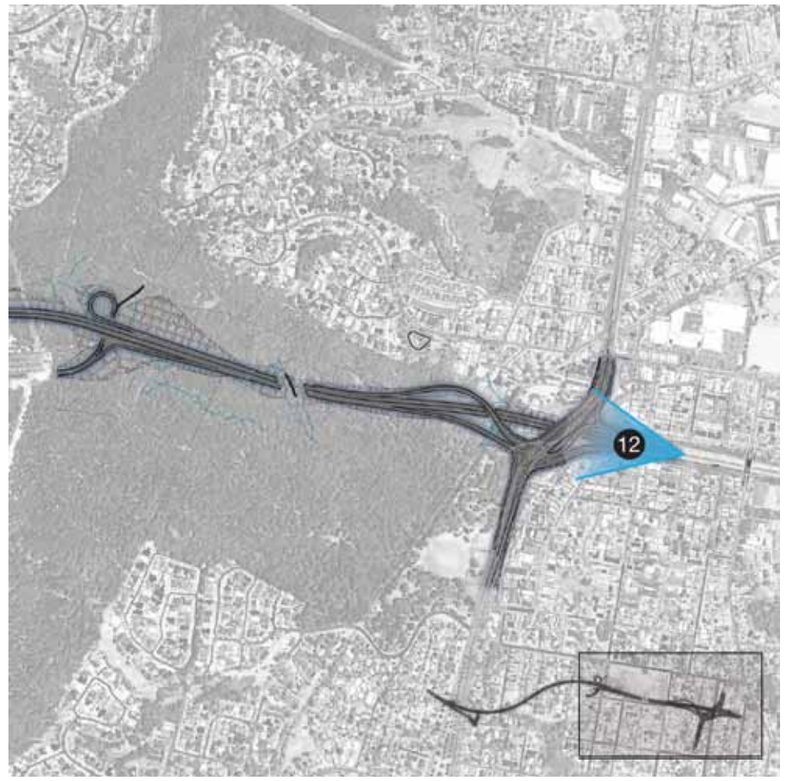


Figure 7.27 Viewpoint location.

Figure 7.28 View from the end of Michael Street, looking south along pedestrian path.

VIEWPOINT 13	
Description of the setting	Pedestrian path along the eastern verge of the Jesmond to Shortland section of the Newcastle Inner City Bypass, north of Newcastle Road.
Element visible of the project	Filtered views towards the Northern Interchange.
Category of viewer	Pedestrians / residents.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	Negligible. Existing screen planting would limit views towards the project.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	Minimal impact on the existing setting. Existing plantings provide for effective visual screening.

