Princes Highway Upgrade Program/ Jervis Bay Road Intersection Upgrade

Urban Design Report and Landscape Character and Visual Impact Assessment

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Prepared by
spackman mossop michaels

Prepared for:

Prepared by: spackman mossop michaels

On behalf of:

SPACKMAN MOSSOP MICHAELS
115 Flinders Street
Surry Hills New South Wales 2010 Australia
Telephone 61 2 9361 4549
Fax 61 2 9361 4569
Email info@sm2group.com.au
www.spackmanmossopmichaels.com

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List of Abbreviations

EIA-N04	Guideline for Landscape Character and Visual Impact Assessment, Environmental Impact Assessment Practice Note EIA-N04
LALC	Local Aboriginal Land Council
LCVIA	Landscape character and visual impact assessment
LCZ	Landscape Character Zone
LGA	Local government area
The proposal	Development of a grade separated interchange at Jervis Bay Road
REF	Review of Environmental Factors
Roads and Maritime	Former NSW Roads and Maritime Services (now Transport for NSW)
RTA	Former NSW Roads and Traffic Authority (now Transport for NSW)
SMM	Spackman Mossop Michaels
Transport	Transport for New South Wales
VEM	Visual envelope map


Falls Creek

1. Introduction

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1.1 Background

Transport for NSW proposes to upgrade the intersection of Jervis Bay Road and the Princes Highway in the vicinity of Falls Creek, NSW, located about 12 kilometres south of Nowra within the City of Shoalhaven local government area.

Jervis Bay Road provides the main east-west link to the coastal villages of Huskisson, Vincentia, Hyams Beach and Jervis Bay. The intersection of Princes Highway and Jervis Bay Road has some of the highest traffic volumes south of Nowra, and has been the location of multiple crashes and injuries. Therefore the proposal aims to provide a safer and more reliable intersection which is consistent with other planned upgrades of the Princes Highway further south.

The proposal forms part of the Princes Highway Upgrade Program and aligns with several strategic planning documents, such as *Future Transport 2056, NSW Road Safety Strategy 2021, Illawarra Shoalhaven Regional Plan*, and *Tourism and Transport Plan*.

Early development work completed by Transport for NSW informed the identification of three potential intersection treatments; a roundabout, traffic signals or grade separation. Arcadis was then commissioned by Transport for NSW to explore and assess a large number of different options for the intersection. Four short-listed options were chosen, which were comparatively assessed in a value management workshop against agreed criteria for all disciplines across the project.

The preferred option was chosen to be a grade separated through alignment for the Princes Highway with network access to Jervis Bay Road and Old Princes Highway provided via dual at grade roundabouts serviced by on and off ramps (Option 2009). The preferred option is currently being developed in the concept design phase which will form part of the Review of Environmental Factors (REF) for planning approval.

1.2 Description of the proposal

The key features of the proposal are:

- Realignment of the existing Princes Highway, including widening from two lanes to a four-lane divided highway (two lanes in each direction), with median separation using flexible barriers, providing an uninterrupted through alignment for the Princes Highway
- An overpass bridge over Jervis Bay Road
- An unsignalised single-lane at-grade double roundabout interchange providing:
  - Direct access from Jervis Bay Road and Old Princes Highway to the Princes Highway
  - Direct access from the Princes Highway to Jervis Bay Road and Old Princes Highway.
- Direct connection to existing properties and businesses at the Old Princes Highway
- A connection from Willowgreen Road to Old Princes Highway
- Tie-ins with the Old Princes Highway and with Jervis Bay Road
- Access road to service Princes Highway properties south east of the intersection
- Shared user paths connecting to Jervis Bay Road and Old Princes Highway
- Three metre wide shoulder along the Princes Highway mainline and ramps for cyclist use
- Adjustments of drainage infrastructure and provision of new drainage infrastructure such as pit and pipe networks, culverts, open channels and retention basins
- Permanent water quality measures
- Adjustment, protection and relocation of existing utilities
- Other roadside furniture including safety barriers, bus stops, signage, line marking, lighting and fencing
- Establishment and use of temporary ancillary facilities during construction
- Property works including acquisition, demolition and adjustments to accesses
- Rehabilitation of disturbed areas and landscaping.

1.3 Purpose of the report

This report constitutes the urban design report and landscape character and visual impact assessment (LCVIA).

The purpose of this report is to describe the urban design concept for the proposal as well as assess its potential landscape character and visual impacts. This report will be a supporting document to the REF for proposal approval.

1.4 Structure of the report

- Section 1 – Introduction
  Presents the introduction and background to the proposal.
- Section 2 – Contextual Analysis
  Provides an analysis of the proposal corridor context including landform, hydrology, land use, biodiversity, access, connectivity, and landscape character in order to establish the appropriate design responses to the context.

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- Section 3 – Urban Design Strategy
  Identifies the urban design objectives for the proposal and supporting key design principles to guide the urban design development. It also presents a high level urban design strategy for the proposal upon which the concept design is based.
- Section 4 – Concept Design
  Presents the urban design concept. It illustrates and describes how the urban design objectives and design principles established in Chapter 3 are applied in the urban design concept.
- Section 5 – Landscape Character and Visual Impact Assessment
  Identifies potential impacts of the proposal on the landscape character and key viewpoints. This section also documents the mitigation measures integrated into the concept design and further measures for detailed design.
- Section 6 – Conclusion
  Summarises the key findings of this report.

1.5 Urban design guidance

Transport for NSW have produced a comprehensive list of design guideline documents aimed at achieving good urban design outcomes. This report has been undertaken with reference to the following published documents:

- Beyond the Pavement (Transport, 2020)
- Guideline for landscape character and visual impact assessment. Environmental impact assessment practice note EIA-N04 (Transport, 2020)
- Landscape Design Guideline (Roads and Maritime, 2018)
- Bridge Aesthetics (Transport for NSW, 2020)
- Biodiversity Guidelines (RTA, 2016)
- Guide to Road Design (Austroads), relevant Australian Standards, and TfNSW supplements to both.

1.5.1 Background studies

In addition to the above documents, a number of papers and reports were also reviewed and contributed to this assessment including:

- Princes Highway Upgrade, Jervis Bay Road to Sussex Inlet Road Preliminary environmental investigation report (Transport for NSW, 2020)
- Princes Highway upgrade Jervis Bay Road intersection. Strategic options report (Transport for NSW, 2020)
- Jervis Bay Road Intersection Upgrade Preferred Strategic Options Report (Transport for NSW, 2020).

1.6 Landscape character and visual impact assessment methodology

The method used to undertake the landscape character and visual impact assessment follows the *Guideline for landscape character and visual impact assessment. Environmental impact assessment practice note EIA-N04* (Transport for NSW, 2020), hereafter referred to as EIA-N04, and is summarised as follows:

- Undertaking an initial site visit and field investigation, reviewing relevant literature, analysing aerial photographs and topographic maps to understand the study area
- Reviewing the engineering concept design on a regular basis, and other supporting material to gain an appreciation of the proposal
- Defining landscape character through a study area analysis, including a detailed site investigation
- Identifying and describing landscape character zones and evaluating the proposal's impact on them
- Evaluating the impact of the proposal on these landscape character zones by combining the sensitivity of the zone and the magnitude of the work to provide an overall impact rating as indicated by the impact assessment grading matrix (Figure 1)
- Identifying the visual catchment of the proposal for the visual impact assessment
- Selecting viewpoints within the visual catchment representing a range of different land uses.

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- Evaluating the visual impact of the proposal by comparing the sensitivity of viewpoints and the magnitude of the impact of the proposal upon them to provide an overall impact rating as indicated by the impact assessment grading matrix
- Identifying urban design and landscape opportunities and methods of mitigating the adverse visual impact, both within and outside of the proposal to assist the ongoing development of the concept design and for consideration in the detail design phase of the proposal.

The impact assessment grading matrix, adopted from EIA-N04, is used in both the landscape character and visual impact assessments. The matrix is applied based on specific criteria relevant to each type of assessment. These criteria are described at the beginning of each assessment chapter.

Landscape character assessment

The method used to undertake this study follows EIA-N04, in which landscape character is defined as "the combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place".

Sensitivity refers to how susceptible the environment is to the proposed change. The assessment is informed by background research, including, the quality of the landscape, it's cultural and historical importance to the community, scenic quality, and the overall composition of the place and its users. Additionally, sensitivity considers the landscape's inherent capacity to absorb change. For example, an area with a pristine natural character would be more sensitive to change than an area that has existing built infrastructure such as a road or building.

Magnitude refers to the type of proposal and its compatibility with existing landscape character, including; scale, form and material composition of elements, as well as their location or setting. Moreover, magnitude considers the influence of the physical presence of the proposal. For example, a sizeable above-ground building would have a greater magnitude of change than an access road through the same landscape. The magnitude impact rating also considers whether the proposal has a positive or negative impact on the landscape character of the zone. For example, a proposal may be of a large scale but may provide beneficial outcomes such as increased open space, enhancement of the areas 'sense of place', better connectivity and a safer road environment.

Landscape character impact is the combined evaluation of the sensitivity and magnitude of change caused by the proposal, in accordance with the impact assessment grading matrix in Figure 1.

Visual impact assessment

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

Visual catchment

The extent from which the proposal would be visible from adjoining areas varies along the length of the study area. It is influenced by topography, vegetation, and buildings. A detailed field and desktop assessment was undertaken to determine the area from where the proposal would be visible, defined as the visual envelope and illustrated in the visual envelope map (VEM). The visual receivers of the proposal include residents, tourists, pedestrians and motorists.

Selection of viewpoints

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

SENSITIVITY	MAGNITUDE				
	HIGH	MODERATE	LOW	NEGLIGIBLE	
HIGH	HIGH	HIGH-MODERATE	MODERATE	NEGLIGIBLE	
MODERATE	HIGH-MODERATE	MODERATE	MODERATE-LOW	NEGLIGIBLE	
LOW	MODERATE	MODERATE-LOW	LOW	NEGLIGIBLE	
NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	NEGLIGIBLE	

Figure 1. Landscape character and visual impact rating matrix (Source: EIA-N04)

2. Contextual Analysis

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2.1 Regional context

The study area is located approximately 12 kilometres south of Nowra, 90 kilometres south of Wollongong and 170 kilometres south of Sydney (Figure 2). The study area is centrally located within the Shoalhaven local government area (LGA).

The Princes Highway provides the principal road connection between Sydney and the south coast of NSW. Jervis Bay Road is the main access route to Jervis Bay's most popular destinations such as Huskisson, Vincentia and Hyams Beach for people coming from the north.

Figure 2. Regional context

2.2 Local context

The proposal sits within township of Falls Creek, a quiet, rural area surrounded by bush scenery including the cascades of water along Parma Creek which give the area its name (Figure 4).

Residential properties are located along the Princes Highway, Old Princes Highway and Jervis Bay Road.

Public buses operate in the area and three bus stops are located on the Jervis Bay Road intersection.

The land surrounding the proposal area has a rural character with extensive mature vegetation.

