



Transport
Roads & Maritime
Services

Foxground and Berry bypass

Princes Highway upgrade

Volume 2 – Appendix I

**Technical paper:
Urban design including landscape
character and visual amenity**

NOVEMBER 2012

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Foxground and Berry bypass

Urban Design Report, Landscape
Character and Visual Impact Assessment

Prepared for
Roads and Maritime Services NSW

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Foxground and Berry bypass

Princes Highway upgrade

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Executive summary

The purpose of this report is to:

- Describe the urban design context of the Foxground Berry bypass (the project), identifying key built, natural, landscape and visual features, characteristics and qualities of the route and its setting.
- Describe the project including the proposed urban design and landscape features and aspects.
- Assess the urban and landscape design of the project (including landscape character and visual impacts).
- Address the Director-General's requirements relating to landscape and visual amenity.
- Identify and describe integrated mitigation measures.

While a specific 'Urban Design Framework' does not yet exist for the whole Princes Highway, the design objectives outlined in this report (Section 2.0) are derived from the RMS urban design policies as published in 'Beyond the Pavement: RTA Urban Design Policy, Procedures and Design Principles' (RTA, 2009), 'Bridge Aesthetics: Design Guidelines to Improve the Appearance of Bridges in NSW' (RTA, 2003), and are also consistent with the 'Gerringong to Bomaderry Princes Highway Upgrade Preliminary Urban and Regional Design Strategy' (AECOM, 2007).

Evaluation of the project

The project has been assessed with regard to:

- Urban design objectives and principles.
- Contextual and landscape character analysis.
- Landscape character and visual impact assessment.

The project has been designed to be consistent with the urban design objectives established during the overall route options assessment stage. The scale of the interventions required for the project (in what is generally an undulating pastoral landscape) will result in impacts that will vary in magnitude. Key specific impacts will include:

- Sections of new alignment, including a substantial cut through Toolijooa Ridge.
- A new interchange at the northern end of Berry.
- A significant new bridge over Broughton Mill Creek and Woodhill Mountain Road.
- A bypass around Berry including new alignment and noise attenuation walls, that run in close proximity to the existing North Street.
- A new interchange at the southern end of Berry with a connection into Kangaroo Valley Road.
- New cut and fill embankments along the route.
- The removal of vegetation and cultural landscape patterns that have evolved over a long period of time.

The integrated urban design concept plan included in this report represents the recommended mitigation strategies for minimising these impacts on landscape character and within the visual environment.

Due to the magnitude of the potential impacts on the landscape character of Berry and the close proximity of these impacts to town, an independent targeted urban design study was undertaken with a focus on the Berry bypass. This study involved detailed community consultation to incorporate community inputs into the concept design and potential mitigation measures.

Four landscape character units have been identified and assessed. The landscape character and visual impacts are considered high for two of these units and moderate to high for the remaining two units.

Nine viewpoints have been identified along the route to illustrate potential landscape character and visual impacts. Existing views and artist's impressions illustrating the project are presented for each viewpoint. The artist's impressions incorporate the recommended mitigation strategies derived from the urban design strategy and illustrate the likely outcomes.

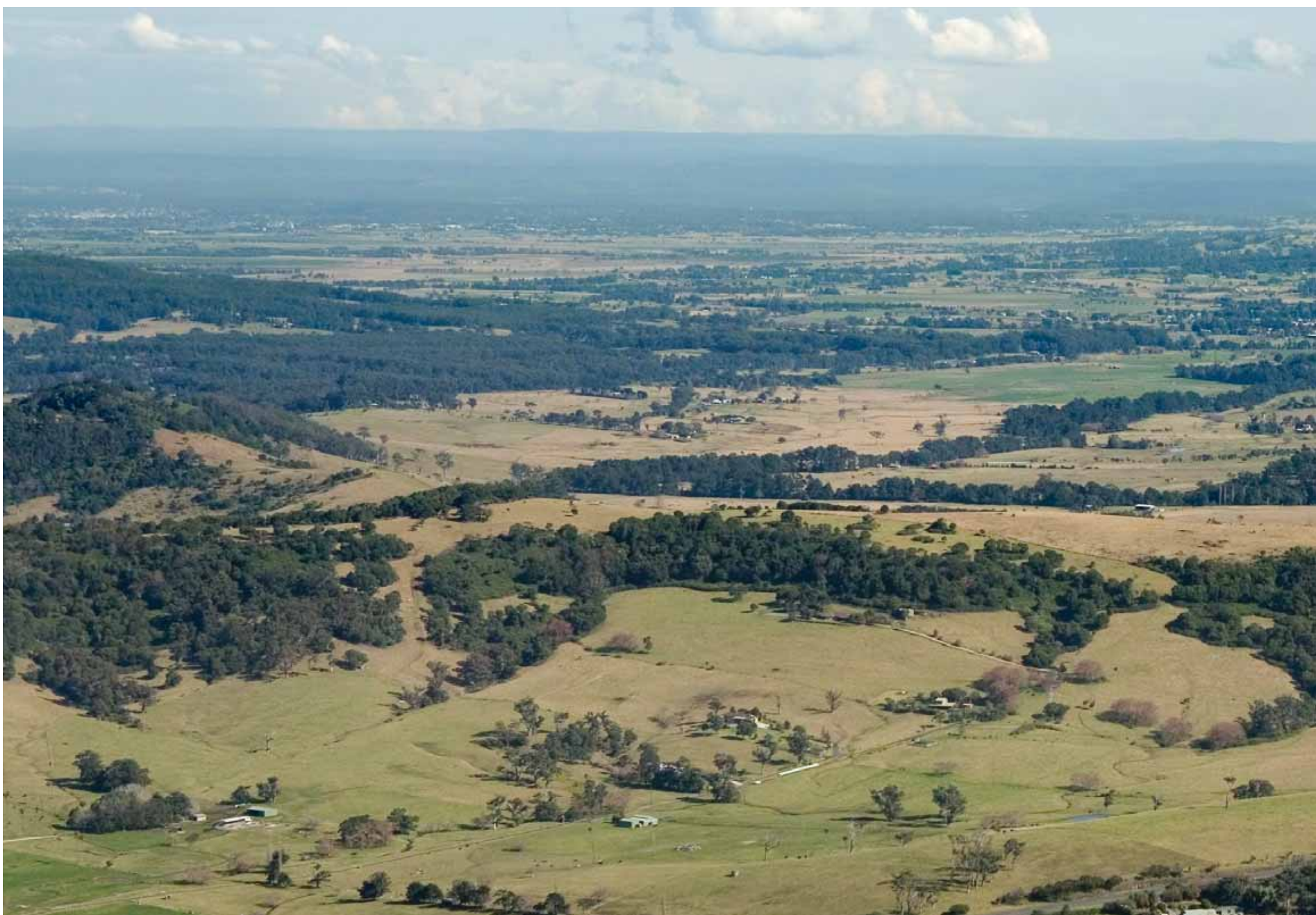
The artist's impressions and the urban and landscape design concept plan combine to illustrate the following key urban design initiatives:

- The development of an alignment and road formation for the proposed highway, that has been designed to best fit with the landform and landscape along the route and to minimise the visual and landscape character impacts.
- The widening of the project footprint during the construction phase that will facilitate:
 - The construction of batter slopes ranging from 4:1 to 10:1, assisting with project cut / fill balances and providing more sympathetic landform integration along the corridor.
 - Maintaining the unique cultural landscape character of the region.
- The use of culturally significant tree species for revegetation strategically along the corridor.
- The reestablishment of open pastoral landscape, including pasture grasses, cultural hedge plantings and rural boundary fencing.
- The selective and prudent screening of some of the new infrastructure associated with the upgrade.
- The development of an alignment and design around Berry selected to minimise potential impact on the town's community open space and heritage features.
- The maintenance of internal connections and circulation patterns within the township of Berry.
- The generation of a design along North Street that recognises the potential substantial impact and change to visual connections between the northern edge of Berry and the ridges and escarpment to the north and west.

- The strengthening of the connection between the eastern side of Berry and its western expansion at the new southern interchange.
- The holistic and considered integration of bridge and retaining elements within the urban design framework.

Of key importance to the implementation of the suggested mitigation and management measures would be:

- To engage with the local community to gather feedback as the design develops, foster broader community support and ownership for the design outcome and facilitate integration with existing pedestrian access mobility plans for the township of Berry.
- To facilitate landscape and urban design outcomes that resolve other project opportunities and constraints including:
 - Balancing cut and fills.
 - Utilising RMS owned land along the corridor to facilitate increasing the short term footprint of the project to reduce the long term footprint and therefore maintenance requirements (primarily through the return to pasture land).





1 Introduction

1.1 The project

The Roads and Maritime Services (RMS) is proposing to upgrade the Princes Highway between Toolijooa Road and Schofields Lane with a bypass to Foxground and the town of Berry. The project is part of the RMS's program to upgrade the Princes Highway between Gerringong and Bomaderry, providing increased road safety and traffic efficiency in the South Coast region.

The horizontal and vertical alignments of the existing largely two-lane highway between Toolijooa Road and Schofields Lane require upgrading to meet current design safety and traffic efficiency requirements. The highway has limited overtaking opportunities, many junctions with rural roads and private, uncontrolled accesses. The existing road also passes directly through the township of Berry (along Queen Street), having a detrimental effect on the safety and amenity of the street.

The preferred route option best meets the objectives applied across the program of projects for the Princes Highway upgrade between Toolijooa Road and Mullers Lane. The route performs well across a combination of the technical inputs gathered through investigations carried out to date (including a review of studies from previous investigations into the project), community feedback and the findings of the value management process.

Other projects included in the ultimate program of works to upgrade the Princes Highway between Gerringong and Bomaderry include:

- The Gerringong upgrade (GU).
- The Berry to Bomaderry upgrade (BBU).

The GU is currently within the detailed design phase. The BBU will be assessed in a future report.

1.1.1 The study area

The study area extends from Toolijooa Road in the north (the southern extent of the proposed GU), to Mullers Lane in the south. Mullers Lane is located just south of Berry township, refer to **Figure 1.1**. The study area varies in width from about one to three kilometres and is strongly influenced by the underlying natural landform and the past and present cultural settlement and pastoral practices. The northern and western sections of the study area are bordered by the southern end of the Illawarra escarpment, Curry's mountain and the Cambewarra range. The eastern and southern sections are bordered by Broughton Creek, Toolijooa Ridge and the South Coast railway line.

From north-east to south-west the study area includes Toolijooa Ridge and Broughton Village where it crosses the Broughton Creek floodplain. At Broughton, the terrain climbs and follows an undulating low ridge line towards the south-west before gently descending down into the township of Berry.

West of Berry the terrain starts to rise into the foothills of the Cambewarra Range while to the south and east, the broad floodplain of the lower Broughton Creek meanders toward the Shoalhaven river landscape.

The undulating landscape, pastureland and rural settlement patterns are defining features within the study area. The broader context is dominated by the almost constantly visible backdrop of the ridges and escarpment of the Cambewarra Range. The rural landscape includes a mix of past agricultural and pastoral activities that have been occurring since the first half of the nineteenth century combined with smaller scale rural allotments with varied practices.

The largest agricultural influence is dairy farming. This has defined the general pattern of vegetation clearance, rural boundaries (by linear cultural plantings) and the distribution of rural houses and farm buildings along the route.

Within the pastoral landscape, topography and drainage patterns provide the major source of variation. The character of the rural backdrop is markedly different between the undulating higher elevations associated with the forested foothills of the Cambewarra Range and the openness of the Broughton Creek floodplain. There is a constant interplay between areas of roadside vegetation and undulating open pastoral landscape that provides for a mix of intimate landscape experiences and broad vistas. North west of the confluence of Broughton and Broughton Mill creeks is the township of Berry. The older section of Berry is set out in a traditional grid pattern and is strongly contained by the South Coast railway line to the south and east and flood prone land to the north. For a detailed description of Berry refer to **Section 5.4.2**.

The rural backdrop is slowly changing due to the partial decline of the dairy industry. This has created a more complex landscape pattern with a wider variety of agricultural activities resulting in increased areas under cultivation.

For further description of the study area refer to **Section 5.0**.

1.1.2 Design constraints

Significant constraints which influence the location and design of the project include:

- The existing highway corridor.
- Extensive areas of slope steeper than 30 per cent.
- The existing sub-standard road geometry.
- Floodplains and soft soil conditions.
- Numerous creek crossings.
- Existing land uses and settlement patterns.
- The Berry township.
- The location of the eastern gas pipeline.
- Indigenous and non-indigenous cultural heritage locations within the study area.
- The residences and communities within and adjacent to the study area.



Figure 1.1 - The overall Princes Highway upgrade between Gerringong and Bomaderry

1.1.3 Major design elements

The project is about 11.6 kilometres in length. **Figure 1.1** highlights the project in the context of the three highway upgrade sections between Gerringong and Bomaderry. **Figure 1.2** illustrates the proposed route and the key elements of the project as they relate to the urban and landscape design. The project is part of the overall Princes Highway upgrade, the overarching objectives of which are to improve road safety and reduce travel times. A detailed description of the project elements is outlined in **Section 3.2**.