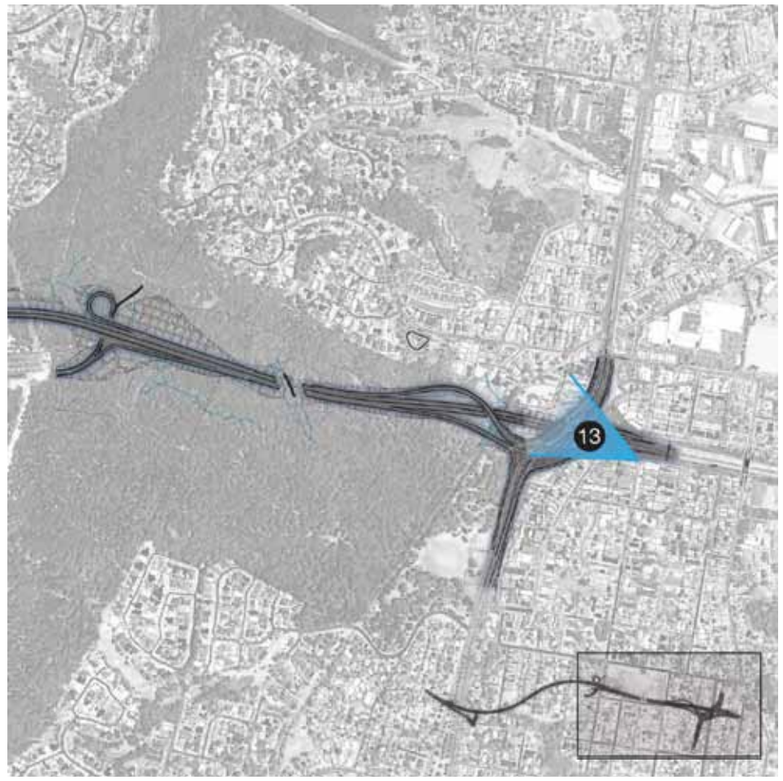


Figure 7.29 Viewpoint location.

Figure 7.30 View at the end of Robert Street looking south towards the Northern Interchange with Newcastle Road.

VIEWPOINT 14	
Description of the setting	Looking into open space verge with stands of trees with grassed understorey that provide a visual buffer to residences looking towards the bypass.
Element visible of the project	Approach to the new interchange with batters and retaining walls.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	Low. The project would be greatly screened by existing vegetation. Approaches to the overpass already exist, hence limiting the amount of change to the setting.
Overall rating of visual impact	Moderate.
Comment / mitigation measures	Additional screen planting incorporated into the project as a mitigation measure.

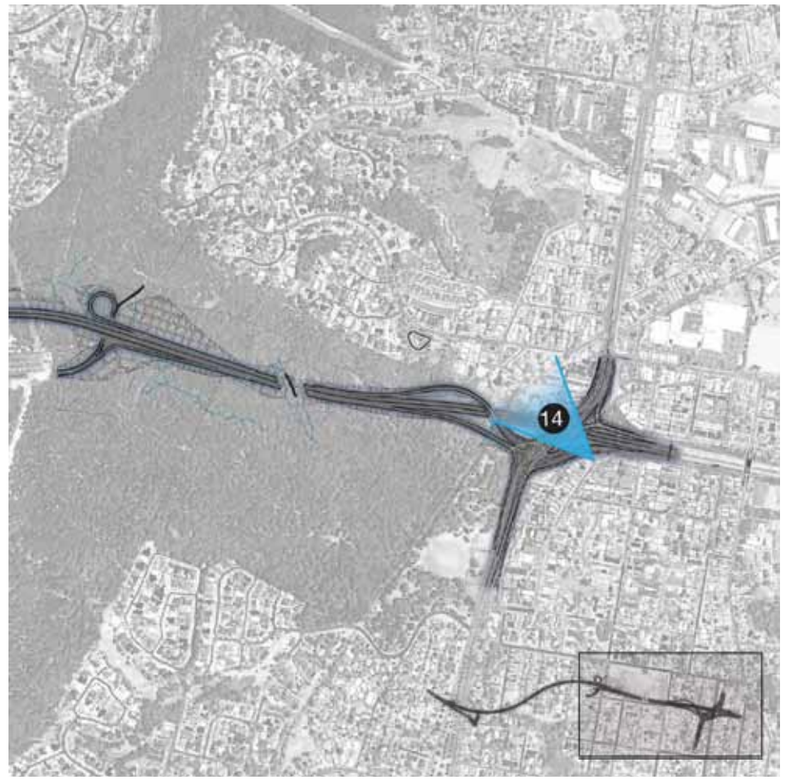


Figure 7.31 Viewpoint location.

Figure 7.32 View from Coles Street looking west towards the proposed Northern Interchange.

Figure 7.33 Indicative photomontage looking towards the Northern Interchange.

VIEWPOINT 15	
Description of the setting	Local residential street in Jesmond looking southwest towards Newcastle Road, Jesmond Park and the Northern Interchange in the mid-ground.
Element visible of the project	Northern Interchange in the mid-ground.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	Moderate. The new intersection would become more dominant and the overpass structure would be clearly visible in the mid-ground, yet the overall nature of a dominant busy road setting would not change.
Overall rating of visual impact	Moderate to high.
Comment / mitigation measures	It should be noted that the viewing angle is obtuse limiting the visual exposure. Streetscape planting would provide effective screening to numerous properties.