Figure 3. View from the corner of Old Princes Highway and Princes Highway, looking north towards the intersection

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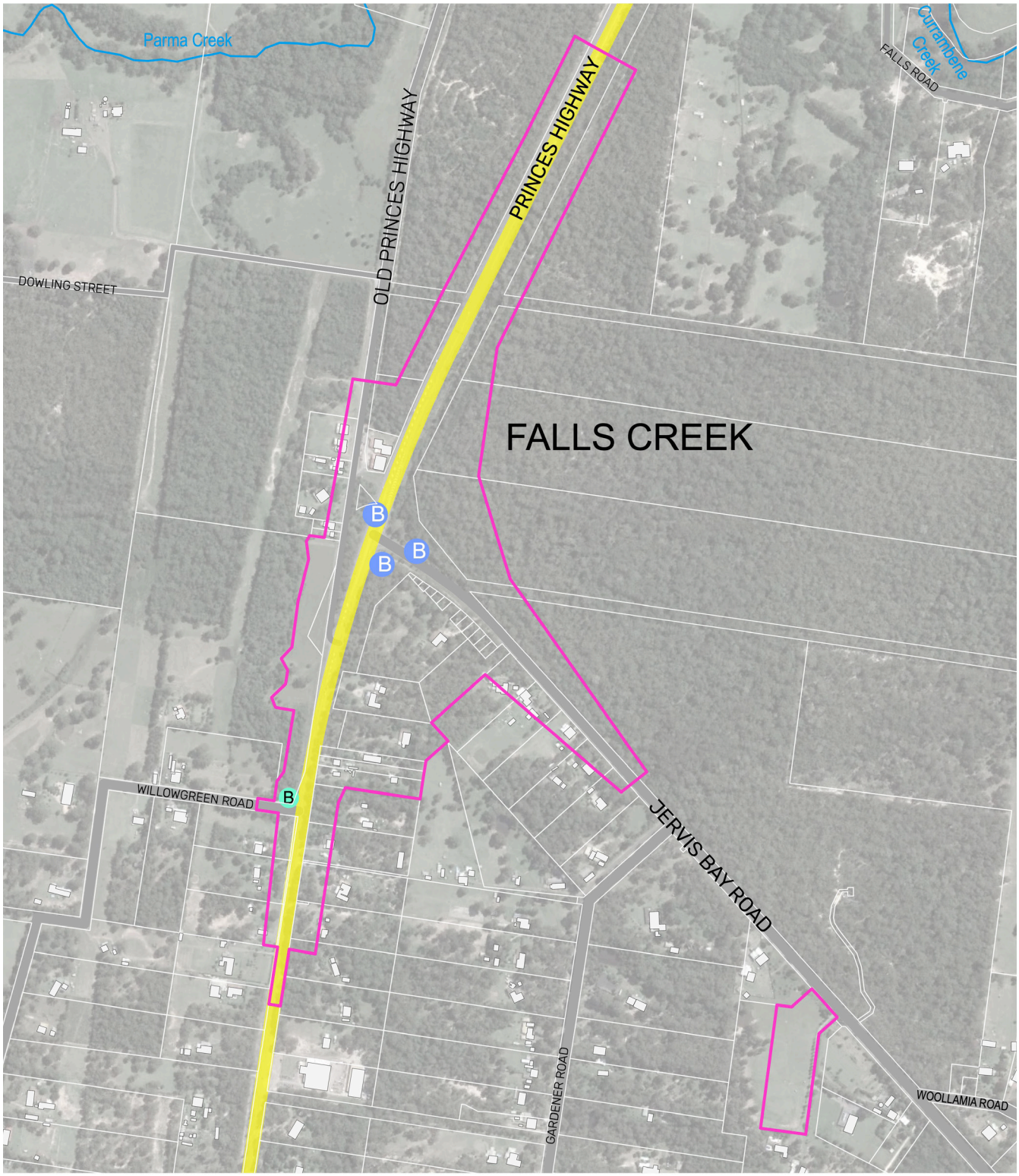

Figure 4. Local context

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2.3 Land use and ownership

The land north of Jervis Bay Road is mostly used for rural purposes, while the area to the south is comprised of large residential lots with single or two story dwellings (Figure 9).

At the north-western side of the intersection there are two parcels used for commercial purposes, which include the Jervis Bay Stock Feeds, and the Klimpton Smash Repairs (which does not appear to be in operation).

The majority of the land adjacent to the proposal is privately owned for residential and rural purposes. Other parcels include Crown land and land owned by the City of Shoalhaven Council and Transport for NSW.

Urban design considerations

- Develop landscape design and planting strategies that enhance and complement existing land uses
- Include screen planting along property boundaries to mitigate the loss vegetation and privacy
- Ensure safe access to properties and between land uses
- Ensure residential land (from property acquisition) is developed to complement existing land use character
- Consider visual and character impact of nearby land uses
- Use planting to reduce the amount of visible infrastructure in order to retain the predominantly rural setting

Figure 6. Residential property on Old Princes Highway

Figure 7. Jervis Bay Stock Feeds

Figure 5. Rural land dominated by mature trees north of the intersection

Figure 8. Rural property on Old Princes Highway

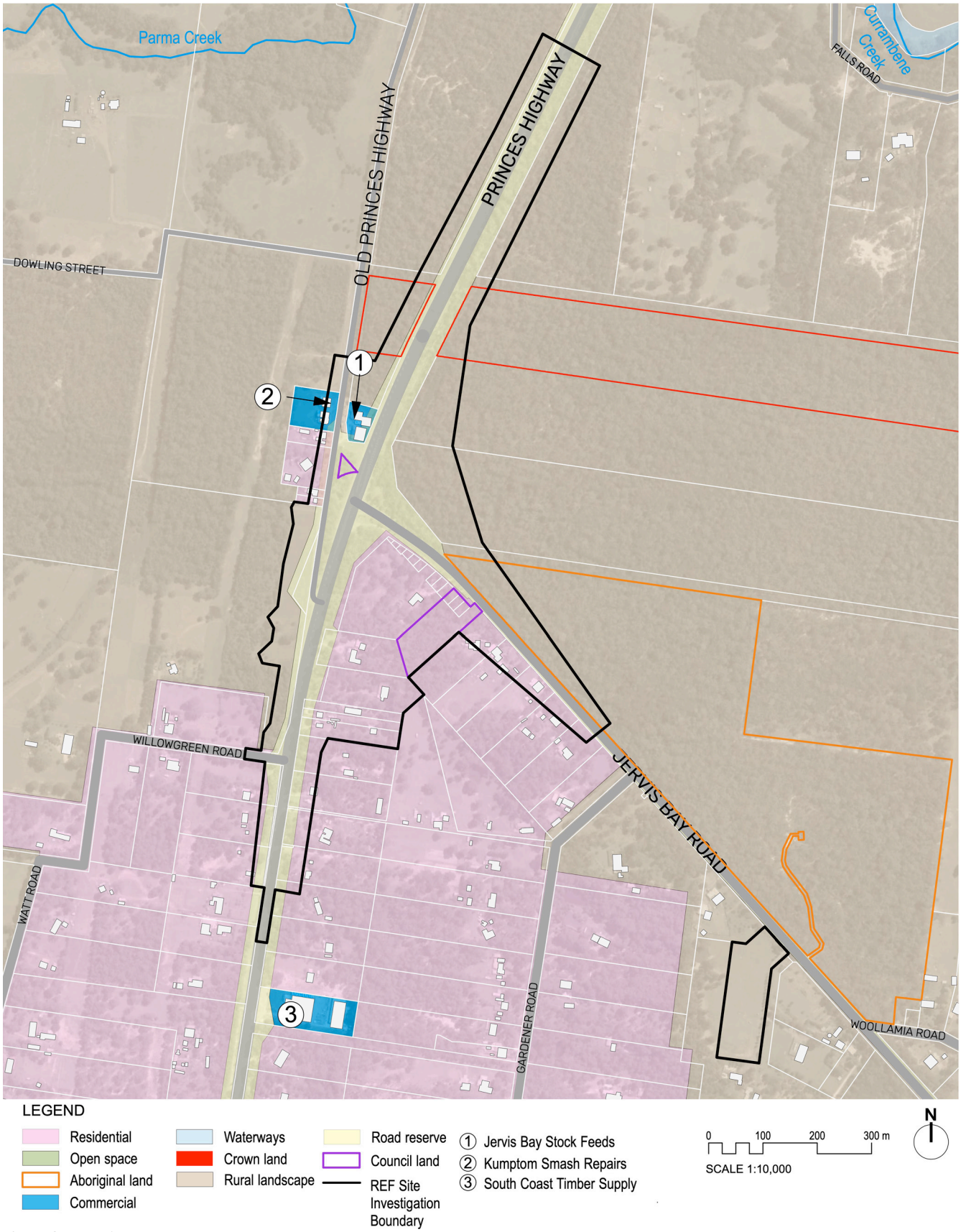

Figure 9. Land use

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2.4 Landform, hydrology and views

The topography of the study area is primarily flat, gently sloping towards a low area west of the Princes Highway.

The site traverses multiple minor, ephemeral watercourses which predominately drain to Currambene Creek and Jervis Bay. Drainage across the Princes Highway is via a number of transverse culverts.

The site area has been identified by Shoalhaven City Council as a flood planning area (Figure 13), which is land affected by a 1:100 average recurrence interval (ARI) flood event plus 0.5 metre freeboard. The main constraints regarding site flooding are (*Princes Highway Upgrade Program/ Jervis Bay Road Hydrology Report, 2020*):

- The floodplain area immediately to the west of the Jervis Bay Road / Princes Highway intersection is influenced by backwater flooding from Parma Creek
- The existing dual cell box transverse culvert under the Princes Highway at the southern end of the proposal appears to be under capacity in the one per cent annual exceedance probability flood event
- Floodwaters surcharging from the existing dual cell box transverse culvert over top the Princes highway and also continue to flow north alongside the embankment towards Jervis Bay Road, resulting in a large area of ponding at the south eastern corner of the existing intersection.

Views from the road corridor are dominated by bushland and mature trees both sides of the Princes Highway and Jervis Bay Road. This vegetation also provides screening to the residences adjacent to the road corridor.

Urban design considerations

- Design of earthworks and embankments to integrate into the existing natural topography, as far as possible, to create a seamless fit with the existing setting
- Planting of appropriate species to assist with erosion and retain the ecological function of drainage corridors
- The design of swales and drainage structures should respond to hydrological requirements as well as other ecological and maintenance requirements.

Figure 10. View 1 from Princes Highway looking south towards the intersection

Figure 11. View 2 from Princes Highway looking north towards the intersection

Figure 12. View 3, from Old Princes Highway indicating the gentle slope towards Princes Highway

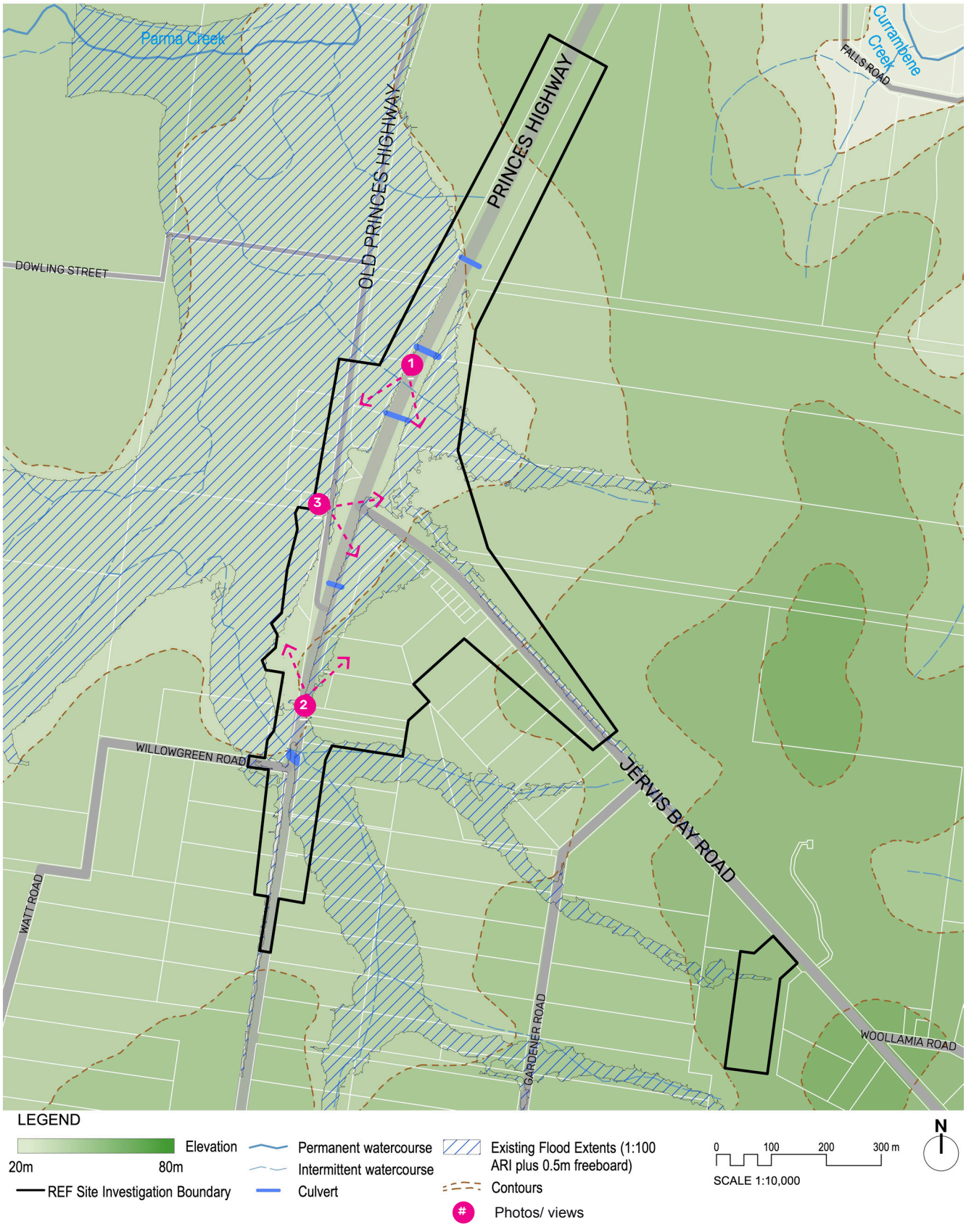

Figure 13. Landform, hydrology and views

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2.5 Vegetation

Vegetation within the study area (Figure 17) consists of both remnant native vegetation and introduced vegetation consisting of native and exotic species associated with farming and residential properties. The remnant native vegetation consists of two plant community types (PCTs), which are (*Princes Highway Upgrade Program/ Jervis Bay Road Intersection Biodiversity Assessment Report, 2020*) :

- Red Bloodwood – Hard-leaved Scribbly Gum – Silvertop Ash heathy open forest on sandstone plateaus of the lower Shoalhaven Valley, Sydney Basin Bioregion (PCT 1082) is recognised as an open forest or woodland with an understorey of sclerophyll shrubs and a groundcover of sedges. Within the road corridor, PCT 1082 is predominantly located northeast, east and south of the intersection in good to moderate condition.
- Woollybutt - White Stringybark - Forest Red Gum grassy woodland on coastal lowlands, southern Sydney Basin Bioregion and South East Corner Bioregion (PCT 1326), listed as endangered under the *Biodiversity Conservation Act 2016* and critically endangered under the *Environmental Protection and Biodiversity Conservation Act 1999*, is recognised as a grassy woodland typically occurring between the Illawarra and Moruya. Within the road corridor, PCT 1326 is predominantly located south and west of the intersection in good to poor condition.