1.2 Study methodology

Early planning is the key to achieving an integrated urban design strategy for major infrastructure projects. The project would ultimately become part of the fabric of the community and landscape into which it is integrated. The establishment of a collaborative multidisciplinary design team prior to route selection has ensured consistent, high level awareness of the landscape and urban design objectives. This enables an integrated 'whole of corridor' outcome within the context of the entire Princes Highway.

Development of the urban design concept plan has been a process of informing and being informed by each of the design team disciplines to ensure a holistic integrated solution.

In this report the following studies are documented as part of the design process:

- Urban and landscape design objectives and principles in **Section 2.0** were developed for the strategic concept design (alignment) of the whole of the Princes Highway upgrade between Gerringong and Bomaderry. These objectives and principles were then used to develop and assess the project.
- A contextual analysis of the Princes Highway was documented to assist in understanding the environment around the project. This analysis was undertaken through field surveys and desktop studies to determine character units, identify key local and regional characteristics and qualities; and identify site opportunities and constraints.
- A landscape character assessment and visual analysis was undertaken in accordance with the 'Environmental Impact Assessment Guidance Note: Guidelines for Landscape Character and Visual Impact Assessment: EIA-N04' (RTA, 2009b) to identify key viewpoints and to review the character of the study area. The visual analysis was used to identify potential impacts of the proposed engineering concept design and to make recommendations for impact treatment and mitigation measures.

Consistent with the overall philosophy and goals for urban design, as described within 'Beyond the Pavement: RTA Urban Design Policy, Procedures and Design Principles' (RTA, 2009), the urban and landscape design team have been continually engaged throughout the concept design phase of the project.

In order to realise the full potential of the integrated approach used to develop the concept design and leave a positive legacy within the landscape and community, collaboration between design disciplines will continue through the detailed design phase of the project to ensure that the 'whole of corridor' landscape and urban design objectives are met.

This report uses both desktop and field studies to define the contextual landscape, physical characteristics and visual analysis of the project area. Information was gathered from the site by undertaking field surveys (in public areas such as, along local roads, within Berry township and along the existing Princes Highway corridor) to assess likely view points and impacts of the project.

1.2.1 Concept design development approach and process

Consistent with the overall philosophy and goals for urban design, as described within 'Beyond the Pavement: RTA Urban Design Policy, Procedures and Design Principles' (RTA, 2009), the urban and landscape design team have been continually engaged throughout the concept design phase of the project.

Maintenance of the integrity of the urban design objectives has been met through a range of initiatives including:

- Participation in value management and value engineering workshops.
- The preparation of visualisations and diagrams to measure the potential impacts of the proposed design options.
- Collaboration with the environmental, geotechnical and earthworks; and road and drainage design disciplines to maximise opportunities for integrated concept design solutions.
- Urban design studies of Berry that illustrate the broader contextual impacts of the bypass and what opportunities and constraints these present.

Adjustments to the alignment were developed through consultation with residents in a community review group and an independent urban design review was undertaken by CM+ to assess the design of the Berry bypass section of the project. The agreed outcomes of the adjusted alignment have been included in this report. The artist's impressions prepared by CM+ are included in **Section 6.8.11** through **Section 6.8.14**, and **Appendix A**.

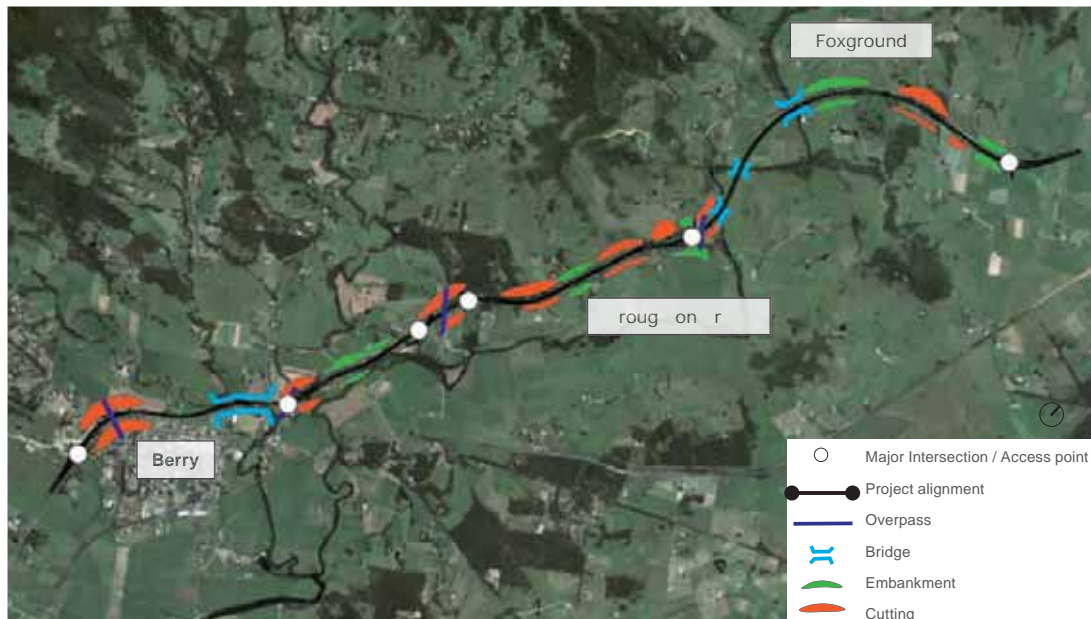


Figure 1.2 The project and the key elements associated with the project

1.2.2 Landscape character units

The project was broken down into a series of landscape character units that were used as the basis for the strategy and assessment of the urban and landscape design.

The landscape character units are defined and discussed in **Section 5.5**.

1.2.3 Options identification and testing

A number of options were identified and tested during design refinement. These options were worked through in a collaborative process to provide a balanced multi-criteria analysis of all of the opportunities and constraints. The key areas of focus were:

- The Toolijooa Ridge cutting and transition onto the Broughton Creek floodplain.
- The Austral Park Road interchange and connection with the existing highway.
- The Berry east interchange and bridge at Berry alignment and arrangement.
- The North Street corridor and Town Creek alignment.
- The Kangaroo Valley Road interchange.

1.3 Director General's requirements

The Director-General's requirements (DGRs) relating to landscape and visual amenity for the project, and where they are addressed, are listed in **Table 1. 1**.

Table 1.1 - Director-General's requirements related to landscape and visual amenity

Director General's requirements	Where addressed
Landscape and visual amenity - including but not limited to:	
<ul style="list-style-type: none">• Assessment of visual significance of the area, including the escarpment and ridges and the township of Berry, and impact of the proposed alignment.	<ul style="list-style-type: none">• Section 5.0 and Section 6.7
<ul style="list-style-type: none">• Design of the project (including noise barriers, retaining walls and landscaping) consistent with the existing (and desired) character of affected localities, including consideration of RMS' 'Noise Wall Design Guideline: Design Guidelines To Improve The Appearance of Noise Walls in NSW' (RMS, 2006). The assessment should also consider highway/street lighting and the potential lightspill impacts on nearby residents.	<ul style="list-style-type: none">• Section 3.0, Section 4.0, Section 5.0 and Section 7.0

1.4 Structure of this report

The structure of the report is as follows:

- **Section 1.0** - Introduction.
- **Section 2.0** - Urban design objectives and principles.
- **Section 3.0** - Concept design description.
- **Section 4.0** - Urban and landscape design strategy.
- **Section 5.0** - Contextual and landscape character analysis.
- **Section 6.0** - Landscape character and visual impact assessment (describing the likely visual impacts of the project through a review of key viewpoints towards and along the route).
- **Section 7.0** - Mitigation and management measures (integrated design and management measures and reference design parameters for key project elements).
- **Appendix A** - This includes the Berry Bypass Urban Design Report prepared by CM+ documenting the outcomes of the community engagement process.

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Urban design objectives and principles

2 Urban design objectives and principles

2.1 Purpose of project urban design objectives and principles

While a specific 'Urban Design Framework' does not yet exist for the whole Princes Highway, the design objectives outlined in this report (**Section 2.0**) are derived from the RMS's policies regarding urban design as published in 'Beyond the Pavement: RTA Urban Design Policy, Procedures and Design Principles' (RTA, 2009). This is explained in further detail in **Section 2.2** and **Section 4.0** - Urban and landscape design strategy.

The purpose of defining the project's urban design objectives and principles

Design objectives and principles provide a framework to ensure the project's design integrates harmoniously within the context of the natural and cultural landscape. Their intent is to guide the design process while allowing flexibility to refine the fine detail of the design to achieve a best-for-project outcome. The objectives and principles encourage integration with other road infrastructure upgrades within the region (including the North Kiama bypass, upgrade of the Princes Highway between Oak Flats and Dunmore, and the Sea Cliff bridge) which provide successful precedents for culturally relevant urban design.

The objectives and principles, along with the visual assessment and landscape character assessment (refer to **Sections 4.0** and **5.0**) are used as a basis for the interrogation of the preferred route and concept design for the project throughout this report. They will also continue to be used as a benchmark for future stages of the project design development.

2.2 Objectives and principles of the project

The objectives that form the urban and regional design framework for the project are supported by specific design principles which guide their achievement. These include:

Objective One: Provide a flowing highway alignment that is responsive and integrated with the natural landscape

- The route selection should respond to the grain of the landscape, including following the edges of valleys and hills and avoid, where possible the disruption of stands of vegetation, both natural and cultural.
- Integrate cut and fill embankments with surrounding terrain by grading out and varying slopes.
- Consider independently graded carriageways.
- Preserve existing cultural patterns within the landscape.
- Avoid where possible impact to significant local features through which the project passes.

- Vary the gradient of earthworks to provide visual interest and reflect the characteristics of the surrounding landform and landscape.
- Grade out cuttings and embankments, where possible to best fit the characteristics of the local landform, returning the land to its former use or replacing vegetation lost to the project.

Objective Two: Protect the natural systems and ecology of the corridor

- Avoid, where possible areas of natural vegetation, particularly those containing threatened species and communities.
- Minimise disruption to natural drainage patterns both through route selection and road design.
- Minimise the number of creek crossings.
- Use medians and road verges to maximise habitat value and maintain pollination paths and wildlife movement patterns.
- Integrate the landscape qualities and characteristics of the project landscape with the locality through which it passes.
- Integrate water quality basins within the landscape form and character.

Objective Three: Protect and enhance the heritage and cultural values of the corridor

- Avoid, where possible areas of identified historic and Aboriginal heritage and cultural value.
- Acknowledge and respond to the heritage and cultural values of the rural landscape.
- Acknowledge and respond to Aboriginal values placed on the broader landscape.
- Reduce the visual and noise impacts of the project.
- Consider the important value of productive landscapes.

Objective Four: Respect the communities and towns along the highway

- Minimise the project impacts to local township residents.
- Provide safe and efficient access to towns.
- Divert the highway around the town of Berry to improve the amenity of its centre in particular, Queen Street.
- Minimise, where possible the visibility of the highway from the edges of Berry, particularly those views along its north - south streets.
- Provide safe and efficient access from the highway into Berry, maintaining visual connections that encourage road users to visit the town.
- Minimise the disruption and loss of amenity to rural residents within the study area.

Objective Five: Provide a safe, enjoyable and interesting highway with strong visual connections to the Pacific Ocean, immediate hinterland, and mountains to the west

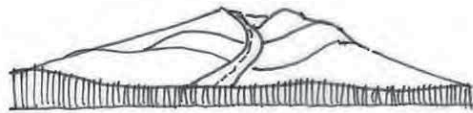
- Acknowledge the role of this section of the Princes Highway as an important part of a longer scenic drive along the New South Wales South Coast.
- Maximise the opportunities for high quality and varied views of the coast, the rural landscape and adjacent mountain ranges.
- Provide visual connections (way finding and directional signage) marking access to the towns/communities along the route.
- Use landscape treatments to soften the appearance of the road for its users without compromising opportunities for key views.
- Consider the heritage aspects of the route to enable road users, where practicable to experience them.

Objective Six: Develop a simple and unified palette of elements and details that are easily maintained

- Develop a consistent approach to the design of bridges along the project. Urban design principles to be consistent with those outlined in 'Bridge Aesthetics: Design Guidelines To Improve The Appearance of Bridges in NSW' (RTA, 2003).
- Develop a consistent approach to the design of noise walls along the project. Apply urban design principles consistent with those outlined in RMS' 'Noise Wall Design Guideline: Design Guidelines To Improve the Appearance of Noise Walls in NSW' (RTA, 2006).
- Develop an integrated strategy for the avoidance, minimisation and improved appearance of shotcrete as outlined in 'Shotcrete Design Guidelines: Design Guidelines to Avoid, Minimise and Improve the Appearance of Shotcrete' (RTA, 2005).
- Develop a consistent approach to the design of soft landscaping along the route. Planting design principles to be consistent with those outlined in 'Landscape Guideline: Landscape Design and Maintenance Guidelines to Improve the Quality, Safety and Cost Effectiveness of Road Corridor Planting and Seeding' (RTA, 2008).