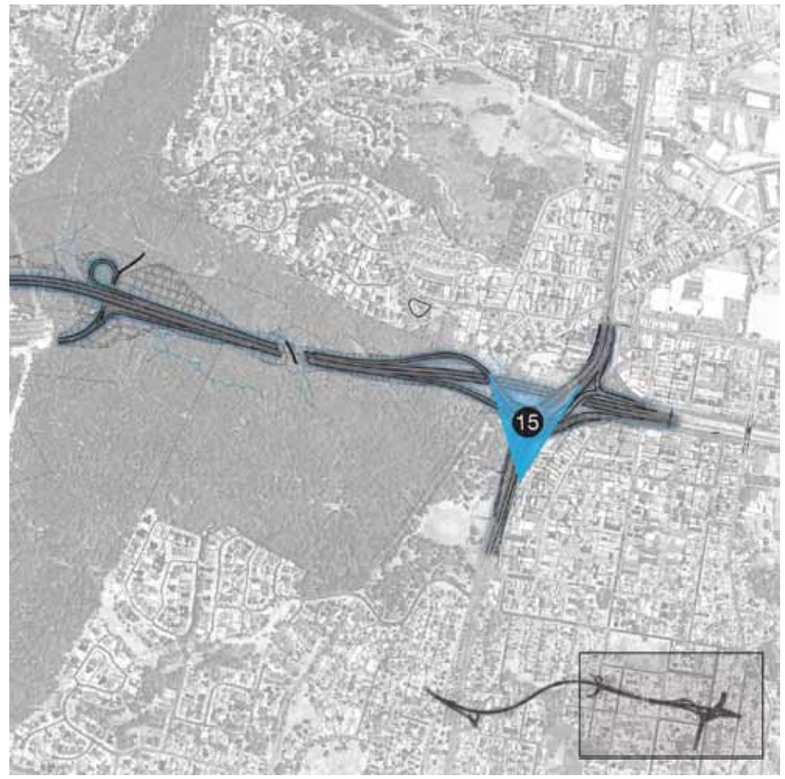


Figure 7.34 Viewpoint location.

Figure 7.35 View from Henry Street looking south towards the Hospital Precinct.

VIEWPOINT 16	
Description of the setting	Local residential street in Jesmond with district views towards the south.
Element visible of the project	Major cutting at the Hospital Interchange partially visible.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	Negligible. The project would slightly affect the skyline ridge.
Overall rating of visual impact	Negligible.
Comment / mitigation measures	It should be noted that the visual impact would be higher until planting is established. Night time glare from street lighting at the Hospital Interchange is considered minor, as other night time lighting would dominate the setting.