Planted native/exotic vegetation is present in narrow strips at the front of residential properties located on the western (northbound) side of the Princes Highway and the southern (westbound) side of Jervis Bay Road.

Areas of cleared grassland are present southwest of the intersection and at the proposed ancillary facility on Jervis Bay Road south of Gardner Road.

Urban design considerations

- Retain existing native vegetation wherever possible, particularly mature trees
- Re-establish PCTs in suitable areas disturbed by the proposal or construction activities to restore ecological and habitat value and assist in biodiversity protection and recovery
- Tree planting to be offset from road and cycle lanes to ensure dropping of branches/leaves don't impede traffic flow
- Planting to allow access for maintenance
- Planting to consider bushfire resilience strategies in terms of species selection, location and density.

Figure 14. Heavily vegetated areas in the vicinity of the intersection

Figure 15. Native vegetation north of Jervis Bay Road

Figure 16. Dense native vegetation screen the views from residences towards the Princes Highway

Figure 17. Vegetation

02

2.6 Connectivity

2.6.1 Vehicles

The Princes Highway is an important national road connecting Sydney with multiple locations along the southern coast of NSW with a high traffic volume. Jervis Bay Road is the main access route to Jervis Bay from the north, while drivers travelling to or from the south are more likely to use Island Point Road or Hawken Road. The intersection experiences some of the highest vehicle movements on the NSW south coast and performs poorly during weekday and holiday peaks, with delay and queueing experienced on Jervis Bay Road.

Vehicle access to rural residential properties located within the proposal area is provided via driveways along Princes Highway south of the intersection, along the Old Princes Highway or Jervis Bay Road on the southern side.

2.6.2 Bus services

The public bus services 102, 103 and 135 operate on Jervis Bay Road and the Princes Highway connecting the Jervis Bay area with Nowra and Bomaderry. Three public bus stops are located within the proposal area; two on either side of Princes Highway and one on the northern side of Jervis Bay Road (Figure 22). The bus stops are not signposted and consist only of an informal lay-by. There is also one school bus stop on the corner of Willowgreen Road and Princes Highway.

2.6.3 Active transport

There is no cyclist infrastructure provided in the area of the proposal. However, it has been reported that cyclists use the existing Princes Highway shoulder and Strava data indicates high cycling activity along Princes Highway and Jervis Bay Road (Figure 20).

There are also currently no formalised pedestrian paths provided in the proposal area. Strava data indicates low pedestrian activity within the intersection, however, high activity was reported to the east and south (Figure 21). According to Census data (2017) local residents do not use public transport to travel to work and therefore unlikely to be walking to the bus stops, however, it is possible that school children cross Princes Highway and Jervis Bay Road to access the bus stops.

Urban design considerations

- Ensure that access to properties is maintained
- Improve the accessibility of pedestrian/cycling connection between both sides of the Princes Highway
- Maintain safe, easy and direct pedestrian access to bus stops.

Figure 18. Bus stop (right) and vehicles queueing on Jervis Bay Road turning right into Princes Highway

Figure 19. Property access on the Princes Highway.

Figure 20. Cyclist activity around the proposal area (*Source below)*

Figure 21. Pedestrian activity around the proposal area *(Source: Strava global activity heatmap, 2020 from the Jervis Bay Road Intersection – Multimodal investigations ,Arcadis)*

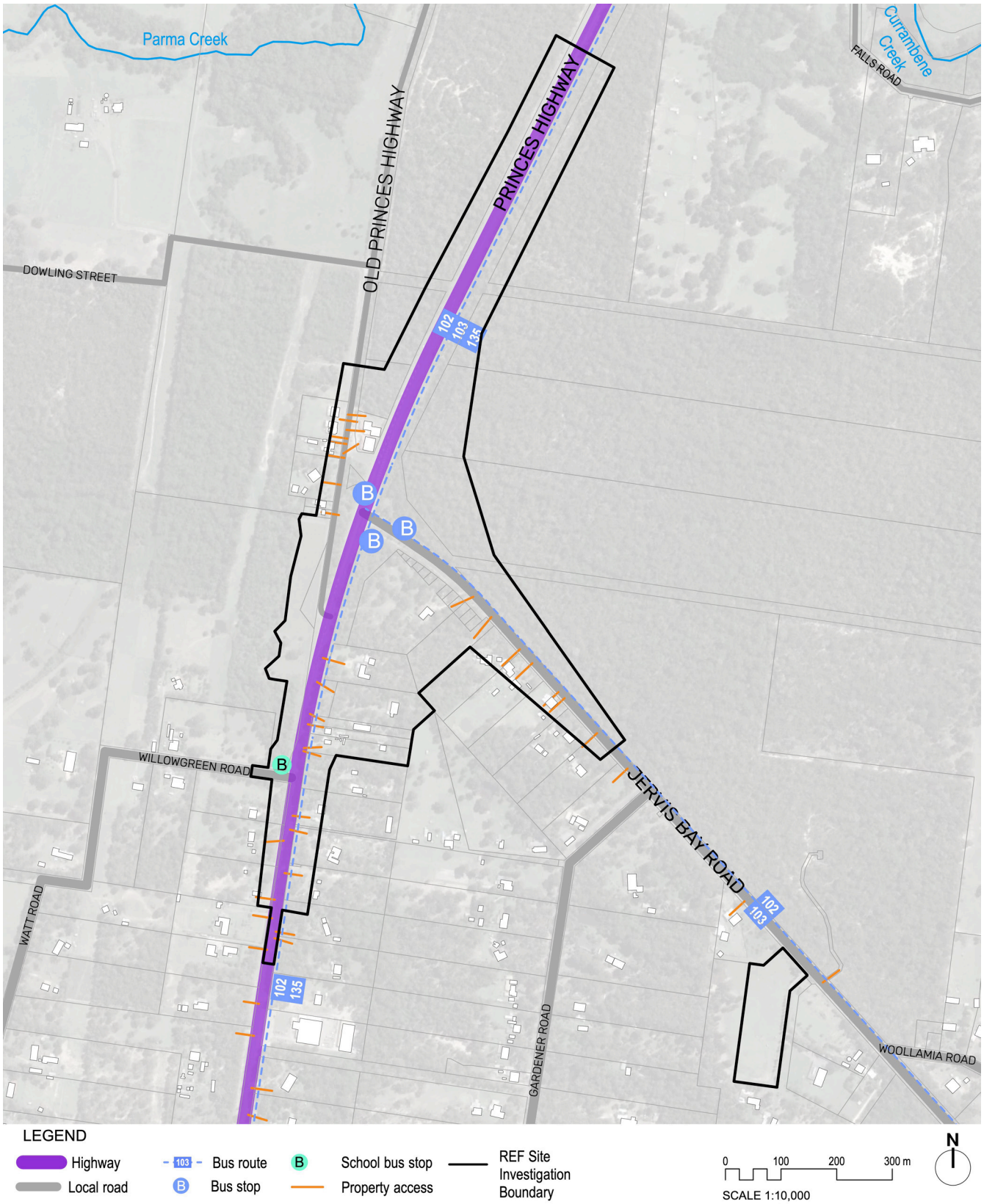

Figure 22. Access and connectivity

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2.7 Landscape character zones

The landform and vegetation, views and vistas, settlement patterns and built structures within and adjoining the study area combine to define its landscape character. Within and surrounding the study area, three Landscape Character Zones (LCZs) can be defined (**Figure 25**):

- LCZ 1 - Rural residential
- LCZ 2 - Mixed use
- LCZ 3 - Bushland.

2.7.1 Landscape Character Zone 1 - Rural residential

Description: This character zone includes the rural residential properties south of Jervis Bay Road and both sides of the Princes Highway.

The properties typically comprise large size lots with mostly single storey residences, with a variety of architectural styles. Most of them retain dense stands of native trees which provide some screening to the road corridor and contribute to the scenic quality of the area.

The topography of this zone is largely flat, gently slopping to the north-west.

Assessment: The sensitivity within this zone is considered **moderate** due to the generally attractive rural residential outlook with dense native vegetation particularly at the property boundary.

Figure 23. Residential property on Princes Highway (south of Jervis Bay Road) within LCZ 1

Figure 24. Residence on Jervis Bay Road with native trees providing screening within LCZ 1

Figure 25. Landscape Character Zones

2.7.3 Landscape Character Zone 2 - Mixed use

Description: LCZ 2 is a small area located west of the Princes Highway. It is primarily comprised of smaller lots, which contain either single story residential dwellings or commercial properties (Jervis Bay Stock Feeds and Klimpton Smash Repairs).

The character of this zone is more modified than the other two zones with the properties mostly devoid of vegetation. The limited vegetation present includes a mix of natives and exotics such as palm trees and conifers.

The topography of this zone is predominantly flat, sitting lower than the Princes Highway and sloping up to the roadway. The area is also subject to occasional flooding.

Assessment: The sensitivity within this zone is considered **moderate** due to its modified nature and mix of mature vegetation.

2.7.4 Landscape Character Zone 3 -Bushland

Description: This character zone includes the dense native vegetation between Jervis Bay Road, Princes Highway and the Old Princes Highway. It contains continuous tree canopy and understorey, which provides an enclosed, high scenic quality to the motorist's experience.

The existing vegetation belongs to a number of plant communities including Threatened Ecological Communities, and is only interrupted by road infrastructure, unsealed tracks, easements and power lines.

Assessment: The sensitivity of this area is considered **high** due to the high quality of the bushland setting.

Figure 28. Jervis Bay Stock Feeds, east of Old Princes Highway within LCZ 2

Figure 27. Bushland north of Jervis Bay Road within LCZ 3

Figure 26. Commercial and residential properties west of Old Princes Highway within LCZ 2

Figure 29. Large stand of native vegetation between Princes Highway and Old Princes Highway within LCZ 3

3. Urban Design Strategy

03

3.1 Urban design objectives and principles

A whole-of-corridor urban design framework for the Princes Highway is currently being developed. Therefore, the urban design objectives and principles outlined below have been developed based on Transport for NSW's guidance documents including Beyond the Pavement (refer section 1.5), and in consideration of nearby Princes Highway upgrade projects.

The following objectives and design principles form the basis of the urban design strategy. They inform the urban design concept in section 4 and should be carried through to detailed design and construction.

OBJECTIVE 1

Achieve a proposal that fits sensitively within the existing environment as well as other Princes Highway upgrades

Principles:

- Maintain and reinforce the existing landscape character including existing land uses, views and spatial character
- Maximise local native vegetation, through minimising the proposal footprint and maximising revegetation, to maintain ecological values and assist in biodiversity protection and recovery
- Use distinct vegetation to mark the approach to and arrival at the intersection
- Respond to other Princes Highway upgrades in terms of planting and materials
- Consider the selection of materials including their form, texture and colour, in the design process to achieve an integrated structure that is complementary to the setting and minimises visual impact
- Planting and material selection to be low maintenance, and be easily accessible for maintenance purposes.

OBJECTIVE 2

To ensure the proposal is integrated and responsive with the surrounding landform

Principles:

- Design major proposal elements and earthworks to integrate into the existing natural topography
- Design structures as a simple and elegant, which avoid unnecessary bulk and clutter.

OBJECTIVE 3

Contribute to the accessibility and connectivity into and through the area

- Design the intersection so that it is legible and easy to navigate
- Provide safe, convenient and comfortable access for local residents to adjacent land uses and bus stops
- Maximise the accessibility and connectivity for pedestrians and cyclists across and along the road corridor.

OBJECTIVE 4:

Minimise impacts on the public realm and surrounding land uses

Principles:

- Use screen planting to provide visual privacy and reduce the scale of infrastructure for residential properties
- Ensure all lighting and signage is unobtrusive in the landscape, including at night
- Planting to consider bushfire resilience strategies in terms of species selection, location and density.