The unifying philosophy behind these objectives (and associated design principles) is the goal to develop a project that not only meets functional and engineering criteria, but one that respects the environment in which it is located. The urban and regional design framework is intended to be a fundamental component of all stages of highway planning and design.

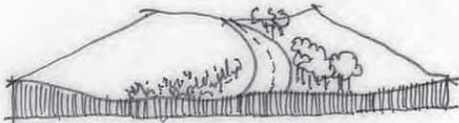
Conceptually, these principles are illustrated in **Figure 2.1**.



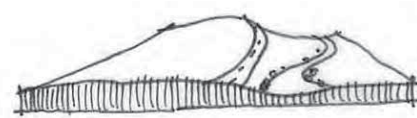
Preservation of and response to the natural landform



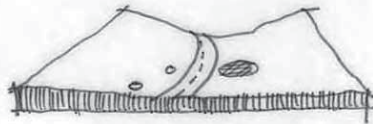
Preservation of cultural patterns in the landscape



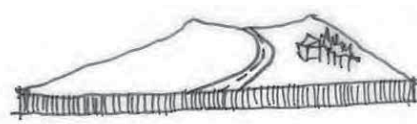
Avoidance of wetlands, unique habitats and remnant plant communities



Respect for rivers, streams and natural drainage ways



Preservation of historical archaeological sites



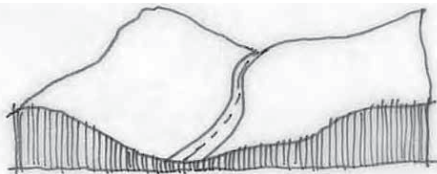
Preservation of historical cultural landscapes



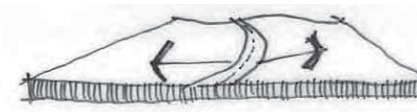
Preservation of context of communities



Consideration of adjacent land uses and access to and from highway



Highway location to engage with terrain



Recognition of special view sheds and scenic character

Figure 2.1 Design principles



3



Concept design description

3 Concept design description

3.1 The concept plan

The project concept design is illustrated and described in **Figure 3.1**. The urban design and landscape concept plans supported with sections, typical treatment illustrations and enlargement plans are illustrated in **Figure 3.2** through to **Figure 3.27**.

3.2 The design elements

RMS propose to upgrade 11.6 kilometres of the Princes Highway between Toolijooa Road north of Foxground and Schofields Lane south of Berry, in New South Wales (NSW) (the project), to achieve a four lane divided highway (two lanes in each direction) with median separation. The project includes bypasses of Foxground and Berry.

The project comprises the following key features:

- Construction of a four lane divided highway (two lanes in each direction) with median separation (wire rope barriers or concrete barriers where space is constrained, such as at bridge locations).
- Bypasses of the Foxground bends and the Berry township.
- Construction of around 6.6 kilometres of new highway where the project deviates from the existing highway alignment at Toolijooa Ridge, the Foxground bends and the Berry township.
- Provision for the possible widening of the highway (if required in the future) to six lanes within the road corridor and, in some areas, construction of the road formation to accommodate future additional lanes where safety considerations, traffic disruption and sub-optimal construction practices are to be avoided.
- Grade-separated interchanges at:
 - Toolijooa Road.
 - Austral Park Road.
 - Tindalls Lane.
 - East of Berry at the existing Princes Highway, referred to as the northern interchange for Berry.
 - West of Berry at Kangaroo Valley Road, referred to as the southern interchange for Berry.
- A major cutting at Toolijooa Ridge (around 900 metres long and up to 26 metres deep).
- Six lanes (two lanes plus a climbing lane in each direction) through the cutting at Toolijooa Ridge for a distance of 1.5 kilometres.
- Four new highway bridges:
 - Broughton Creek bridge 1, a four span concrete structure around 167 metres in length and nine metres in height.
 - Broughton Creek bridge 2, a three span concrete structure around 76 metres in length and eight metres in height.
 - Broughton Creek bridge 3, a six span concrete structure around 190 metres long and 13 metres in height.
- A bridge at Berry, an 18 span concrete structure around 600 metres long and up to 12 metres in height.
- Three highway overbridges:
 - Austral Park Road interchange, providing southbound access to the highway.
 - Tindalls Lane interchange, providing southbound access to and from the highway
 - Southern interchange for Berry, providing connectivity over the highway for Kangaroo Valley Road along its existing alignment.
- Eight underpasses including roads, drainage structures and fauna underpasses:
 - Toolijooa Road interchange, linking Toolijooa Road to the existing highway and providing northbound access to the upgrade.
 - Property access and fauna underpass in the vicinity of Toolijooa Ridge at chainage 8400.
 - Dedicated fauna underpass in the vicinity of Toolijooa Ridge at chainage 8450.
 - Property access underpass between Toolijooa Ridge and Broughton Creek at chainage 9475.
 - Combined drainage and fauna underpass in the vicinity of Austral Park Road at chainage 12770.
 - Combined drainage and fauna underpass in the vicinity of Tindalls Lane at chainage 13320.
 - Dedicated fauna underpass in the vicinity of Tindalls Lane at chainage 13700.
 - Property access underpass between the Tindalls Lane interchange and the northern interchange for Berry in the vicinity of at chainage 15100.
- Modifications to local roads, including Toolijooa Road, Austral Park Road, Tindalls Lane, Gembrook Lane, North Street, Queen Street, Kangaroo Valley Road, Hitchcocks Lane and Schofields Lane
- Diversion of Town Creek into Bundewallah Creek upstream of its confluence with Connollys Creek and to the north of the project at Berry.
- Modification to about 47 existing property accesses.
- Provision of a bus stop at Toolijooa Road and retention of the existing bus stop at Tindalls Lane.
- Dedicated u-turn facilities at Mullers Lane, the existing highway at the Austral Park Road interchange and Rawlings Lane.
- Roundabouts at the southern interchange for Berry and the Woodhill Mountain Road junction with the exiting Princes Highway.
- Two cul-de-sacs on North Street and the western end of Victoria Street in Berry.
- Tie-in with the existing highway about 75 metres north of Toolijooa Road and about 440 metres south of Schofields Lane.
- Left in/left out only provisions for direct property accesses to the upgraded highway.

- Dedicated public space with shared pedestrian/cycle facilities along the southern side of the upgraded highway from the playing fields on North Street to Kangaroo Valley Road.
- Ancillary operational facilities, including permanent detention basins, stormwater treatment facilities and a permanent ancillary facility site for general road maintenance.

The project and the key features of the project are shown **Figure 3.1**

- Construction activities as part of the project would include the following:
 - Site preparation and establishment works.
 - Temporary construction facilities, including construction compounds, stockpile sites, creek crossings, sediment control basins and haulage roads.
 - Temporary works, including relocation/protection of services, tie-ins, traffic facilities and side tracks.
 - Earthworks and bridge construction.
 - Pavement construction.
 - Drainage construction.
 - Street furniture installation.
 - Site restoration.

3.3 Application of the urban and landscape design principles

The concept design utilises existing landscape elements to integrate a design response which is sensitive to its landscape context. The key design elements that relate to the overall strategy are:

- Widening the project footprint during construction to flatten batters, reestablish pasture grasses and ultimately minimise the footprint impact. This will also allow for better ultimate landform and land use integration.
- Reducing the size and scale of structural elements within the landscape.
- Minimising the impacts on the township of Berry and reinforcing the opportunities that the bypass presents.
- Reinforcing the cultural landscape by planting trees perpendicular to the carriageway at the interface of creeks, fence lines and existing vegetation lines.
- Extending the pastoral landscape to the edges of the carriageway.
- Responding to the open nature of the broader landscape setting.
- Integrating the design to minimise impacts to the existing landscape character.

3.4 Urban design and landscape concept plan

The urban design and landscape concept plans are illustrated in **Figure 3.2** through to **Figure 3.27**. The concept design responds to the Urban and Landscape Design Strategy (**Section 4.0**), which was informed by the visual assessment and contextual analysis as documented in **Sections 4.0** and **5.0**.

The visual assessment and contextual analysis identify impacts associated with the project and the Urban and Landscape Design Strategy proposes treatments and mitigation measures that have been integrated into the concept design to minimise its impacts.