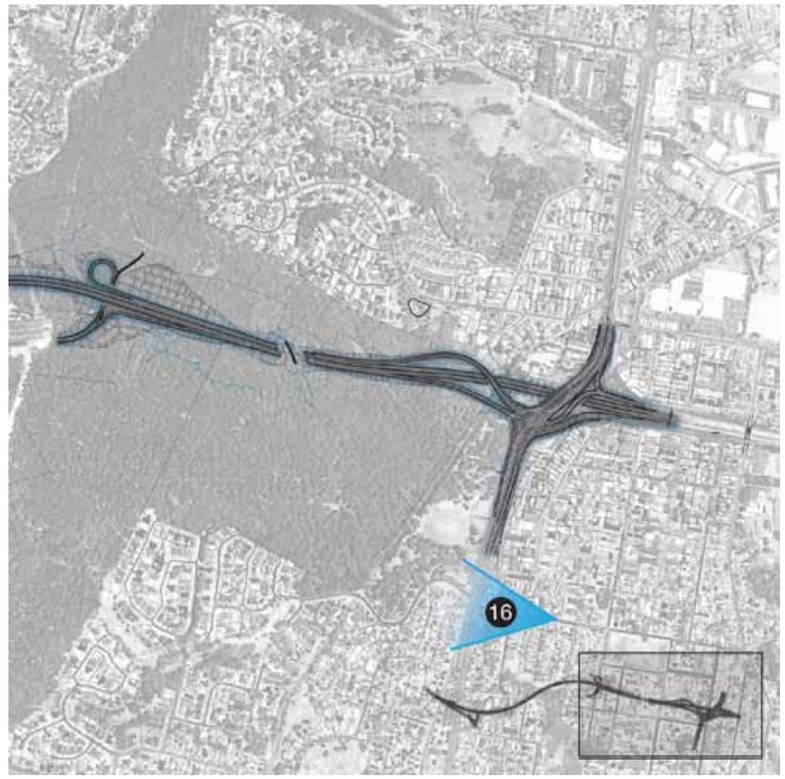


Figure 7.36 Viewpoint location.

Figure 7.37 View from Jesmond Park looking north towards Newcastle Road and the intersection with Steel Street.

Figure 7.38 Indicative photomontage looking towards the shared path bridge.

VIEWPOINT 17	
Description of the setting	High quality park with a number of amenities including sportsfield and picnic tables.
Element visible of the project	Shared path bridge over Newcastle Road and associated stairs and ramps in the mid-ground.
Category of viewer	Park visitors.
Nature of impact	Adverse.
Visual sensitivity	Moderate due to high visual quality of the setting and recreational value, albeit its transient nature.
Magnitude of impact	High. The shared path bridge over Newcastle Road would become a dominant element in the setting. It should be noted that the visual exposure to the overall park setting would be limited due to effective vegetative screening in most situations.
Overall rating of visual impact	Moderate to high.
Comment / mitigation measures	Landscape design strategies have been incorporated to settle the structure within its setting. These strategies would also provide some welcomed visual screening towards Newcastle Road.

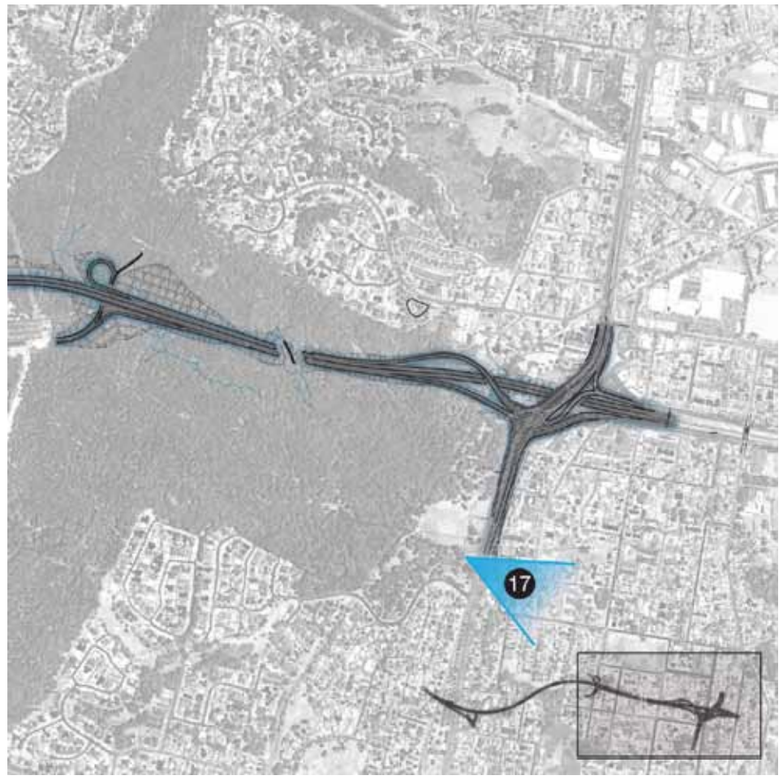


Figure 7.39 Viewpoint location.

Figure 7.40 View at the intersection of Coles Street and Steel Street looking west towards the Northern Interchange.

Figure 7.41 Indicative photomontage showing the northern abutment of the shared path bridge.