3.2 Urban design strategy

The urban design strategy has been developed in response to the proposal context and the urban design objectives and principles. The overall aim of the design strategy is to reduce the visual impact of structures and the road itself, and create a roadway that integrates well, within its context.

Strategies adopted in the proposal to achieve the objectives are:

- Re-vegetate disturbed areas with a planting palette that responds to the existing plant communities and Shoalhaven Council's suggested species list
- Use vegetation to help provide an enclosed spatial experience within the road corridor while maintaining required sight lines
- Signal the approach to the intersection through feature tree planting of species local to the area. The species are to be resolved during detailed design but may include *Corymbia gummifera* (Red Bloodwood) and *Corymbia maculata* (Spotted Gum)
- Use distinct native trees within the town of Falls Creek to differentiate from the proposal and respond to the existing character and provide visual interest
- Use accent planting near the bridge to signal the arrival at the intersection
- Use dense vegetation to help screen the proposal from existing properties
- Embankments to be integrated in to the natural landform and setting, where practicable, with gentle slopes and consistent planting with the adjoining landscape
- Materials of the bridge to respond to the existing rural context as well as other bridges along Princes Highway
- The shared path to be set back from the road, where possible, with planting and canopy trees to provide shade
- Safe pedestrian access which responds to CPTED design principles including lighting and passive surveillance
- A shade structure and seating to be provided at the bus stop
- Property access to be maintained and fences reinstated/ upgraded.

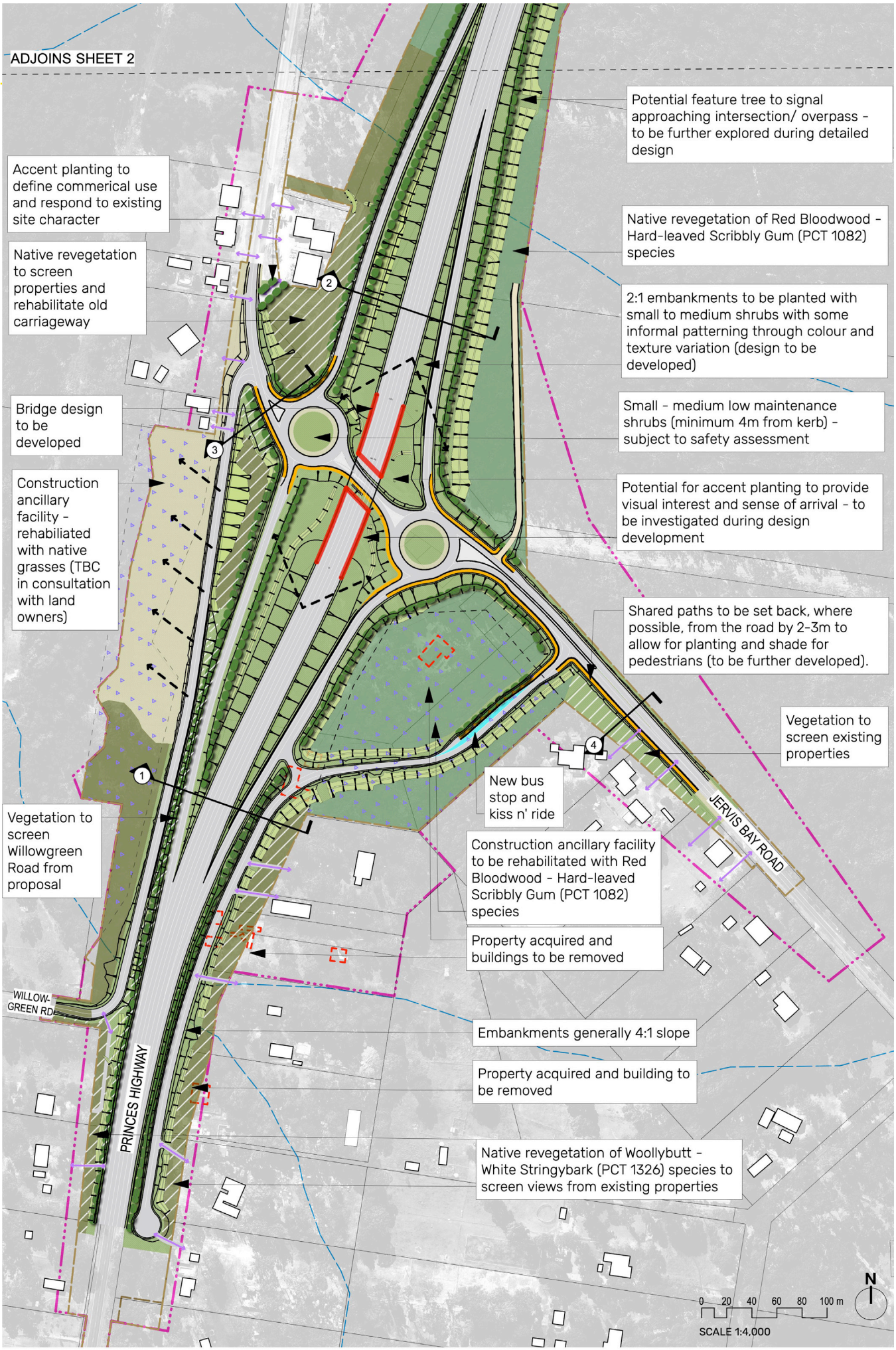


Figure 30. Urban Design and Landscape Strategy (Sheet 1). Diagram based on concept design only and will be refined during detailed design.

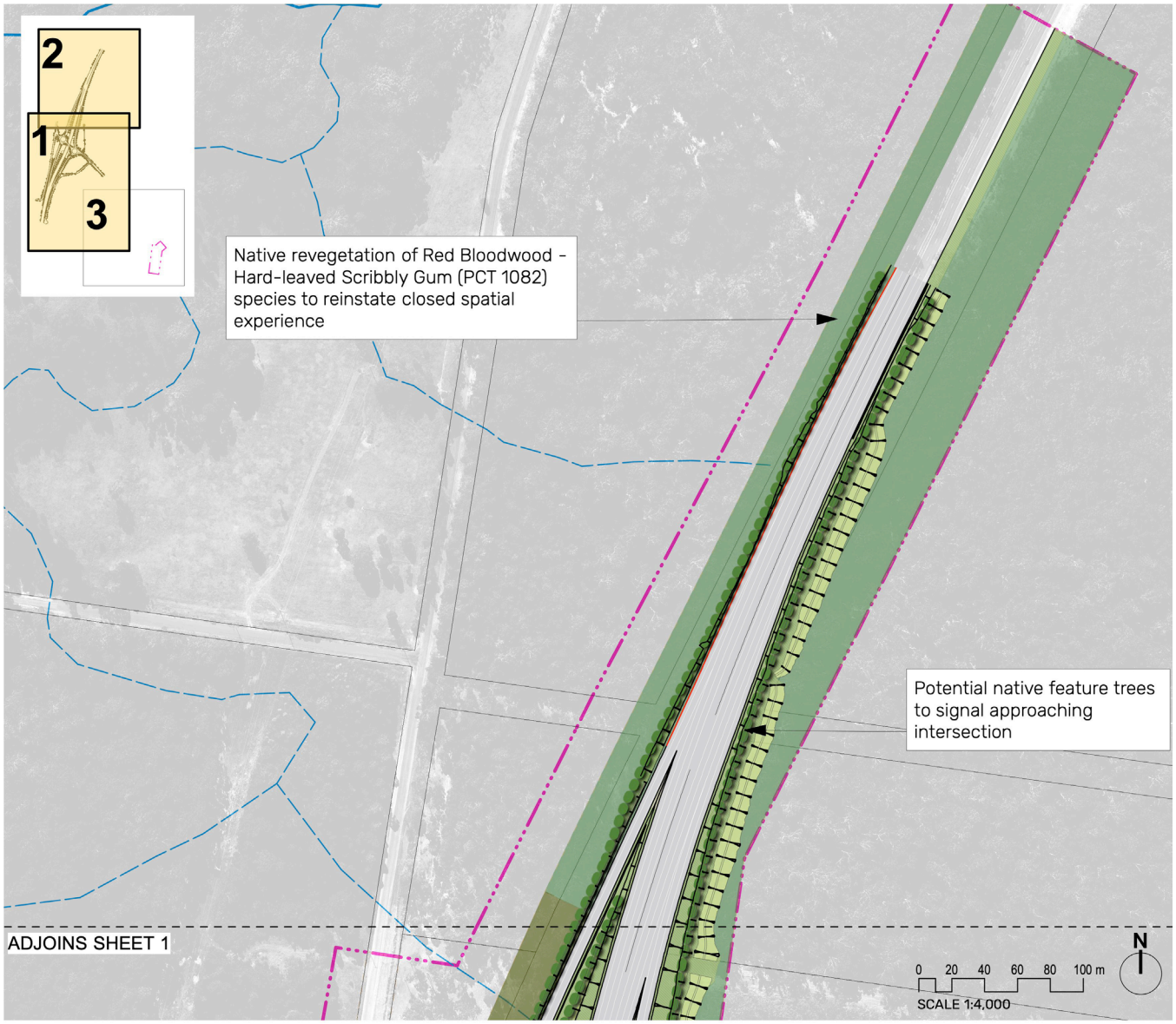


Figure 31. Urban Design and Landscape Strategy (Sheet 2). Diagram based on concept design only and will be refined during detailed design.

LEGEND

VEGETATION

- Potential feature trees
- Revegetation - Red Bloodwood - Hard-leaved Scribbly Gum (PCT 1082)
- Revegetation Woollybutt - White Stringybark (PCT 1326)
- Native ground covers and grasses
- Native shrubs
- Screen planting - includes native trees and shrubs
- Swale - planted with small native grasses

SURFACES AND STRUCTURES

- Carriageway
- Shared path
- Bus stop/ kiss n' ride
- Concrete median
- Embankment (Top / Bottom)
- Retaining wall

OTHER

- Construction ancillary facility
- Property to be aquired
- Property to be retained
- Property access
- Project construction footprint
- REF site investigation boundary
- Cadastral boundary
- Key views

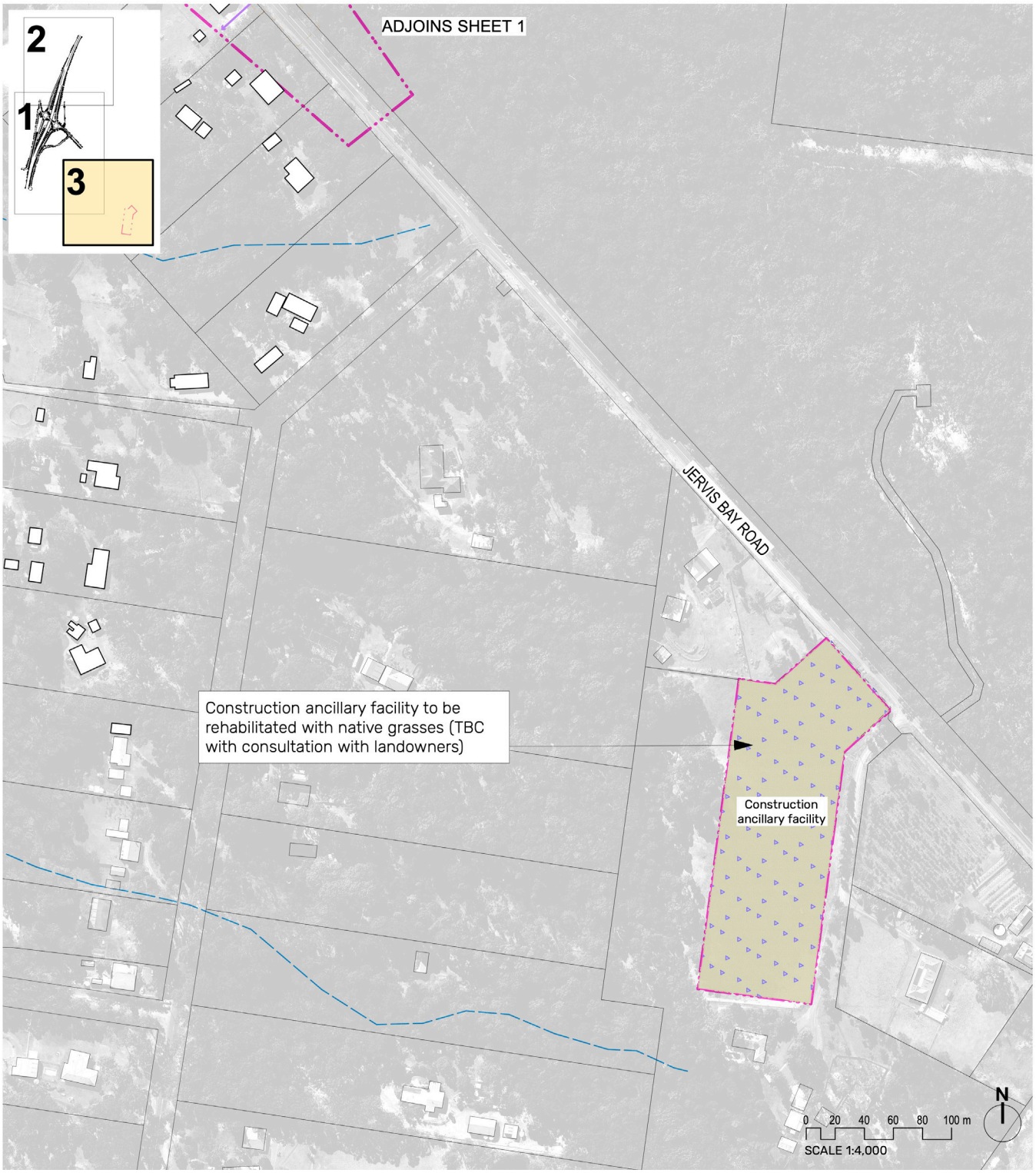


Figure 32. Urban Design and Landscape Strategy (Sheet 3). Diagram based on concept design only and will be refined during detailed design.