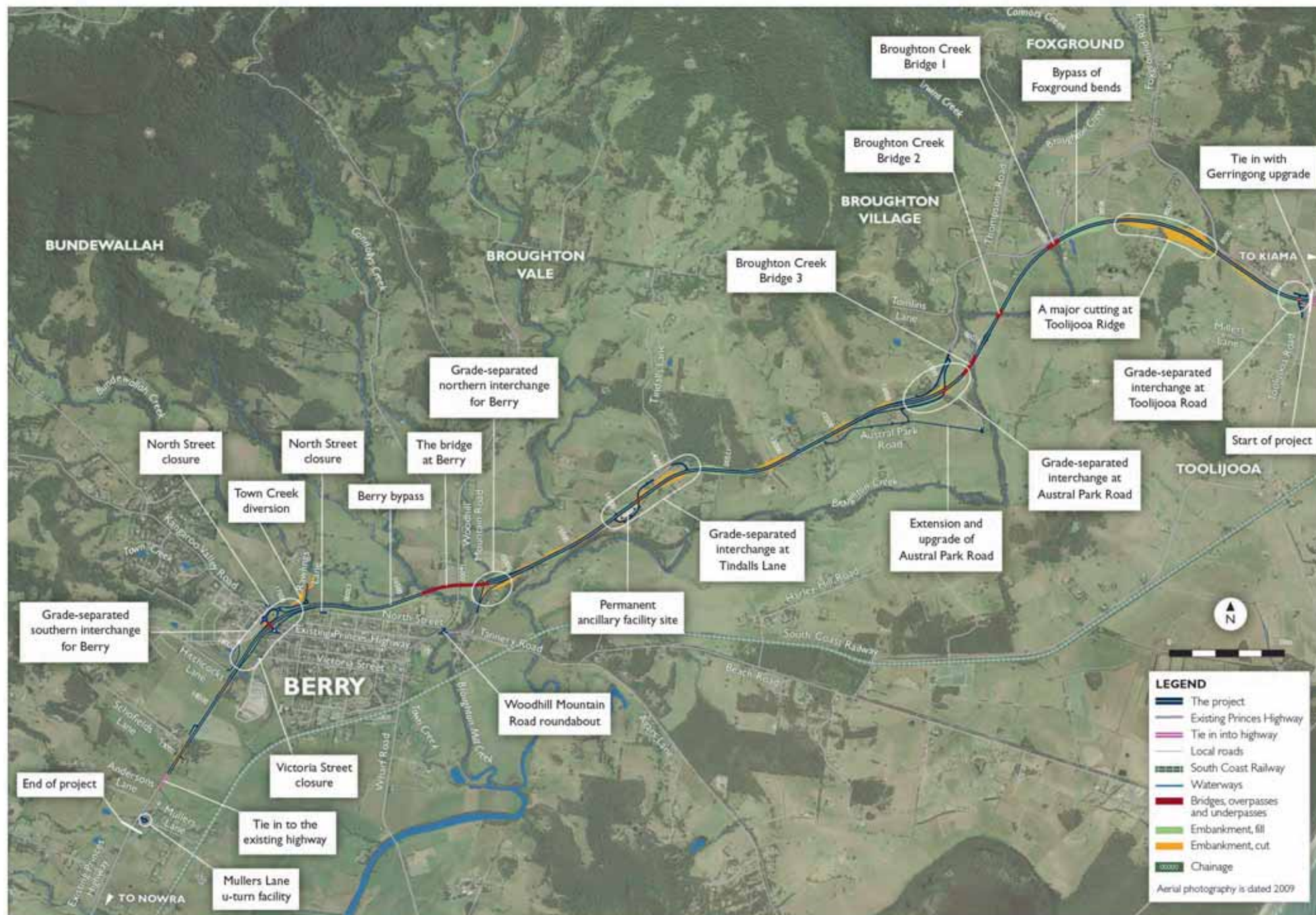
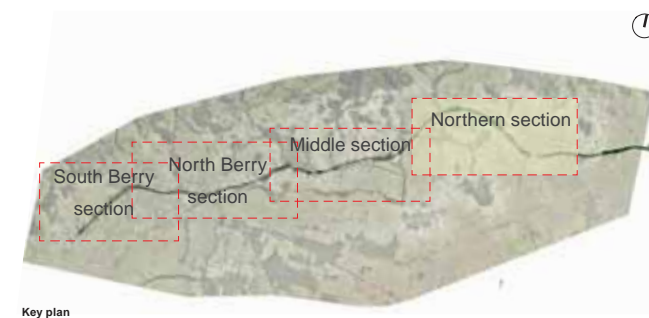
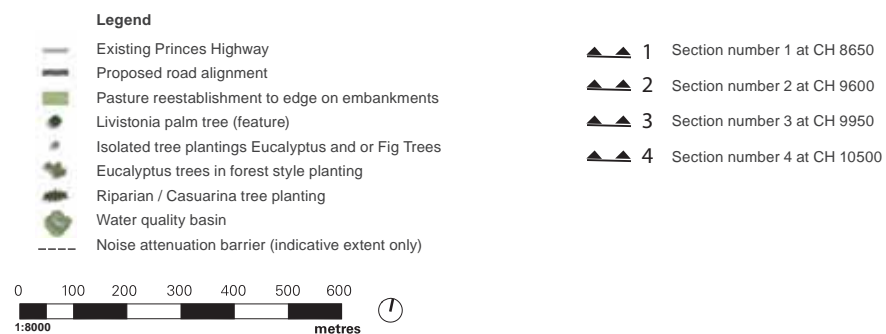
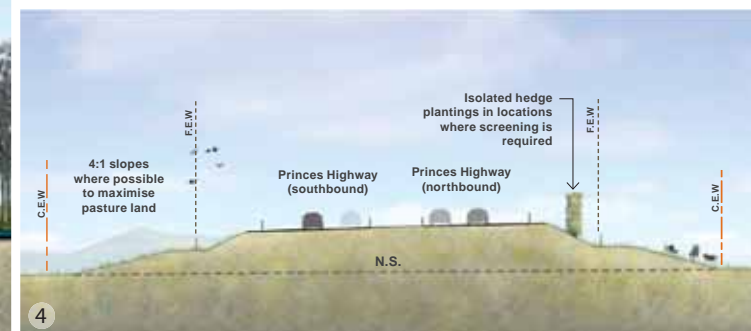
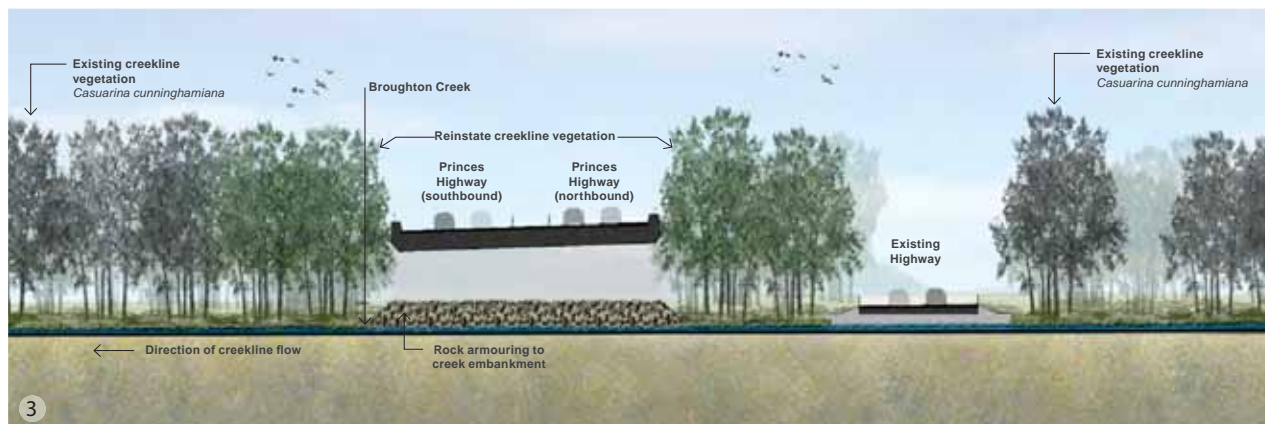
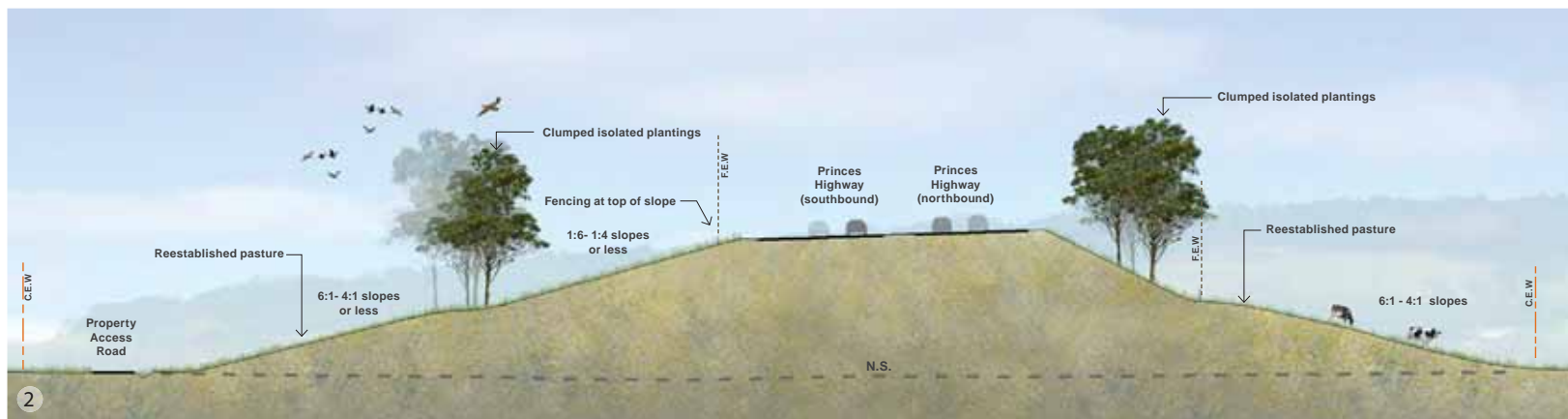
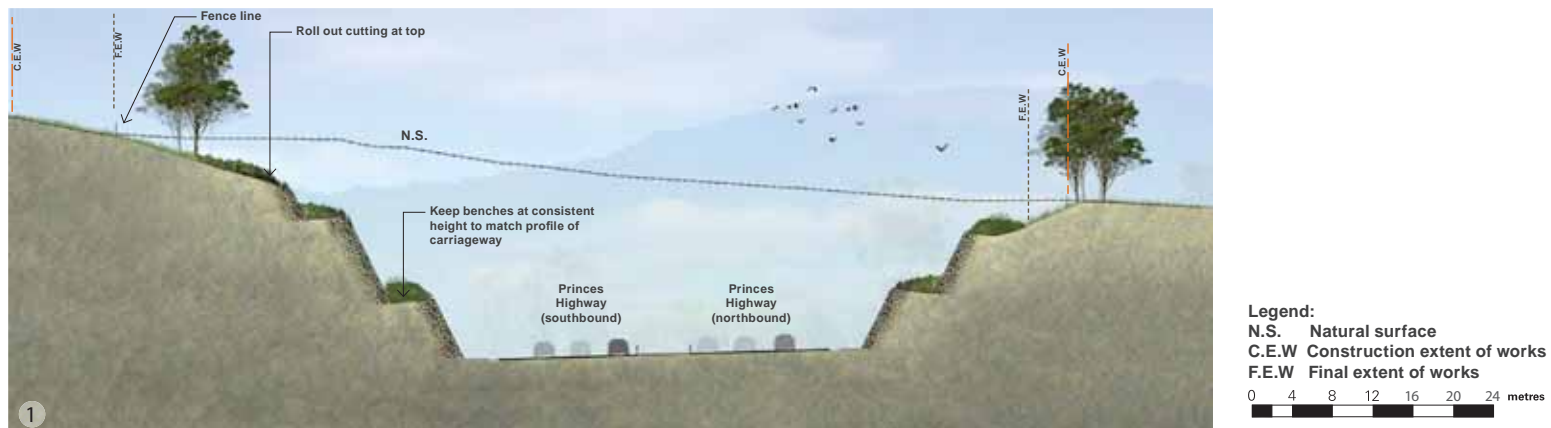


Figure 3.1 The project engineering concept drawing



Figure 3.2 Concept for northern section of the project including Toolijooa and Broughton Creek





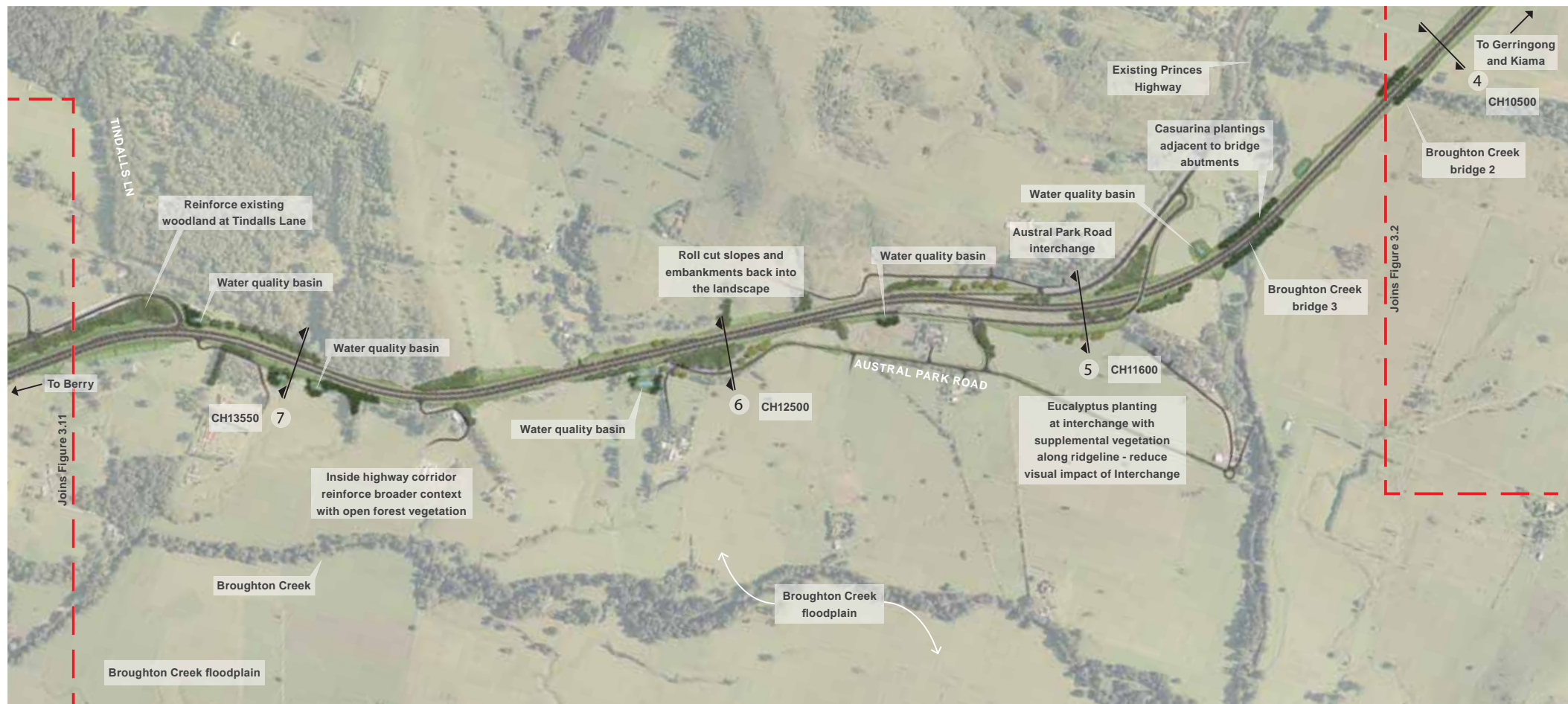


Figure 3.7 Concept for middle section of the project including Broughton Creek and North Berry