VIEWPOINT 18	
Description of the setting	Local residential street in Jesmond with district views towards Jesmond Park.
Element visible of the project	Shared path bridge over Newcastle Road, including associated access ramp in the foreground. Northern Interchange in the distance.
Category of viewer	Residences.
Nature of impact	Adverse.
Visual sensitivity	High due to the nature of the viewer.
Magnitude of impact	High. The shared path bridge, including ramps and stairs, would become a major feature at the intersection. Some district views would be impacted.
Overall rating of visual impact	High.
Comment / mitigation measures	Landscape design measures would add greenery and partially screen Newcastle Road. The improved connectivity would make the Jesmond Park more accessible.

Figure 7.42 Viewpoint location.

SUMMARY OF VISUAL IMPACTS

The adjacent table 7.1, summarises the visual impacts of the various assessed viewpoints that the project would likely have. Towards the south, the impacts are limited due to the effective visual screening effect of either the existing bushland, or proposed landscape design measures.

Towards the north, the visual impacts are higher due to the stronger visual interface of the project in its setting. Only two viewpoints have been identified with a high visual impact:

- Viewpoint 8, at the end of Myall Street, driven by the change in outlook whereby distant bushland views would be screened with new vegetation screening the project; and
- Viewpoint 18, at the intersection of Coles Street and Steel Street, where district views would be interrupted by the access ramps of the shared path bridge over Newcastle Road.

Viewpoint 15 would experience a likely moderate to high impact, yet the obtuse angle of viewing would limit the overall visual exposure in this case.

Viewpoint 17, albeit its moderate to high rating, is confined to a small section of the park and the overall functioning and amenity of its facilities would not be affected.

All other viewpoints in the northern area of the project would likely experience a moderate or negligible visual impact. Hence, albeit the scale and intervention of the project, the visual impacts appear to be of a limited nature.

In order to limit these impacts, it is important to undertake the identified landscape design measures which would provide effective visual screening and re-instate the original bushland character wherever possible.

viewpoint	sensitivity	magnitude	impact
1	High	Negligible/Low	Negligible/Moderate
2	Moderate	Negligible	Negligible
3	High	Negligible	Negligible
4	Moderate	Negligible	Negligible
5	Moderate	Negligible/Low	Negligible/Low to Moderate
6	Moderate	Negligible	Negligible
7	Moderate	High	Moderate-high
8	High	High	High
9	High	Low	Moderate
10	High	Low	Moderate
11	Low	High	Moderate
12	Low	High	Moderate
13	High	Negligible	Negligible
14	High	Low	Moderate
15	High	Moderate	Moderate-high
16	High	Negligible	Negligible
17	Moderate	High	Moderate-high
18	High	High	High

Table 7.1 Visual impact summary table

8.0 CONCLUSION

The project is situated in a unique bushland setting within an otherwise urban environment. The rugged topography and dense bushland greatly contributes in limiting visual and landscape character impacts to the surrounding areas. The refinement in the alignment from the 2007 strategic design has also contributed in minimising these impacts and consolidating the bushland setting.

Noise impacts within the bushland would vary greatly, with some areas being more exposed to noise, thereby changing the ‘quiet’ character of the area in key locations. Noise attenuation measures towards the northern end would contribute to mitigating such impacts, and the large extent of the bushland to the south would limit the overall impact (refer Technical Paper 3, Noise and Vibration Assessment, 2016).

At the southern end of the project, the visual impacts are considered to be limited and predominantly would occur at night time against an urban backdrop, thereby limiting the visual contrast of the project. Generally, the areas most impacted would occur in the vicinity of the Northern Interchange, where the project would have a greater visual exposure to the community. Yet, due to effective landscape design measures integrated into the design, these impacts are considered predominantly moderate.

The project provides open views for motorists towards the bushland, thereby reinforcing the sense of place and uniqueness of the site, and providing a quality journey experience. Overall, the project not only improves regional traffic, enhancing connectivity for the future vitality of Newcastle, but also enhances access to the hospital, thereby improving its functionality.

Figure 8.1 Indicative 3D image of the project looking south from the Northern Interchange.