4. Concept Design

4.1 Introduction

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

4.2 Urban Design Concept

The urban design concept is illustrated on the following pages. They include:

- Concept Design plans
- Illustrative cross sections
- Illustrative bridge and retaining wall elevations and sections
- Plant species.

4.3 Plans

1:2,000 plans to be included in next submission following agreement on the urban design and landscape strategy (section 3.2).

4.4 Cross Sections

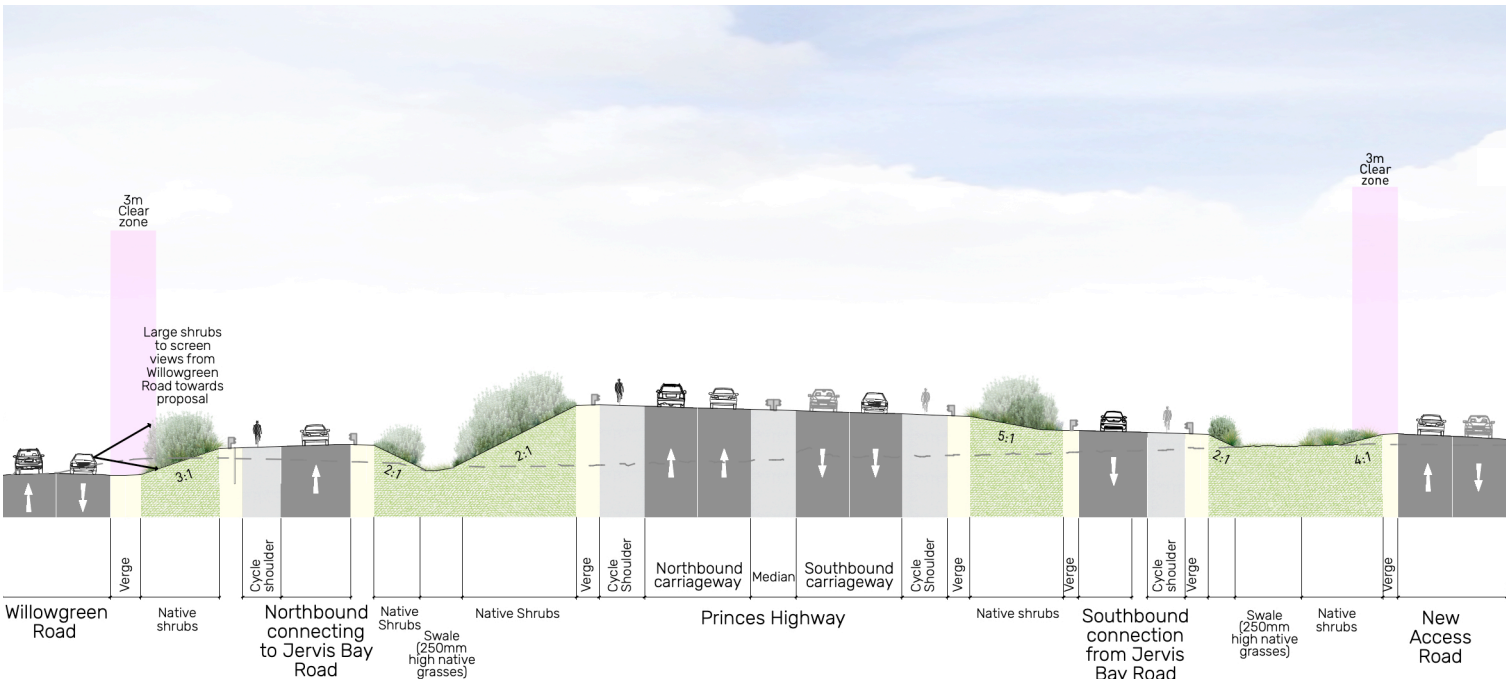


Figure 33. Section 1 (MCNO Ch1140) Scale 1:500

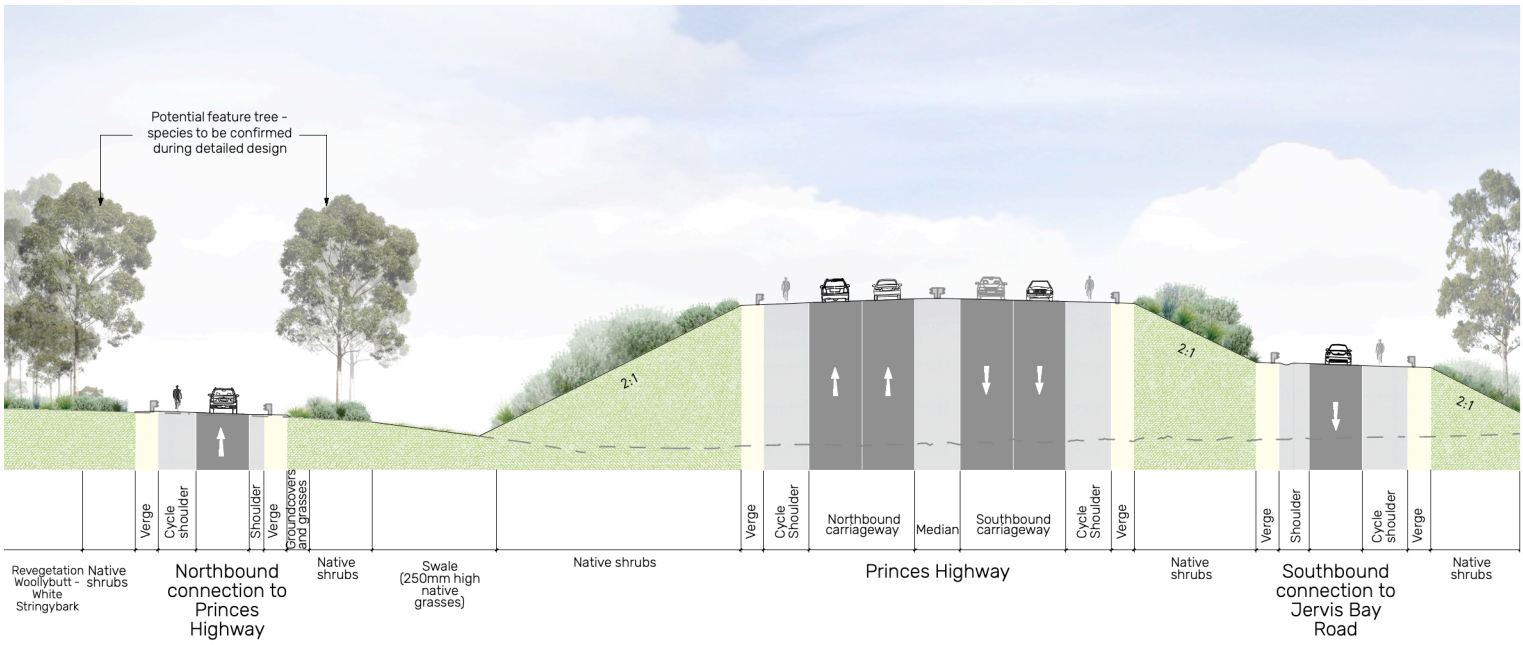


Figure 34. Section 2 (MCNO Ch740) Scale 1:500

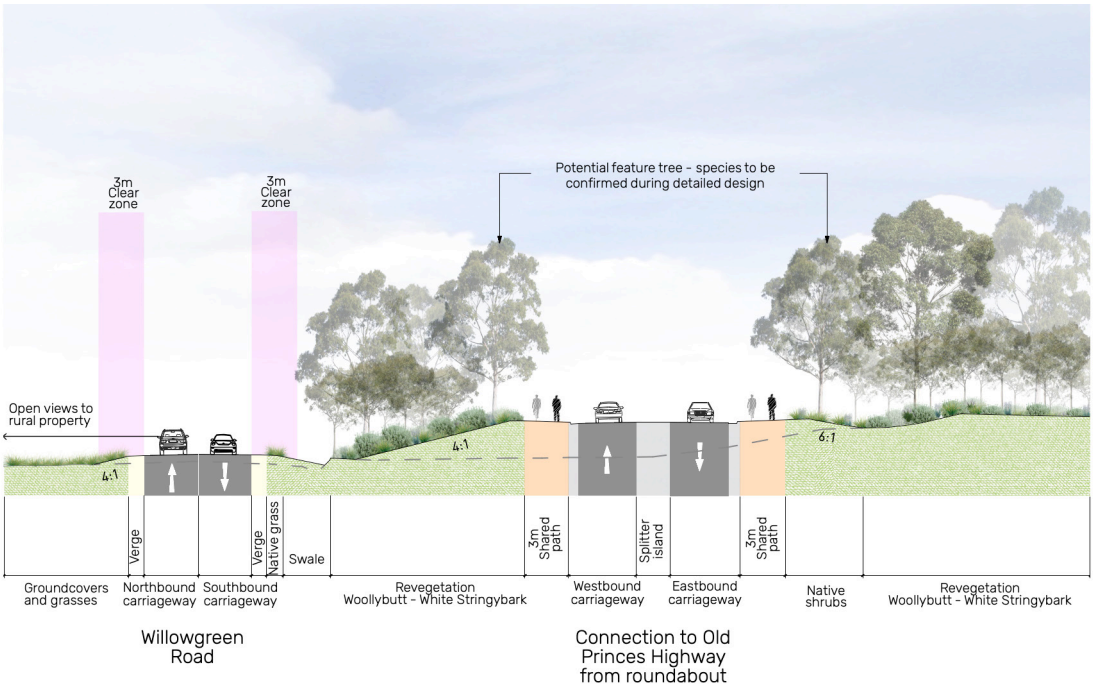


Figure 35. Section 3 (MCC0 Ch40) Scale 1:500

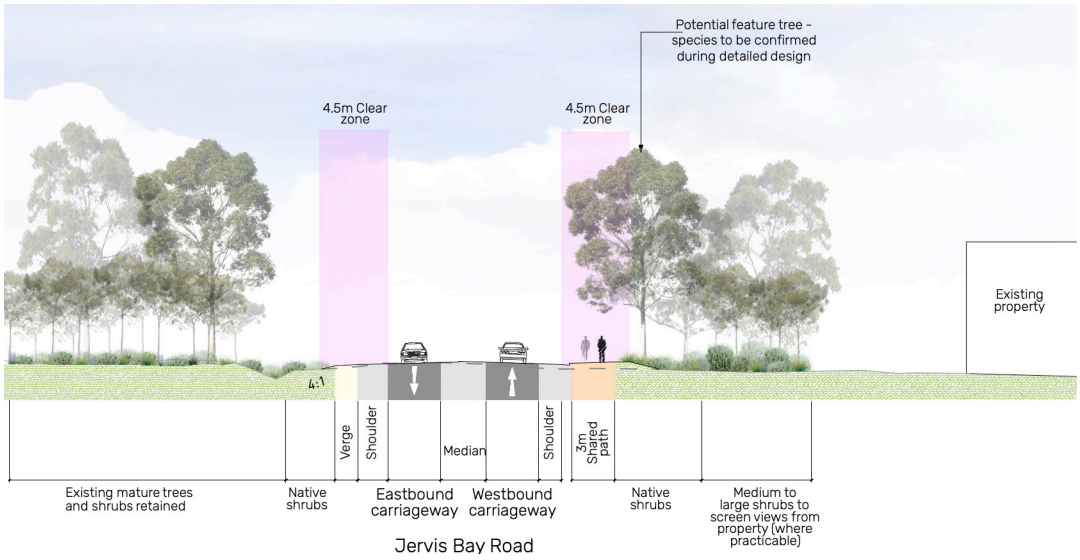


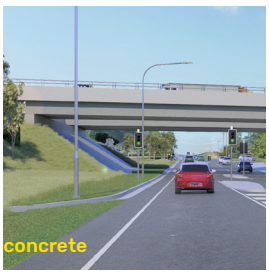
Figure 36. Section 4 (MC10 Ch200) Scale 1:500

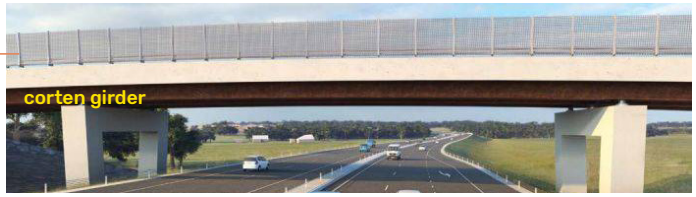
4.5 Bridge Elevations and Sections

The bridge design is still being developed by the project team. The bridge should respond to the existing context as well as the built and planned bridges along Princes Highway.