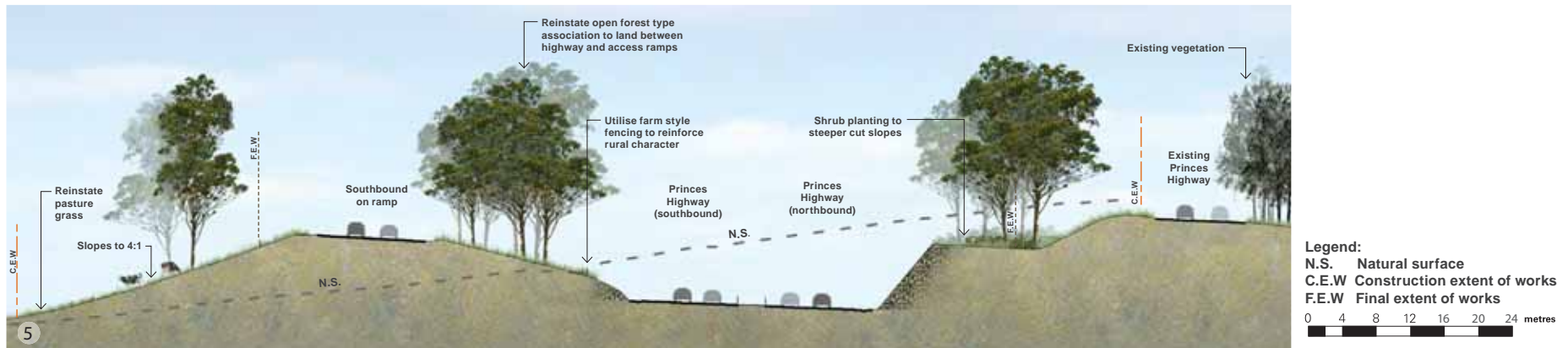


Figure 3.8 Elevation / Section 5 - North Berry - Chainage 11600

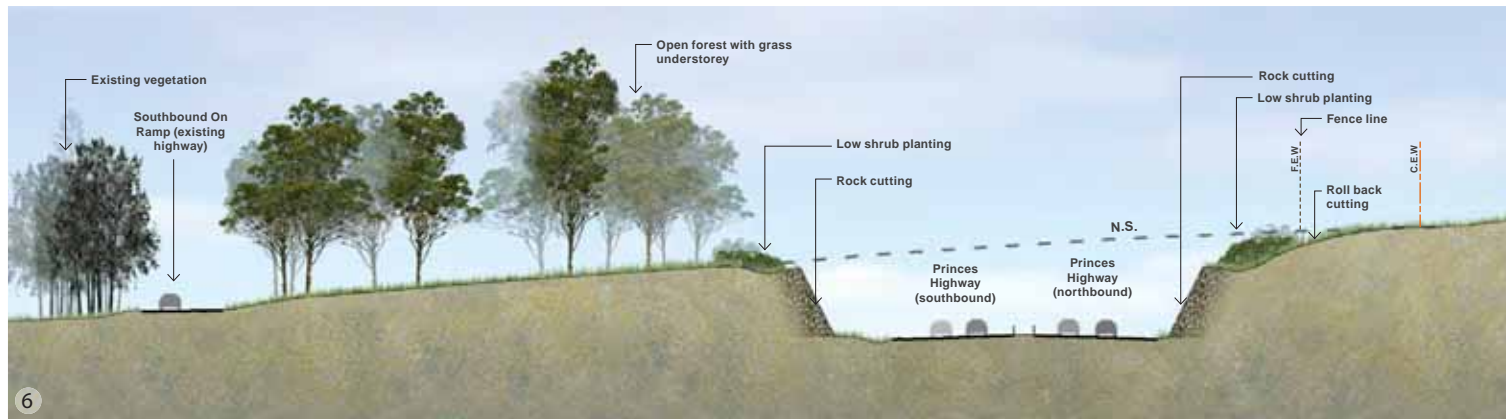


Figure 3.9 Elevation / Section 6 - Broughton Creek - Chainage 12500

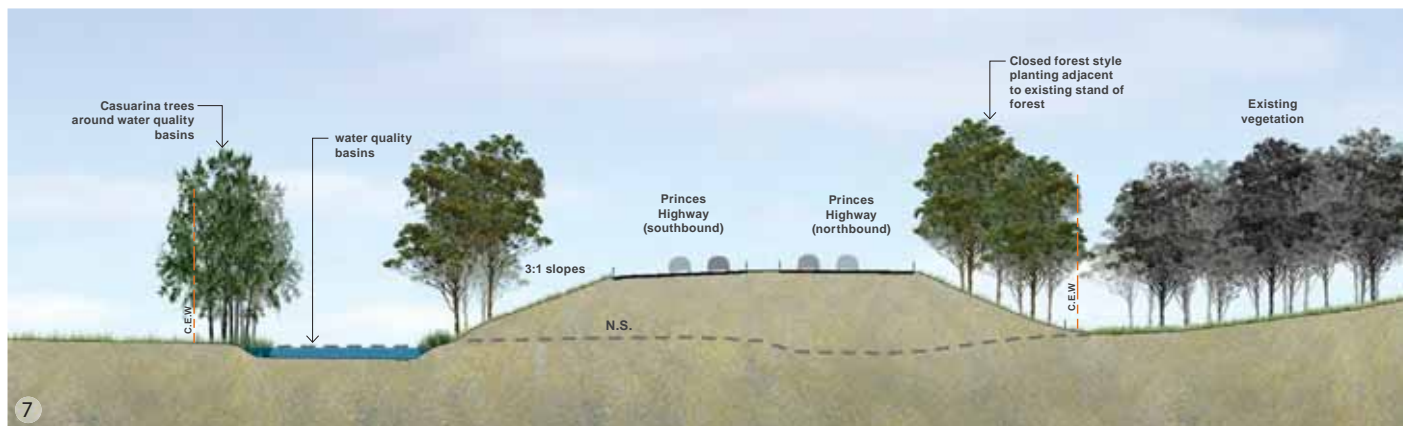


Figure 3.10 Elevation / Section 7 - North Berry - chainage 13550

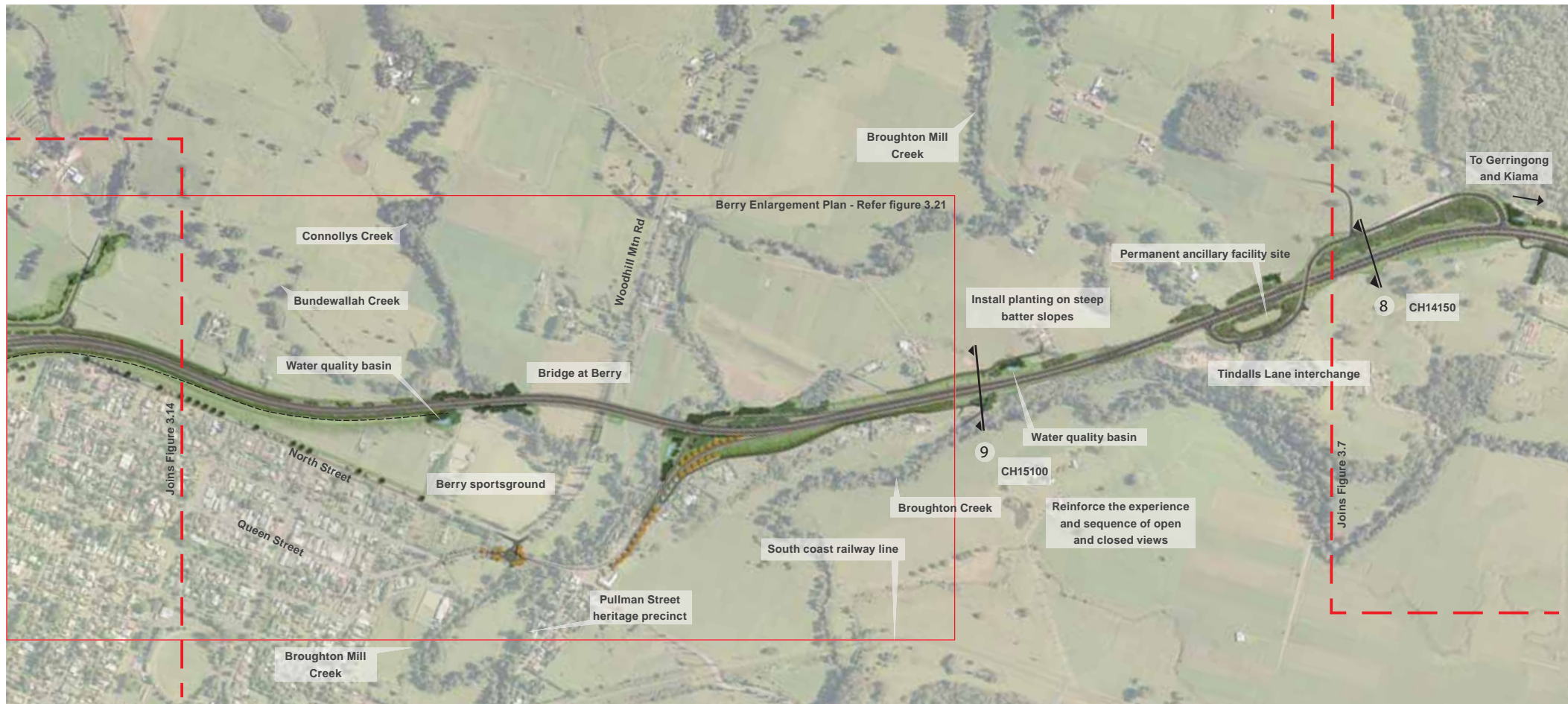
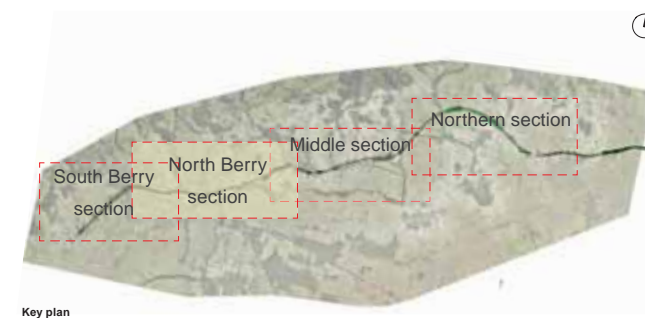
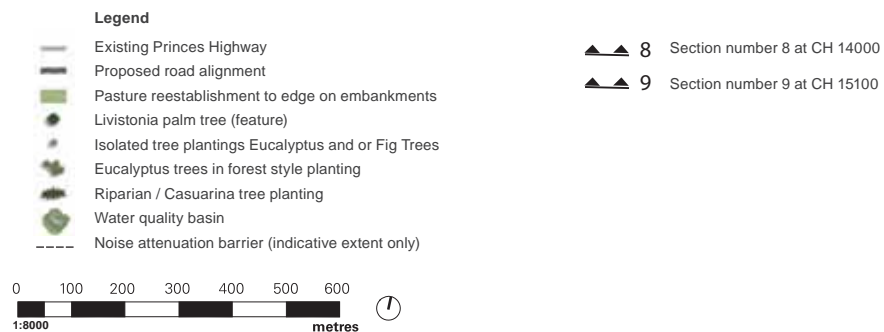


Figure 3.11 Concept for southern section of the project including North Berry and Berry