4.5.1 Bridge Analysis/Inspiration

The following map and images provide some analysis of the existing and proposed bridges along Princes Highway as well as context relating to Jervis Bay.





4.5.2 Bridge concept

To be provided in next phase of design development.

4.6 Cyclist and Pedestrian Connections

Cyclist infrastructure along the Princes Highway mainline and the ramps would be provided via three metre wide paved shoulders. These are to be integrated into a wider cyclist strategy for the Princes Highway.

Pedestrian and cyclist provisions within the intersection are provided via three metre wide shared paths along the southern side of Jervis Bay Road and the roundabouts. These connect pedestrians to and from the residences on the western side of the Highway to the proposed bus stop. Where possible, the shared paths will be set back from the carriageway approximately two to three metres to allow vegetation to buffer pedestrians from traffic as well as to provide shade (Figure 37). These are to undergo further design development during detailed design. Crime Prevention Through Environmental Design (CPTED) principles would also be adopted in the design.

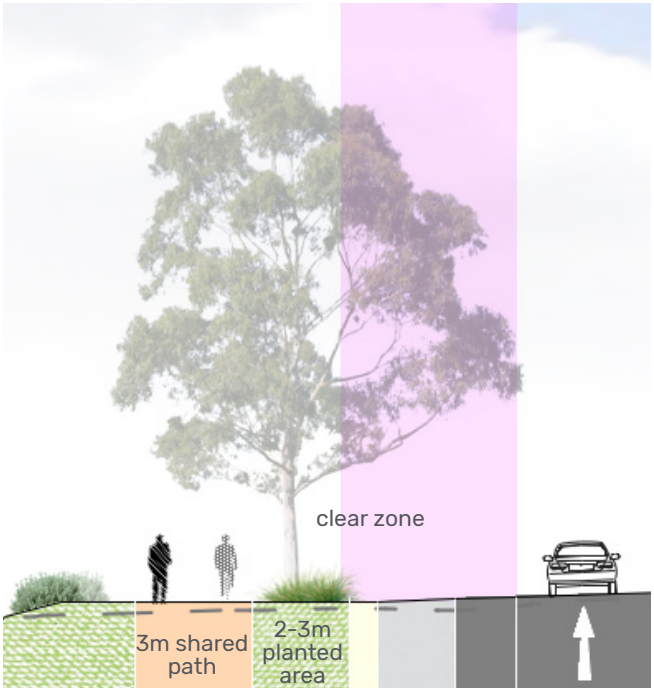


Figure 37. Example of a shared path set back from the road with road-side planting

4.7 Property impacts

The proposal would impact the road reserve of the existing highway corridor and includes the construction of a new access road to properties along the Princes Highway to the south-east of the intersection. The impacts of the proposal are mostly upon large rural residential lots resulting in the loss of existing dense vegetation, which is currently screening many properties from the Princes Highway and Jervis Bay Road.

Property acquisition would mostly be limited to partial, however, a number of properties would require full acquisition. Property adjustments, such as access, drainage, and reinstatement of landscape works and fences are also be required as part of the proposal.

The majority of properties impacted by the proposal require screening from the highway to mitigate the visual impact of the works.

The reinstatement of fences would be required as part of the proposal and may require consultation with the property owners.

4.8 Earthworks and slope stabilisation

The proposal requires a considerable volume of fill to lift the alignment, particularly the Jervis Bay Road overpass. As a result, there are a number of large embankments which require careful integration with the natural landform. Flatter slopes are preferred and should be used wherever practical.

Embankment slopes should be manipulated so that views can extend above and beyond the formation rather than being blocked. Key design considerations for embankments include:

- Planting on embankment slopes to be consistent with the adjoining landscape
- Transitioning the interface between the existing ground and the embankment batter to avoid obvious junctions
- Designing the slopes to match the adjoining natural landform as much as possible.

4.9 Drainage

Due to the low lying nature, the proposal area requires drainage channels and culverts. The drainage channels proposed vary in width and depth but are expected to be treated with native grasses approximately 250 millimetres high.

4.10 Planting

The landscape strategies below have been put forward to minimise the impact of proposal upgrade on the existing environment. The landscape and planting design would place a strong emphasis responding to the existing landscape character as well as mitigate the impact of the areas introduced embankments and structures in to the primarily rural setting.

4.10.1 Planting Strategy

The planting strategy would provide:

- Native feature tree planting that signal the approach to the intersection. The species are to be resolved in detailed design but may include *Corymbia gummifera* (Red Bloodwood) and *Corymbia maculata* (Spotted Gum)
- Distinct native trees within the town of Falls Creek to differentiate from the proposal and respond to the existing character and provide visual interest
- Use of accent planting near the bridge to signal the arrival at the intersection
- A planting palette including local endemic species particularly through the existing native vegetation communities and the Shoalhaven Council's suggested species list (for Falls Creek)
- Distinctive semi-mature tree plantings to emphasise intersections and local roads
- A range of low-maintenance, non-flowering, frangible shrubs and groundcovers in medians
- Minimal visibility of the proposal from properties where practicable and appropriate
- Safe sight distances which are not obscured by planting and re-vegetation areas
- Areas with a more structured response to planting with vegetation used to define the margins of the road, provide character and minimise impacts of adjoining associated structures
- Tree locations to be setback to prevent falling branches impacting safety and potentially blocking traffic flow
- Setbacks for structures to enable clear access for maintenance and visual inspections when the landscape matures.

4.10.2 Re-Vegetation Strategy

- New planting and seeding would integrate with existing vegetation communities to reinforce local and remnant vegetation patterns and to maintain or enhance existing landscape character
- Retention of existing vegetation would be maximised

4.10.3 Plant Species

The images and tables on the following pages specify and depict potential plant species for the proposal, which include native trees, shrubs and grasses.

Feature Trees

1. *Corymbia gummifera* - Red Bloodwood
2. *Corymbia maculata* - Spotted Gum
3. *Acacia floribunda* - Gossamer Wattle
4. *Livistonia australis* - Cabbage Tree Palm

Accent Plant

5. *Doryanthes excelsa - Gymea Lily*

Indicative Shrubs

6. *Acacia longifolia subsp. longifolia*
7. *Melaleuca linariifolia* (1mH x 1mW)
8. *Callistemon 'Great Balls of Fire'* (1H x 3mW)
9. *Pultenaea villosa* - Hairy Bush-pea
10. *Hibbertia aspera* - Rough Guinea Flower

Suggested Species List (from Shoalhaven Council species list for Falls Creek)

Table 1. Some suggested plant species

Tree Species	Shrub Species	Groundcover Species	Grasses
Acacia floribunda *Callistemon* 'Harkness' *Corymbia gummifera* *Corymbia maculata* *Eucalyptus longifolia* *Eucalyptus paniculata* *Eucalyptus pilularis* *Eucalyptus punctata subsp. punctata* *Eucalyptus sclerophylla*	*Acacia longifolia subsp. longifolia* *Banksia ericifolia subsp. ericifolia* *Elaeocarpus reticulatus* *Grevillea* 'Honey Gem' *Grevillea* 'Robyn Gordon' *Hibbertia aspera* *Hibbertia empetrifolia* *Indigofera australis subsp. australis* *Pultenaea villosa*	*Grevillea* 'Bronze Rambler' *Grevillea* 'Poorinda Royal Mantle' *Myoporum parvifolium* *Persoonia chamaepitys* *Pratia purpurascens* *Viola hederacea*	*Doryanthes excelsa* *Imperata cylindrica* *Lomandra longifolia* *Lomandra confertifolia spp. pallida* 'Stanthorpe' *Lomandra confertifolia spp. rubiginosa* 'Seascape' *Lomandra* 'Tanika'

Re-vegetation

Table 2. Red Bloodwood - Hard-leaved Scribbly Gum (PCT 1082) species

Dominant Canopy Species	Dominant Shrub Species	Groundcover/ Grass/Climber Species	
Allocasuarina littoralis *Angophora floribunda* *Eucalyptus longifolia* *Eucalyptus punctata* *Eucalyptus tereticornis* *Exocarpos cupressiformis* *Melaleuca decora* *Banksia serrata* *Corymbia gummifera* *Eucalyptus globoidea* *Eucalyptus sclerophylla* *Melaleuca ericifolia*	*Acacia mearnsii* *callistemon linearis* *Kunzea ambigua* *Leptospermum polygalifolium* *Leucopogon juniperinus* *Pimelea linifolia* *Pittosporum undulatum* *Pultenaea villosa* *Acacia brownii* *Acacia ulicifolia* *Boronia pinnata* *Bossiaea heterophylla* *Epacris pulchella* *Hakea dactyloides broad leaf form* *Hakea laevipes* *Hakea salicifolia* *Hakea sericea* *Hakea teretifolia* *Hovea linearis* *Lambertia formosa* *Leptospermum trinervium* *Mirbelia rubiifolia* *Petrophile pedunculata* *Petrophile pulchella* *Platylobium formosum* *Pomaderris spp.* *Pultenaea daphnoides* *Telopea speciosissima* *Xanthorrhoea spp.* *Xanthosia tridentata*	*Billardiera scandens* *Brunoniella pumilio* *Cyathochaeta diandra* *Cynodon dactylon* *Dianella caerulea* *Entolasia marginata* *Entolasia stricta* *Glycine clandestina* *Glycine microphylla* *Glycine tabacina* *Hardenbergia violacea* *Imperata cylindrica* *Lagenifera stipitata* *Laxmannia gracilis* *Lomandra brevis* *Lomandra longifolia* *Lomandra multiflora* *Microlaena stipoides* *Oxalis perennans* *Parsonsia straminea* *Patersonia longifolia* *Patersonia sericea* *Rhytidosporum procumbens* *Themeda triandra* *Trachymene incisa* *Veronica plebeia*	*Acianthus spp.* *Aristida spp.* *Aristida vagans* *Caustis flexuosa* *Dodonaea triquetra* *Gompholobium grandiflorum* *Hibbertia spp.* *Lepidosperma laterale* *Lindsaea linearis* *Lomandra glauca* *Lomandra obliqua* *microtis spp.* *Patersonia glabrata* *Persoonia levis* *Persoonia linearis* *Platysace linearifolia* *Pteridium esculentum* *Ptilothrix deusta*

Table 3. Woollybutt - White Stringybark (PCT 1326) species

Dominant Canopy Species	Dominant Shrub Species	Groundcover/ Grass/Climber Species	
Allocasuarina littoralis *Angophora floribunda* *Eucalyptus amplifolia* *Eucalyptus botryoides* *Eucalyptus longifolia* *Eucalyptus moluccana* *Eucalyptus punctata* *Eucalyptus tereticornis* *Exocarpos cupressiformis* *Melaleuca decora*	*Acacia mearnsii* *callistemon linearis* *Kunzea ambigua* *Leptospermum polygalifolium* *Leucopogon juniperinus* *Melaleuca thymifolia* *Pimelea linifolia* *Pittosporum revolutum* *Pittosporum undulatum* *Pultenaea villosa*	*Adiantum aethiopicum* *Billardiera scandens* *Brunoniella pumilio* *Carex breviculmis* *Cassytha pubescens* *Centella asiatica* *Cheilanthes sieberi* *Clematis glycinoides* *Cyathochaeta diandra* *Cynodon dactylon* *Daviesia ulicifolia* *Dianella caerulea* *Dianella longifolia* *Dichondra repens* *Echinopogon caespitosus* *Entolasia marginata* *Entolasia stricta* *Glycine clandestina* *Glycine microphylla* *Glycine tabacina* *Hardenbergia violacea*	*Imperata cylindrica* *Kennedia rubicunda* *Lagenifera stipitata* *Laxmannia gracilis* *Lomandra brevis* *Lomandra longifolia* *Lomandra multiflora* *Microlaena stipoides* *Oplismenus imbecillis* *Oxalis perennans* *Parsonsia straminea* *Patersonia longifolia* *Patersonia sericea* *Pratia purpurascens* *Pterostylis spp.* *Rhytidosporum procumbens* *Themeda triandra* *Trachymene incisa* *Veronica plebeia* *Wahlenbergia gracilis*

5. Landscape Character and Visual Impact Assessment

5.1 Introduction

This section of the report aims to assess the impact of the proposal on the identified Landscape Character Zones (Chapter 2) and viewpoints within the study area. The Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (*"EIA No. 4 Guidelines", August 2020, Transport for NSW*), referred to as the Practice Note hereafter, sets out two main purposes of landscape character and visual impact assessment:

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

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

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

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

5.2 Landscape Character Assessment

The landscape character assessment identifies the built, natural and cultural aspects that make the character zones unique, and assesses the impact that the proposal would have within each character zone.