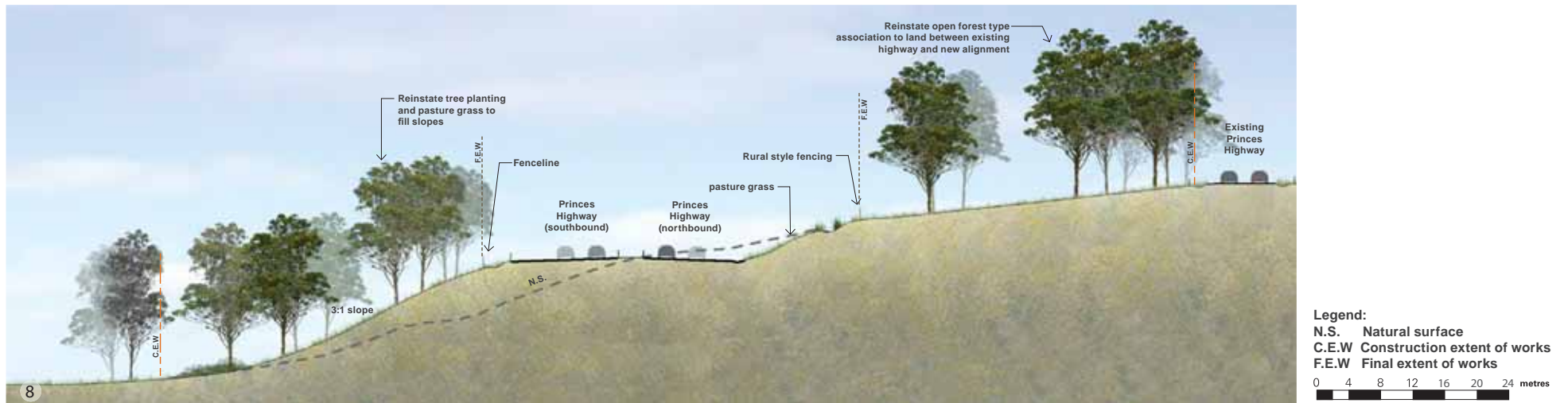


Figure 3.12 Elevation / section 8 - North Berry - chainage 14150

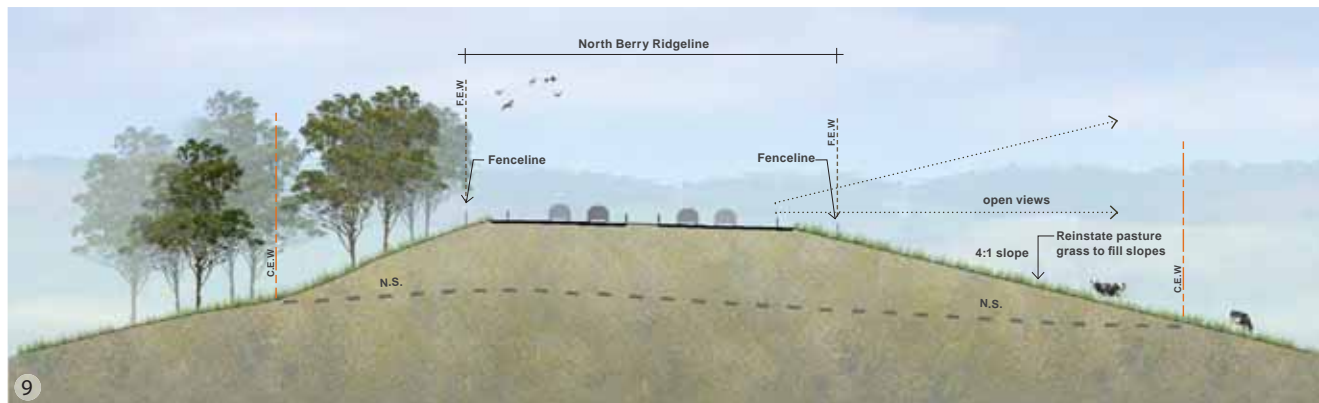


Figure 3.13 Elevation / section 9 - North Berry - chainage 15100

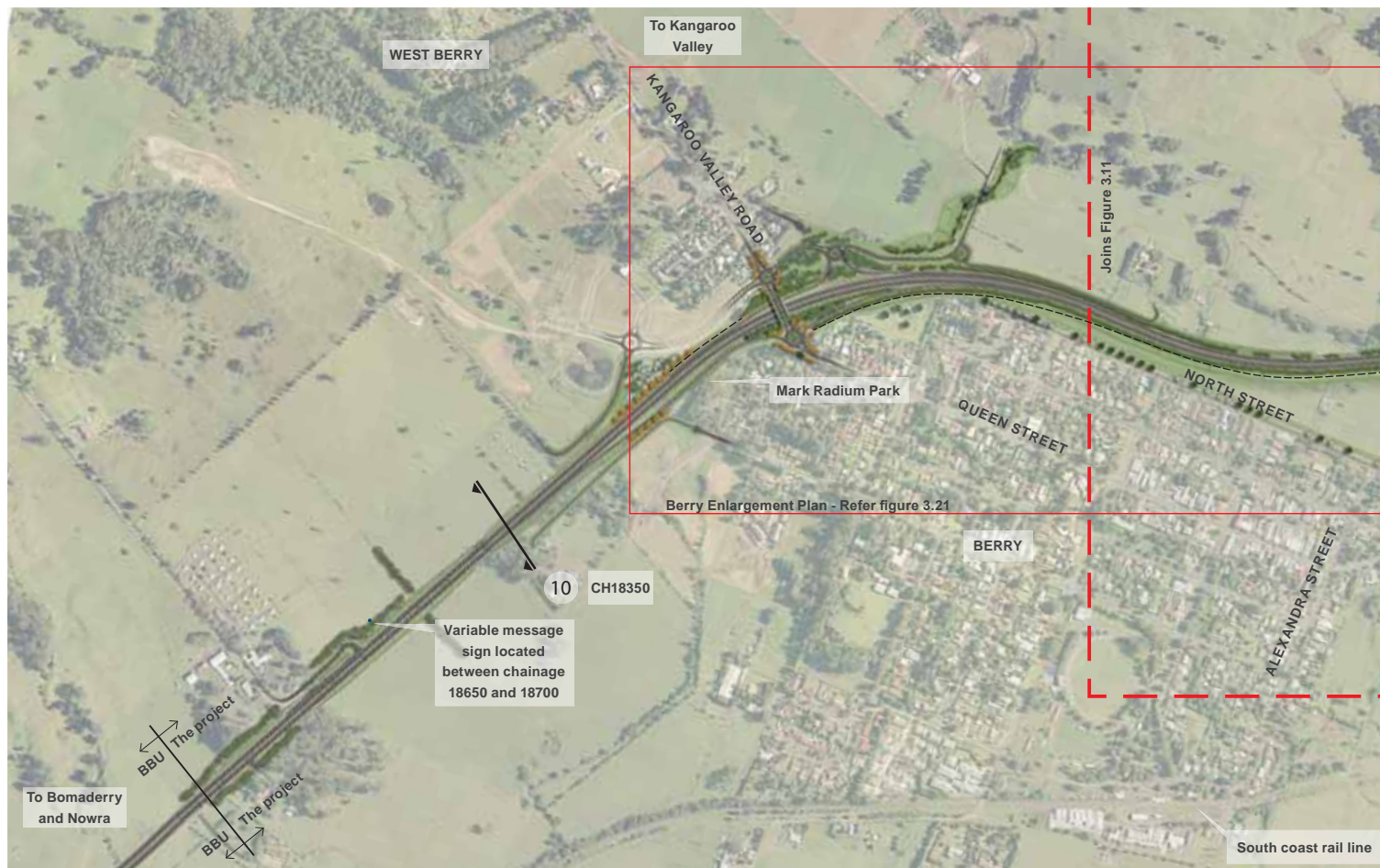


Figure 3.14 Concept for south Berry section of the project including North Berry and Berry

Typical treatment - Fills

The proposed fill treatment (refer **Figure 3.16** and **3.17**) will:

- Maintain consistency with the existing landscape character and patterns.
- Engage road users with the landscape.
- Reduce road width corridor by returning land to its former use.
- Integrate the ultimate road corridor by utilising larger construction footprint during construction and construct broader flatter batters. Reestablish the adjacent pasture and return to prior use as much as practicable. This would ultimately minimise the apparent road corridor width.
- Reduce total area of maintenance.
- Balance project cut and fills.
- Reduce the perceived carriageway width.

Typical treatment - Cuts

The cut batters would be designed to ensure:

- Shotcrete is not required for stabilisation.
- A sufficient depth of soil is maintained in order to support vegetation.
- Ease of maintenance.

Where unstable rock exists consider:

- Slopes of 3:1 or flatter that can potentially be returned to existing use and/or better integrated within the surrounding landscape character (refer **Figures 3.18** and **3.20**).

Where stable rock exists consider:

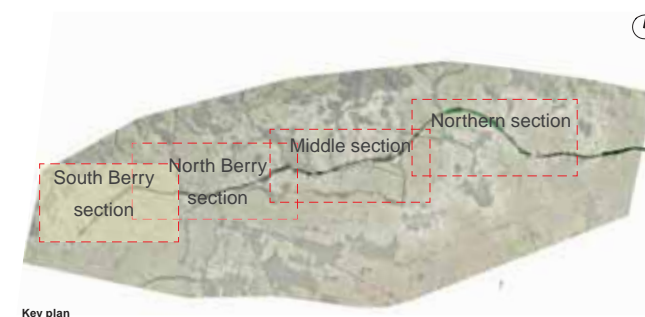
- Close to vertical cuttings (refer **Figure 3.19**).
- Leaving room (a minimum of two metres) at the base of the cutting for vegetation (refer **Figure 3.19**).
- Where cuttings are made to include the ultimate widening of the corridor to six lanes the opportunity arises to include additional vegetation at the base of the cutting up until the widening occurs.

Legend

- Existing Princes Highway
- Proposed road alignment
- Pasture reestablishment to edge on embankments
- Livistonia palm tree (feature)
- Isolated tree plantings Eucalyptus and or Fig Trees
- Eucalyptus trees in forest style planting
- Riparian / Casuarina tree planting
- Water quality basin
- Noise attenuation barrier (indicative extent only)



10 Section number 10 at CH 18100



Key plan

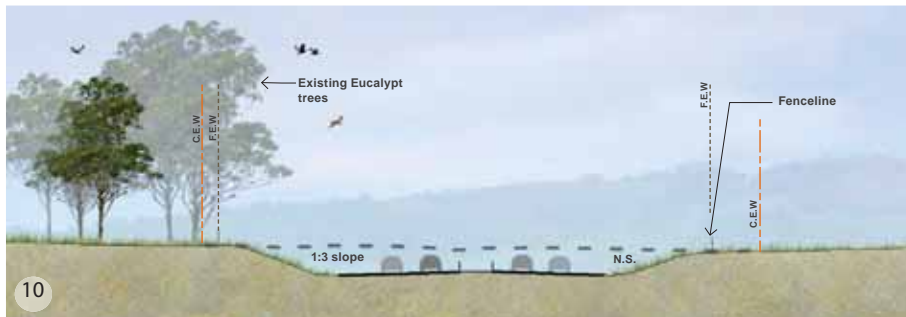


Figure 3.14 Elevation / section 10 - Berry - chainage 18350

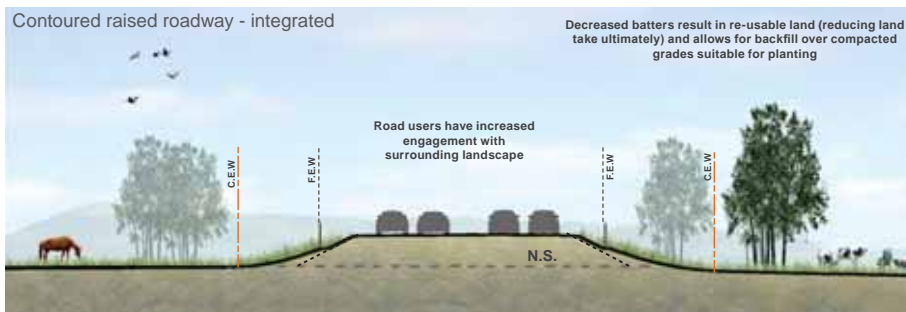


Figure 3.16 Section - Typical corridor approach (fills)

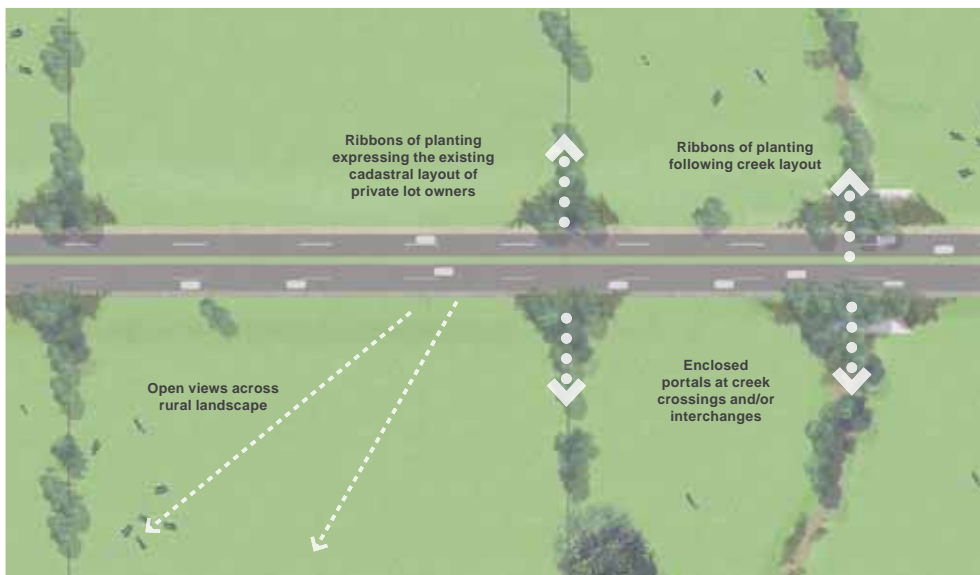


Figure 3.17 Typical corridor approach (fills)

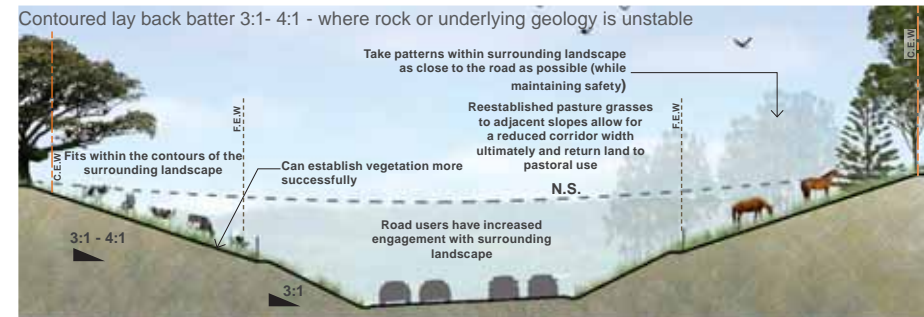


Figure 3.18 Section - Typical corridor approach (cuts)