The three Landscape Character Zones were identified in Chapter 2 (Figure 38) and this section provides an outline of the introduced elements of the proposal within each of the zones. An assessment of the magnitude of the proposal and its impact to the character zone is also included.

Figure 38. Landscape Character Zones

5.2.1 Landscape Character Zone 1 - Rural residential

Sensitivity

In Chapter 2 the sensitivity of LCZ 1 was assessed as **moderate**.

Magnitude

Proposal works in this LCZ would include the introduction of the following elements:

- The southern section of the proposal realignment of the existing Princes Highway to the east and a new road connecting south-bound traffic to Jervis Bay Road. This would result in the removal of a large amount of existing dense native vegetation belonging to the Woollybutt - White Stringybark (PCT 1326) in moderate condition
- A large portion of the Jervis Bay Road overpass
- Large embankments up to 10 metre above the existing ground level
- Two 40 metre wide roundabouts
- A new road connecting Willowgreen Road to Old Princes Highway
- Access road to service Princes Highway properties south east of the intersection
- Shared paths on the southern side of roundabouts connecting Jervis Bay Road and Old Princes Highway
- New drainage infrastructure including large open channels
- Roadside furniture including safety barriers, bus stops, signage, lighting and fencing
- Establishment and use of temporary ancillary facilities during construction including the site compound and stockpile areas
- Property works including acquisition, demolition and adjustments to accesses
- Rehabilitation of disturbed areas.

The proposal introduces new infrastructure and associated earthworks into the natural, largely unmodified landscape character. The clearance of a large proportion of vegetation is also required to accommodate the proposal. The changes to this landscape character has therefore resulted in the magnitude being assessed as **high**.

Assessment of impact:

The combination of the sensitivity of the character zone and the magnitude of the proposed change provide an integrated landscape character impact of **high- moderate**.

5.2.2 Landscape Character Zone 2 - Mixed use

Sensitivity

In Chapter 2 the sensitivity of LCZ 2 was assessed as **Moderate**.

Magnitude

Proposal works in this LCZ would include the introduction of the following elements:

- Some new paved areas along the existing Old Princes Highway
- Some small embankments to accommodate the new road connecting to the roundabout and Jervis Bay Road.

The proposal introduces small changes to this character zone, which has therefore resulted in the magnitude being assessed as **low**.

Assessment of impact:

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

Figure 39. Residential property on Princes Highway (south of Jervis Bay Road) within LCZ 1

Figure 40. Commercial and residential properties west of Old Princes Highway within LCZ 2

5.2.3 Landscape Character Zone 3 -Bushland

Sensitivity

In Chapter 2 the sensitivity of LCZ 3 was assessed as **high**.

Magnitude

Proposal works in this LCZ would include the introduction of the following elements:

- Approximately half of the proposal realignment of the existing Princes Highway to the east and a new road connecting south-bound traffic to Jervis Bay Road. This would result in the removal of a large amount of existing dense native vegetation belonging to the Red Bloodwood - Hard-leaved Scribbly Gum (PCT 1082) in good condition
- A large portion of overpass bridge over Jervis Bay Road
- Large embankments up to 10 metres above the existing ground level
- A shared path along the north-western shoulder of Jervis Bay Road
- New drainage infrastructure such as pit and pipe networks, culverts and open channels
- Roadside furniture including safety barriers, bus stops, signage, lighting and fencing
- Property works including partial acquisition and a new access road.

The proposal introduces new infrastructure and associated earthworks into the natural, largely unmodified landscape character. The clearance of a large proportion of vegetation is also required to accommodate the proposal. The changes to this landscape character has therefore resulted in the magnitude being assessed as **high**.

Assessment of impact:

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

Figure 41. Bushland north of Jervis Bay Road within LCZ 3

5.3 Visual Impact Assessment

This section provides an assessment of the visual impact that would be created by the proposal from a number of viewpoints. The visual impact assessment is intended to identify design improvements that can address adverse impacts either through design integration or as mitigation measures.

The visibility of the proposal is illustrated in the Visual Envelope Map (VEM) (Figure 42). The proposal will be most visible from the properties to the west along Old Princes Highway including from the Stockfeeds site. The elevated infrastructure of the Jervis Bay Road overpass will be most obvious particularly due to the removal of vegetation associated with the new road connecting to Old Princes Highway.

From the eastern and southern sides of the intersection views from properties will largely be obscured due to the existing vegetation and the relatively flat topography. These includes the residences along Jervis Bay Road and the new access road. Glimpses of the proposal from driveways and between trees are likely from a number of houses including the two on the western side of Princes Highway on approach to Willowgreen Road. The proposal from the eastern side will be most visible on the approach along Jervis Bay Road.

The selection of viewpoints were based on identifying:

- Views that assess the impact of the proposal at a range of distances (short, medium and long)
- Particular views that address issues specific to a certain viewpoint (ie. as close to residents as possible).

Four viewpoints have been selected along the proposed corridor, which are:

- Viewpoint 1: Stockfeeds driveway looking south-east
- Viewpoint 2: Residence along Old Princes Highway looking east
- Viewpoint 3: Driveway along Jervis Bay Road looking west
- Viewpoint 4: North-bound along Princes Highway.

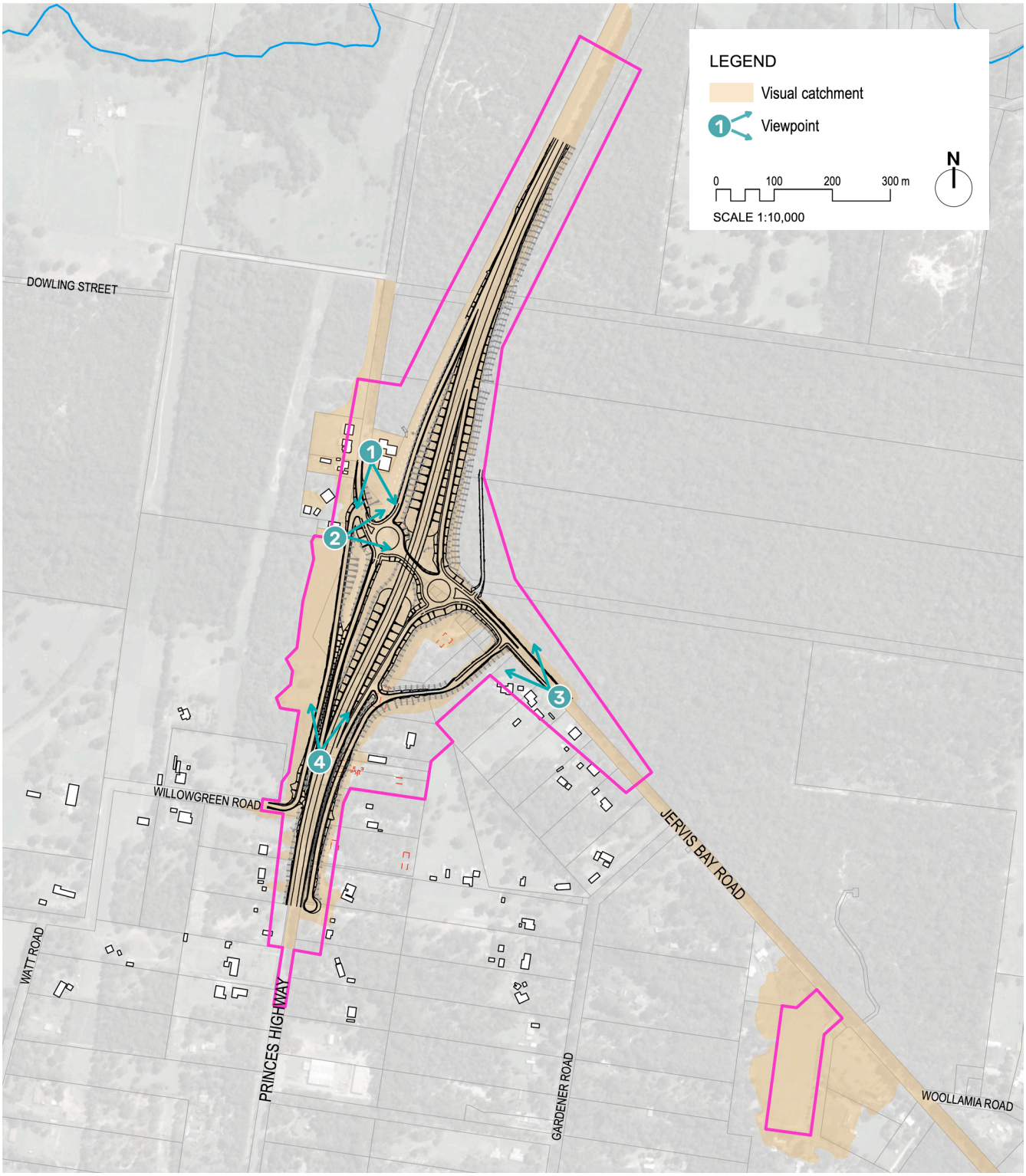


Figure 42. Visual Envelope and Viewpoint Map

Viewpoint 1

Description: This view is from the driveway of Stockfeeds on the corner of Old Princes Highway and an unused access road. The view is south-east towards the existing Princes Highway and is dominated by a grassed embankment sloping up towards the highway. In the mid-ground to the south (right) is dense native vegetation from the *Woollybutt - White Stringybark* community (PCT 1326). In the back ground on the eastern side of the highway vegetation belonging to the *Red Bloodwood - Hard-leaved Scribbly Gum* community (PCT 1082) exists in good condition. There are also some elements of road infrastructure and overhead electrical wire which detract from the view including road barriers and pavement from the access road.

Sensitivity: The Stockfeeds site appears to be frequented by many people during the day. It has attractive native vegetation in the mid and backgrounds, however is a modified landscape in the foreground. The combination of these elements and position and frequency of viewers results in the sensitivity of this viewpoint to be considered **moderate**.

Magnitude: The proposal introduces a large amount of infrastructure in close proximity (50-80 metres) to this viewpoint. The elevated Jervis Bay overpass will be approximately 80 metres away and up to 10 metres high from the existing ground level. Large embankments (2:1 slope), road barriers, traffic and lighting (TBC) will also be seen from this view.

The new Old Princes Highway connection to the Princes Highway would be shifted approximately 220 metres to the north and will result in the removal of all vegetation to the right of this view. The shifting of the alignment of Princes Highway to the east would also remove the background vegetation. The existing Princes Highway and access road will require removal and subsequent rehabilitation. The overhead electrical wires would be relocated underground.

Revegetation is proposed to mitigate its impact during the day but also obstruct light glare from headlights at night. The combination of the increased infrastructure and earthworks, distance to the proposal, and revegetation (assuming 8-10 years maturation) results in the magnitude being assessed as **moderate**.

Assessment of impact: The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides a combined impact of **moderate**. The impact would be reduced over time as the proposed landscape matures.