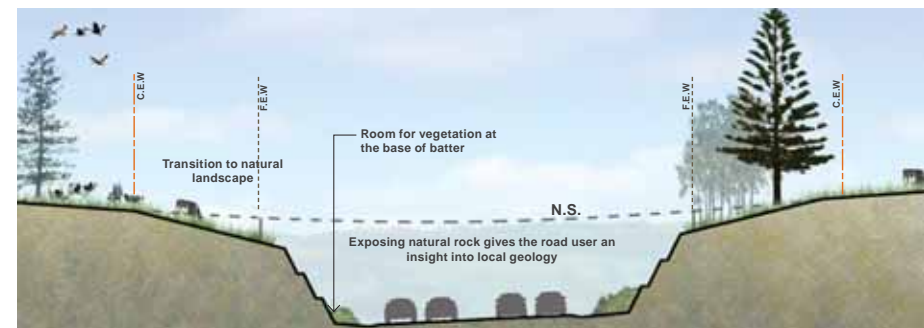


Figure 3.19 Section - rock cut batter 2:1-1:1 - in suitable rock formation

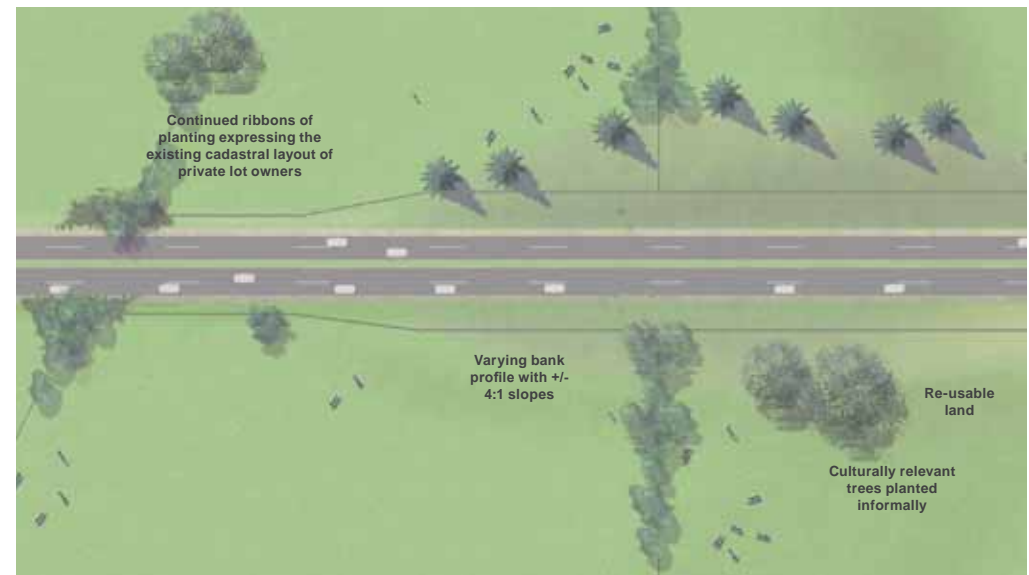
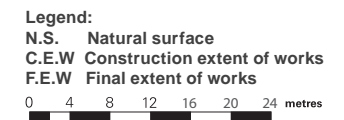
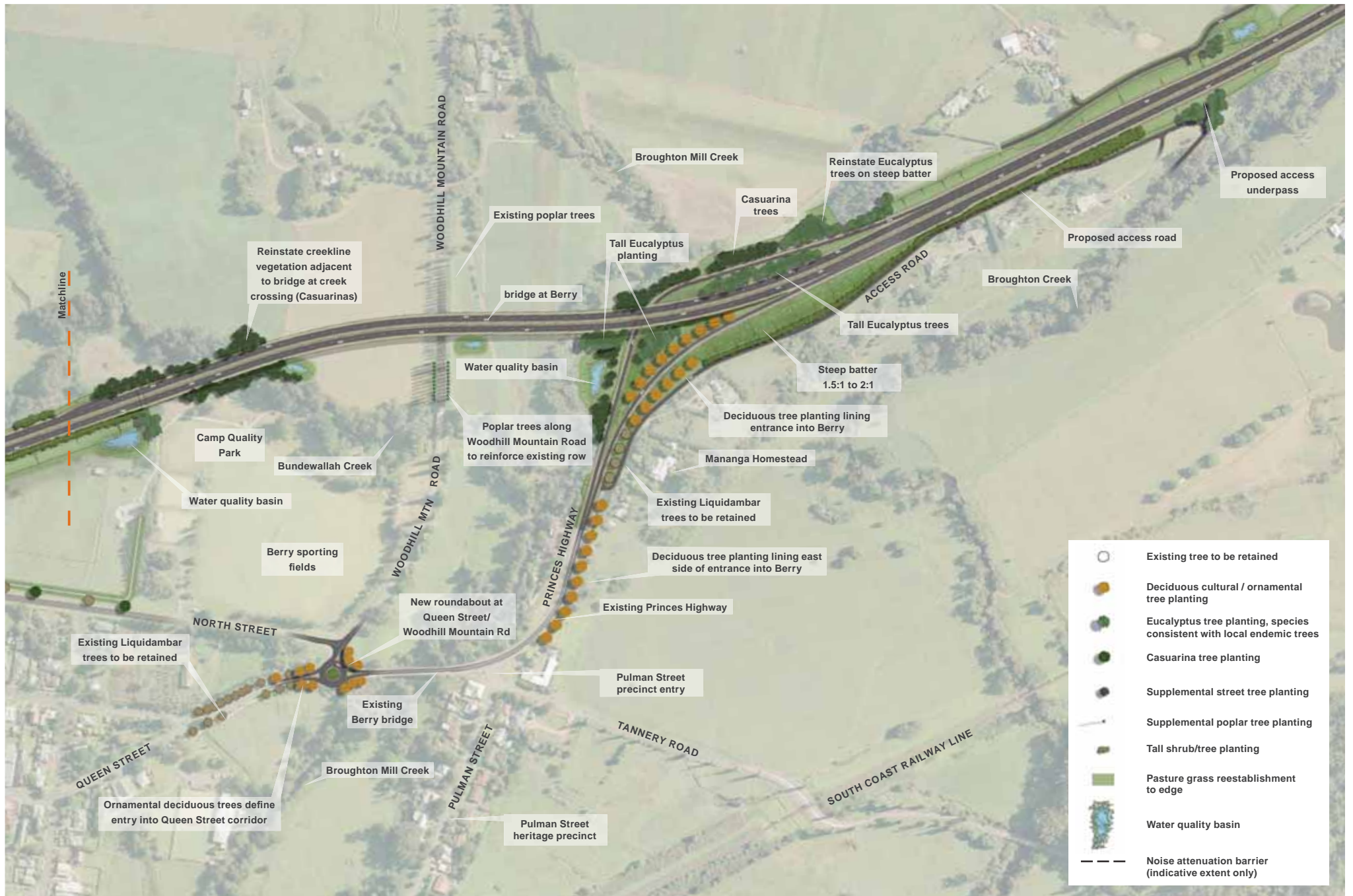


Figure 3.20 Typical corridor approach (cuts)



Figure 3.21 Concept enlargement plan - Berry township







4

Urban and landscape design strategy



4 Urban and landscape design strategy

4.1 Urban and landscape design process

Urban and landscape design objectives/issues and the goal of reducing visual impacts have been integral to the design process at all stages of the project to date and the development of the concept design has been continually assessed against these urban design objectives. A 'Gerrington to Bomaderry Princes Highway Upgrade Preliminary Urban and Regional Design Strategy' was prepared by AECOM in November 2007 prior to the identification of route options. This report informed the development of route options and the preferred option selection process.

This assessment was refined based on the:

- Urban design objectives and principles for the project study area as described in **Section 2.0**.
- Contextual analysis (based on landscape character units) of the project study area as described in **Section 5.0**.
- Landscape character and visual impact assessment and suggested mitigation measures (based on landscape character units and view shed analysis) of the project study area as described in **Section 6.0**.

4.2 Urban and landscape design assessment

The table shown in the following pages provide an assessment of the proposed concept design route against the urban design objectives and principles, and the design responses to that ongoing assessment.

Table 4.1 - Design assessment

Objective one Provide a flowing highway alignment that is responsive and integrated with the landscape		
	Design principles	Design responses
1)	Respond to the grain of the landscape, including following the edge of valleys and hills and avoiding disruption of stands of vegetation, both natural and cultural planting.	The project comprises an upgrade, including widening, of the existing highway alignment and new alignment in the vicinity of Toolijooa Ridge and the Broughton Creek floodplain. Some remnant stands of vegetation would be disturbed as part of the project. The creek crossings would impact on the mature stands of River She Oaks (<i>Casuarina cunninghamiana</i>) that line the banks. The surrounding landscape has developed around the existing road for more than 80 years therefore the project would impact adjacent stands of cultural vegetation that have evolved over time. The vertical alignment has been designed to improve grades and improve road safety. The landscape topography includes many areas where slopes are greater than 20 per cent and in some locations greater than 30 per cent. This presents a number of challenges to fitting a road with design speeds of 110 kilometres per hour (posted 100 kilometres per hour). Nevertheless, the road generally responds to the natural grain of the landscape by following the existing contours and utilising the existing road alignment where possible. Essential areas where topography is integrated with the road design include: <ul style="list-style-type: none"> • The interchanges at Austral Park Road and Tindalls Lane where utilising spurs result in road cuttings allowing for bridge overpasses. • Following the narrow ridgeline down into Berry.
2)	Integrate cut and fill embankments with surrounding terrain by grading out and varying slopes.	Cut and fill embankments would integrate with the adjacent landscape and be assessed at a detail level based on detailed geotechnical survey, slope, aspect and existing adjacent landscape character. Where significant embankments would be required, slopes would be decreased to improve visual and landscape character integration. Excess spoil would be used to soften batter slopes from 2:1 to 4:1 or less where the width of the corridor allows. The ultimate objective is that these flatter batter slopes would be restored to productive pastoral landscape consistent with the existing landscape character.

Objective one Provide a flowing highway alignment that is responsive and integrated with the landscape		
	Design principles	Design responses
3)	Consider independently graded carriageways.	Independent grading of carriageways has been reviewed and the benefits to be gained are negligible. Generally, the nature of the landform through which the project passes does not require the consideration of independently graded carriageways.
4)	Preserve cultural patterns in the landscape.	The project alignment would minimise the long term impacts on productive land through appropriate earthworks and revegetation to essentially preserve the existing cultural patterns. This would be achieved by reinforcing the patterns of the broader landscape context. The use of cultural and local endemic species would be used to complement and reinforce existing landscape character.
5)	Avoid as much as possible impact to significant features of the areas through which the alignment passes.	The impact on significant landscape and landform features would be minimised as far as practicable without compromising road safety. The project would impact existing properties along the route (how they presently function and operate). The steep gradients and slopes in the vicinity of Toolijooa Ridge would necessitate the construction of a substantial cutting. The bridge to the north of Berry, while being a significant intervention, has been located to avoid severing the town's sporting facilities from the town centre. Along the North Street corridor, the strong visual and physical connection between the rural landscape (the foreground pastoral landscape and the background ridges and escarpments) and the townscape would be impacted. The project also aims to maximise the connectivity of west Berry to Queen Street along Kangaroo Valley Road with a 21 metre wide bridge over the proposed highway that would include space for a 3 metre wide shared path.
6)	Vary the gradient of the earthworks to provide visual interest and reflect the characteristics of the surrounding landform and landscape.	Earthworks would be integrated by incorporating where possible the opportunities and constraints identified by the geotechnical investigations. A number of embankment strategies have been developed including: <ul style="list-style-type: none"> • The increase in usability of pasture land adjacent to the road and integration of the highway with the surrounding landscape. • Reducing the visual impact of cuttings and embankments by introducing planting to the base and top of new batters where practicable. • Where corridor width permits and excess spoil is being generated, embankment widths would be increased to tie back into the existing landform.
7)	Grade out cuttings and embankments, wherever practicable, to best fit the characteristics of the local landform, returning the land to either its former use or replacing vegetation lost to the highway upgrade.	Cuttings and embankments would be graded to integrate with the local landform, land coverage and land use. Areas of vegetation lost would be reinstated, where possible. It is expected that there would be a large surplus of material resulting from the cutting at Toolijooa Ridge. To minimise this surplus it is proposed that some of that material be utilised to significantly soften the large (up to sixteen metres) 2:1 embankment to the west of Toolijooa Ridge. This land could then be reinstated to rural pasture blending in with the existing landscape more sympathetically. This would have no detrimental impact on the existing drainage patterns.

Objective two Protect the natural systems and ecology of the corridor		
	Design principles	Design responses
1)	Avoid areas of natural vegetation, particularly those containing threatened species and communities.	Much of the landscape surrounding the project has been cleared for agricultural purposes. Some of the remaining vegetation within the current road reserve would be impacted during construction. Impact to threatened species and communities would be minimised and any natural vegetation removed would be replaced and rehabilitated where possible. The most significant impact to existing vegetation would be at the creek crossing points and in the vicinity of Austral Park Road.
2)	Minimise disruption to natural drainage patterns both through route selection and road design.	Existing drainage systems would be retained and improved where appropriate. Upgraded and new crossings of Broughton Creek, Bundewallah Creek, and Broughton Mill Creek would be designed to minimise potential impacts on the existing drainage patterns. It is proposed that Town Creek would be diverted into Bundewallah Creek allowing for the bypass alignment to be lowered in the vicinity of North Street.
3)	Minimise the number of crossings of Broughton Creek and other creeks in the study area.	There are a total of five creek crossings within the study area. These include three crossings of Broughton Creek, one crossing of Broughton Mill Creek, and one crossing of Bundewallah Creek. All of these crossings are unavoidable as much of the proposed corridor runs through floodplain and natural drainage corridors. Broughton Creek meanders back and forth across the upper catchment resulting in the requirement for three crossing points.
4)	Use medians and road verges to maximise habitat value and maintain pollination paths and wildlife movement patterns where feasible.	The proposed planting areas include the embankments associated with new interchanges, and new embankments along the project and ribbon planting along property boundaries and waterways. The first crossing of Broughton Creek is a potential fauna movement corridor. Reinforcement of planting at this location would be considered in the detailed design phase of the project. Planting would also be carried out at the base of new cuttings where possible. Median widths are not sufficient to support planting of any major significance or scale. To reduce ongoing maintenance and occupational health and safety issues the median would be concrete pavement.
5)	Integrate the landscape qualities and characteristics of the highway corridor with the landscape form and character.	The project would pass through four landscape character unit types. These differ in topography, vegetation type, land use, land form and overall landscape character. The highway corridor would reflect and respond to the differences in these landscape units and their associated patterns. The four landscape units are: <ul style="list-style-type: none"> • Toolijooa Ridge. • Broughton Creek. • North Berry. • Berry.
6)	Integrate water quality basins with the landscape form and character.	Water quality basins would be integrated into the landscape to best represent how water bodies appear within the natural landscape. Design may consist of organic shapes, a low profile form by reducing steep batters, placing naturalistic objects in and around the basins and planting throughout the basins with native grass and ephemeral plant species. The detailed design would develop a mix of swale and basins for the treatment of runoff from the carriageway.