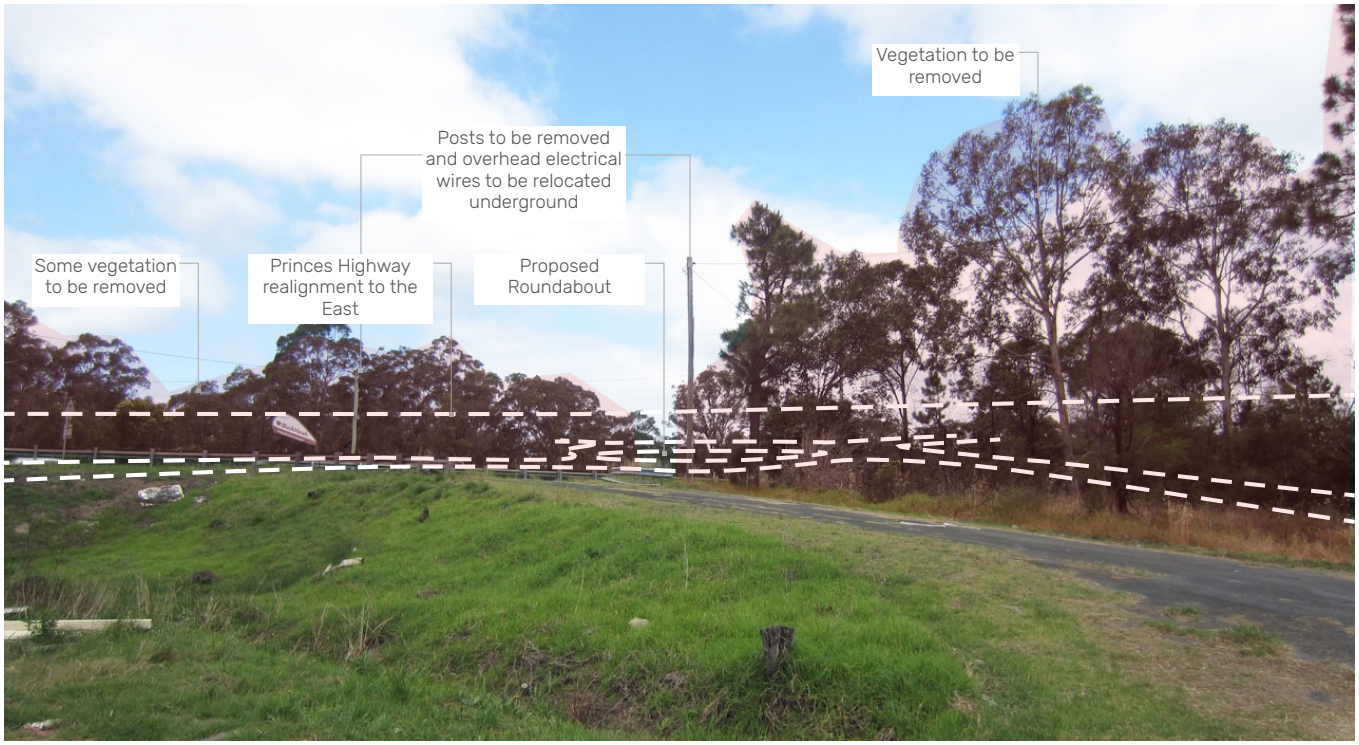
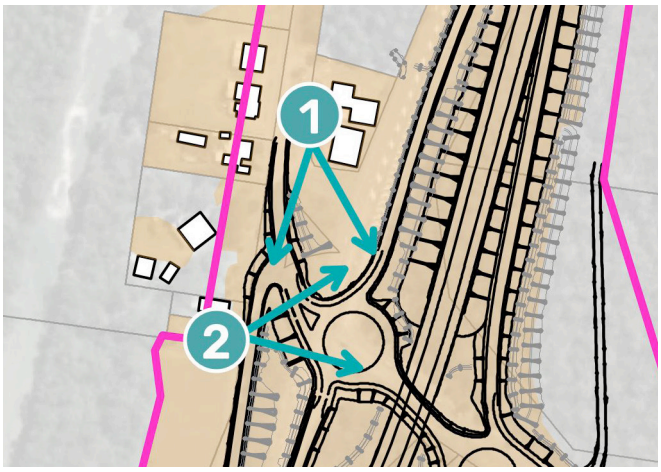


Figure 43. Viewpoint 1: Stockfeeds driveway looking south-east towards the proposal



Viewpoint 2

Description: This view is from the outside of a residential property along Old Princes Highway. The view is north-east towards native vegetation from the *Woollybutt - White Stringybark* community (PCT 1326) in poor condition (*Jervis Bay Road REF Biodiversity Report, 2020*). The vegetation largely includes mature native trees and grass understory. The foreground includes road pavement and the verge of the Old Princes Highway.

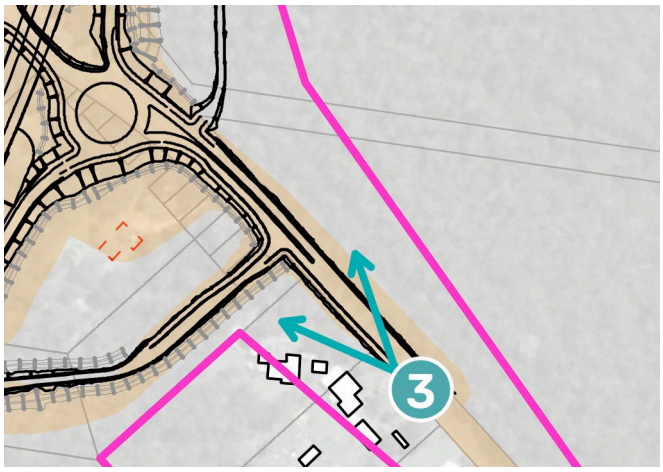
Sensitivity: The view is dominated by mature native vegetation and is from a residential property, therefore the sensitivity of this view is considered to be **high**.

Magnitude: The proposal would require the removal of all of the vegetation in this view to accommodate a new access road from the roundabout and Jervis Bay Road. It would also introduce embankments (2:1 and 4:1), a large grassed drainage channel in the fore and mid-grounds approximately 20-40 metres away. The new Jervis Bay Road overpass and associated embankments (2:1 slope and up to 10 metres high), road barriers, traffic and lighting (TBC) would also be seen from this view, approximately 100 metres away.

Some revegetation is proposed to mitigate its impact, however, due to 2:1 embankments of limited space it would be difficult to achieve the existing coverage and subsequent screening from this view. Light glare from headlights at night would also be an issue for the residents in this location and all along Old Princes Highway. The combination of vegetation removal, revegetation (assuming 8-10 years maturation), the introduction of significant infrastructure and earthworks in close proximity to this viewpoint, results in the magnitude being assessed as **moderate**.

Assessment of impact: The combination of the sensitivity of the viewpoint and the magnitude of the proposal on the view provides a combined impact of **high-moderate**. The impact would be slightly reduced over time as the proposed landscape matures.

Figure 44. Viewpoint 2: Residence along Old Princes Highway looking east



Viewpoint 3

Description: This view is from the driveway outside of a residential property along Jervis Bay Road looking west towards the proposal. The view is enclosed along the carriageway by dense mature native vegetation and provides an attractive outlook from this location. Within the property boundary there are small native trees and large shrubs in the foreground which include *Callistemon* species.

Sensitivity: The view is dominated by mature native vegetation and is representative of the residents view in this location (closest view possible), therefore the sensitivity of this view is considered to be **high**.

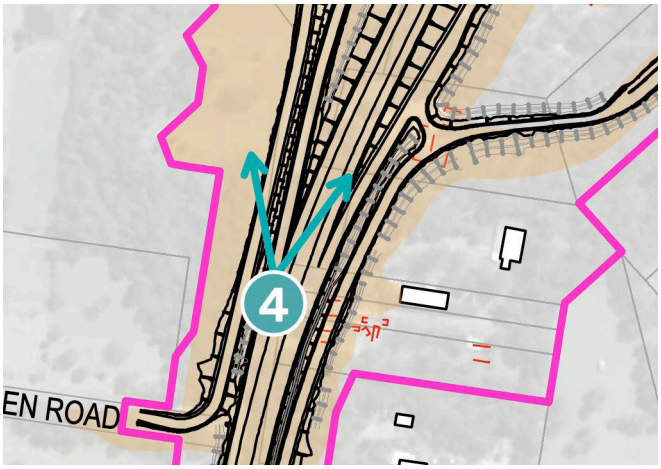
Magnitude: The proposal would introduce a three metre wide shared path along the southern side (left) of Jervis Bay Road, a two metre wide embankment (4:1 slope). This would require up to six metres to be cleared from the road shoulder on this side which would include most of the vegetation in this view. These would open some views from the adjacent residential properties particularity where the shrubs are, however some dense mature native vegetation would remain behind that removed in the mid-ground.

On the northern side (right) of Jervis Bay Road approximately six metres of land from the shoulder would be required to accommodate some minor earthworks and would result in some vegetation loss. As there is dense vegetation behind that to be removed, the view will be similar but more open along the corridor and to the sky.

Some planting is proposed to offset the impact of the proposal but will take time to mature. The impact of the vegetation removal, revegetation (assuming 8-10 years maturation), increased infrastructure and minor earthworks results in the magnitude being assessed as **moderate**.

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

Figure 45. Viewpoint 3: Driveway along Jervis Bay Road looking west



Viewpoint 4

Description: This view is from Princes Highway, just past Willogreen Road, looking north towards the intersection. Dense native vegetation from the *Woollybutt - White Stringybark* community (PCT 1326) and a one and a half metre wide grassed verge are on either side of the road corridor. The road pavement and overhead electrical wires detract from this view.

Sensitivity: The view is dominated by road infrastructure and dense, mature native vegetation, which provides an attractive enclosed experience for motorists. The combination of elements and motorists being transitory results in the sensitivity being assessed as **moderate**.

Magnitude: The existing two-lane carriageway would be widened from approximately 13 to 40 metres to accommodate the road connections to and from Jervis Bay Road and the dual carriageway overpass. The overpass would be lifted and large, steep embankments (2:1) would be seen in the mid and background up to 10 metres high. Further east of the existing Princes Highway (left) there would also be a nine metres wide verge, an access road and a large drainage channel increasing the entire new footprint to approximately 70 metres on the eastern side. To accommodate the proposal, all of the vegetation on this side would be removed.

On the western side minor earthworks (cut), a four metres wide drainage channel and a new road connection between Willowgreen Road and Old Princes Highway would be required. Approximately 20 metres from the existing shoulder would be cleared of vegetation in the fore and mid-grounds, as well as the vegetation in the background (verge in the middle of view). There are not many opportunities for revegetation, particularly trees, in this view due to road infrastructure and 2:1 embankments.

Due to the extensive infrastructure and the removal of most if not all of the vegetation in this view, the magnitude is considered **high**.

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

Figure 46. Viewpoint 4: North-bound along Princes Highway

5.3.1 Viewpoint Summary

The proposal would change views throughout the study area by increasing road infrastructure and earthworks in a scenic bushland setting. With mitigation strategies including landscaping, the overall visual impact of the proposal is considered to be moderate to high-moderate. Areas of re-vegetation are proposed particularly adjacent to the proposal and planting maximised throughout the proposal, however, this would be challenging due to limited space, maintenance requirements, 2:1 and embankments and large drainage channels. Some of the impacts of the proposal would lessen overtime as the shrubs and trees mature.

View Point	Sensitivity	Magnitude	Impact
1	Moderate	Moderate	Moderate
2	High	Moderate	High-Moderate
3	High	Moderate	High-Moderate
4	Moderate	High	High-Moderate

5.4 Mitigation Strategies

A number of urban design and landscape strategies have been proposed to minimise and improve the proposal impacts for residents and motorists which include:

- Fill batters screened where practicable using native shrubs and trees
- The selection of plant species to complement and integrate with existing context, existing plant communities and Shoalhaven Council's suggested species list
- All opportunities to reduce 2:1 embankments to integrate into existing landform and maximise vegetation establishment should be explored
- Fill batters rounded to help integrate into the existing landform and create a more natural appearance
- The design of the abutments of the bridge to complement the existing context and other bridges along Princes Highway
- Large shrubs and accent planting in front of the abutment walls to help reduce its visual impact. Further design measures such as variation in materials of the abutments to be explored in detailed design
- Variation in planting along the 2:1 embankments to provide visual interest while maintaining a native bushland theme
- Maximising screen planting ,where possible, near to existing residential properties along Old Princes Highway, Jervis Bay Road and the new access also providing a headlight screen
- The re-vegetation of acquired properties and roads of includes from the existing plant communities types
- Tree planting has been maximised where practicable to reinforce the enclosed spatial character.

The Landscape Character and Visual Impact Assessment undertaken above is based on the current 80% concept design incorporating all of the above strategies. The ratings however highlight the degree of visual presence of the proposal and its impact on the existing environment. This visual impact of the proposal varies from a rating of moderate to high. Detailed Design would need to ensure that a high degree of attention is paid to the final detailing of the various elements of the proposal including materials and finishes.

The following measures are to be adopted during the Detailed Design stage:

- All reasonable measures taken to minimise the loss of existing vegetation along the proposal corridor. Those measures will include minimise clearing of trees for construction access, rationalisation of maintenance access
- Further opportunities investigated to increase landscape zones within the road corridor
- Lighting and signage to be well-considered in its placement and should not detrimentally add to the visual impact
- At locations where greater visual impacts have been identified, the specification and planting of more mature sized shrubs and trees would be adopted to help reduce the visual impact upon opening of the road since the proposed planting would take a number of years (approximately between three to 10 years) to establish at adequate height
- Management of the natural environment to include rehabilitation of any affected areas of important native habitat and creek embankments; use of endemic vegetation in these and other areas where habitat values are important; during the Detailed Design phase identify and retain as many mature trees as possible; rehabilitate and replace of any lost public space
- Site compounds: rehabilitate with native grasses/ plant community type (PCT) in consultation with land owners

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