Objective three Protect and enhance the heritage and cultural values of the corridor		
	Design principles	Design responses
1)	Avoid items of identified European and Aboriginal heritage and cultural value.	Consultation in regard to Aboriginal heritage is ongoing. The cutting at Toolijooa Ridge has the potential to impact on both Aboriginal and European cultural and heritage items. Another area of European heritage where there are potential impacts from the project is at the intersection of Pullman Street and Queen Street at the entrance into Berry. These impacts have largely been avoided during the route selection process and any remnant impacts associated with the introduction of a roundabout at Tannery Road would be minor.
2)	Acknowledge and respond to the heritage and cultural values of the rural landscape.	Important values and connections to the cultural landscape would be maintained by using a range of strategies including: <ul style="list-style-type: none"> • Ribbon planting to emphasise property boundaries and waterways. • Reestablishment of pasture grasses. • Use of culturally relevant trees. • Reinstatement of rural fencing.
3)	Acknowledge and respond to indigenous value placed on the broader landscape.	The design would consider the recommendations of the heritage consultant and the outcomes of ongoing consultation with the Aboriginal community.
4)	Reduce the visual and noise impact of the highway through the design of the project.	Visual and noise impact to local residents may be significant for: <ul style="list-style-type: none"> • Isolated residences along the corridor. • The residents of Berry, particularly in the vicinity of the North Street corridor, the west end of Berry (between Queen Street and North Street) and Huntingdale Park Estate to the west of the proposed bypass of Berry. <p>The alignment adjacent to the most populated section of Berry would be elevated for some of its length, up to two metres above existing grades at the western abutment of the bridge at Berry before a transition into cut underneath Kangaroo Valley Road. Detailed community engagement has been undertaken throughout the concept design. Feedback from a series of community working groups, focused on the development of the urban design treatment along the North Street corridor has informed the design of the project and its interaction with its surroundings in this area. The inclusion of earth embankments and different noise wall treatments to minimise the visual impacts of the infrastructure in this area and maximise the use of the open space between North Street and the project have been carried through into the concept design (refer Appendix A).</p>
5)	Consider the important value of the productive landscapes.	As the project involves both a widening of the existing alignment and bypasses of Foxground and Berry, it would impact on areas that are presently utilised as productive landscapes. New works would be integrated with the surrounding landscape to maximise the productive use of land (eg. by merging landscaping to the road edge and reducing batter slopes to gradients that would allow for grazing).

Objective four Respect the communities and towns along the highway		
	Design principles	Design responses
1)	Minimise the impact of the project on the amenity of residents of Berry.	<p>The impact of the project to the township of Berry would be significant in its magnitude of change. Importantly, the project provides numerous opportunities for the town that could help to counteract identified constraints and / or adverse impacts.</p> <p>The amenity within Queen Street would be greatly enhanced by the removal of through traffic and heavy vehicles in particular. The proposed highway and bridge over Broughton Mill Creek and Woodhill Mountain Road, while large, would generally be obscured by the existing vegetation. The impacts have been greatly reduced through consultation with the community and multiple refinements of the design to reduce the height and scale of the proposed structure.</p> <p>As the project sweeps closer to town at the western end of the North Street corridor, there would be impacts on the existing amenity for residents and some form of noise attenuation would be required.</p> <p>The impact to amenity on the North Street corridor would be minimised by providing a legible circulation system, mounding, and suitable cultural and indigenous planting that would provide a refined pastoral landscape consistent in character with Berry.</p> <p>The longer term connectivity of the older established part of Berry and the newer growing western part of Berry (along Kangaroo Valley Road) has been considered, with the proposed provision of two shared paths over the Kangaroo Valley over bridge, to ensure that existing and future development is well integrated and suitable for pedestrians and cyclists.</p> <p>Residents living in Huntingdale Park Estate would be impacted with the north bound off ramp running immediately in front of Huntingdale Park Road before connecting into Kangaroo Valley Road.</p>
2)	Provide effective and efficient access to Berry.	Connectivity between the project and Berry would be provided at the northern and western ends of town, which have been located and designed to ensure that the internal road structure and hierarchy of the township remains unaltered.
3)	Design new town access points as an important and integral part of the town, ensuring a clear and consistent way finding.	<p>The new town access points would include landscaping and planting that is consistent with the existing landscape character of Berry. At the Berry east interchange, an appropriate relocation of the Alexander David Berry memorial would be considered. The City of Shoalhaven also utilises entry signage that would be considered for relocation.</p> <p>User views from the new access to the north of Berry (travelling southbound) would be restricted by embankments and bridge abutments.</p> <p>The Berry west interchange access to the town would be located in flatter terrain and the view of the township would be more evident than from the northern entrance. A self explanatory landscape environment would allow road users to transition from the highway into town in a legible and safe way.</p> <p>Generous landscape gestures and pedestrian and cycle integration would be integrated into this transitional landscape and road environment.</p>
4)	Minimise the disruption and loss of amenity to rural communities in the study area.	There would be a range of loss of amenity to rural communities and residents depending on their proximity to the project. Access points would be provided at Austral Park Road and Tindalls Lane. The revegetation strategy would provide a balance of visual screening and reinforcement of the existing landscape character to minimise any loss of amenity.

Objective five Provide a safe, enjoyable and interesting highway with strong visual connections to the Pacific Ocean, immediate hinterland and mountains to the west		
	Design principles	Design responses
1)	Acknowledge the role of this section of Princes Highway as an important part of a longer scenic drive along the New South Wales South Coast.	The project has a visual connection to the ocean, township, rural land and forested escarpment. The visual experience shifts in this section from the dramatic coastal engagement seen further north, to the rural and rolling pastoral landscape. The urban design strategy takes advantage of this by maximising broader views, integrating the project with the existing landscape and using planting and design techniques for infrastructure that are culturally and visually relevant within the landscape context.
2)	Maximise opportunities for high quality and varied views of the coast, the rural landscape and adjacent mountain ranges.	<p>The project would increase the opportunities for experiencing the coast, rural landscape and adjacent mountain ranges by opening up views across the rural landscape towards the Broughton Creek and Broughton Mill Creek catchments, the Toolijooa Ridge landscape, the coast (travelling north bound through Toolijooa Ridge) and the forested escarpment of the Cambewarra range.</p> <p>There would be a dramatic transition travelling southbound through the Toolijooa cutting and into the Broughton Creek landscape.</p> <p>Views to the ridges and escarpment specifically at the west end of North Street in Berry, would be impacted.</p>
3)	Provide visual connections and easy, well marked access to the towns along the route.	<p>The project locates the new southbound entrance (at the Northern Interchange) approximately 650 metres north of the existing entrance into the town. Visually the connection is difficult as the access (southbound off ramp) is in a cut on the ridge. The access would take users into the heritage precinct of Berry and to the main commercial centre along Queen Street.</p> <p>The second south bound exit would be at Kangaroo Valley Road and would have a stronger visual connections to the town with views from the bridge at Berry.</p> <p>Travelling northbound, an easy visual connection would be made with the township as the built form areas would be evident on both the eastern and western sides of the highway. The topography in this vicinity is generally flat to gently undulating.</p>
4)	Use landscape treatments to soften the appearance of the road for the road user without compromising opportunities for key views.	<p>The landscape is both a balance of the subtle detail of the foreground rolling open pasture, isolated trees, small forested clumps and tree lined creeks, contrasted against the dramatic escarpment beyond. The landscape treatment would endeavour to reinforce the existing landscape character and allow for the continuing engagement with it.</p> <p>Where possible the landform associated with the road corridor would be blended into the existing landscape. This would be further embellished with planting that is characteristic in form and species of the broader landscape.</p> <p>Around Berry the landscape treatments would embellish the existing landscape qualities and character to assist in integrating the proposed bridge at Berry, and earth mounds, low planting and noise attenuation walls along North Street into the landscape. The important cross connection between the established Berry (Queen Street) and West Berry (Kangaroo Valley Road) would include landscape treatments to reinforce connection and circulation. This would consider the connection at a pedestrian scale ensuring connectivity across the proposed highway.</p>

Objective five Provide a safe, enjoyable and interesting highway with strong visual connections to the Pacific Ocean, immediate hinterland and mountains to the west		
	Design principles	Design responses
5)	Consider the heritage of the highway in the project so that where practicable road users may experience it.	Much of the heritage along the project may be experienced by the road user through the broader visual engagement with the landscape. The northern entrance into Berry takes the road user through the heritage precinct consistent with the existing town circulation.
Objective six Develop a simple and unified palette of elements and details that are easily maintained		
	Design principles	Design responses
1)	Develop a consistent approach to the design of bridges along the project. Urban design principles to be consistent with those outlined in the 'Bridge Aesthetics: Design Guidelines to Improve the Appearance of Bridges in NSW' (RTA, 2003).	<p>There would be eight bridges associated with the project:</p> <ul style="list-style-type: none"> • A bridge over the highway at the Toolijooa Road interchange. • Three bridges over Broughton Creek. • A bridge over the highway at the Austral Park Road interchange. • A bridge over the highway at Tindalls Lane interchange. • A large bridge north of Berry over Broughton Creek and Woodhill Mountain Road. • A bridge over the highway at Kangaroo Valley Road. <p>The above would consist of a design family of bridges with their various contextual requirements influencing their individual specific elements. This approach is consistent with the 'Bridge Aesthetics: Design Guidelines to Improve the Appearance of Bridges in NSW' (RTA, 2003). The key driving objectives for the bridges are to make them as simple and elegant as possible to complement their landscape settings.</p> <p>The bridge at Berry would be located in close proximity to the main Berry sports grounds and the existing Camp Quality Park. The alignment and form of the bridge has undergone significant community consultation and design refinement to improve its form and reduce the height and scale of the structure. Careful consideration would be required through detailed design development with regard to the treatment of the bridge elements, particularly the soffits, headstocks, columns and abutments.</p> <p>The Kangaroo Valley Road bridge would serve as the key connection between the eastern side of Berry and the growing western side of Berry. The design of this bridge and adjacent connections onto the highway needs to consider pedestrians and cyclists and the connection into the landscape character of the town. Strategies around planting, lighting and bridge parapet detailing all require an integrated design approach to provide a legible and appropriate design outcome.</p> <p>Minimum design reference requirements would be provided (refer to Section 7.0) to ensure commitment to a quality design outcome for:</p> <ul style="list-style-type: none"> • The overpass at Toolijooa Road. • The three Broughton Creek bridges. • The over bridges at Austral Park Road and Tindalls Lane. • The bridge at Berry. • The Kangaroo Valley Road interchange.

Objective six Develop a simple and unified palette of elements and details that are easily maintained		
	Design principles	Design responses
2)	Develop a consistent approach to the design of noise walls along the project. Urban design principles to be consistent with those outlined in the 'Noise Wall Design Guidelines: Design Guidelines to Improve the Appearance of Noise Walls in NSW' (RMS 2006).	Earth mounds, planting, and noise attenuation walls would be integrated as required particularly along the interface of the project with the township of Berry and in the vicinity of Huntingdale Park Road. Planting would be included to screen these elements where appropriate. This would be further addressed in the detailed design stage. A set of detailed design objectives is outlined in Section 7.0 .
3)	Develop an integrated strategy for the avoidance, minimisation and improved appearance of shotcrete as outlined in the 'Shotcrete Design Guidelines: Design Guidelines to Avoid, Minimise and Improve the Appearance of Shotcrete' (RTA 2005).	A detailed geotechnical investigation would be undertaken during detailed design to investigate the need for shotcrete and minimise its use where possible.
4)	Develop a consistent approach to the design of soft landscape along the project. Planting design principles to be consistent with those outlined in the 'Landscape Guideline: Landscape Design and Maintenance Guidelines to Improve the Quality, Safety and Cost Effectiveness of Road Corridor Planting and Seeding' (RTA, 2008).	The project would include soft landscaping at the new interchanges, along embankments and at property boundaries and creek crossings, as well as along the project alignment where appropriate. The project would not pass through any large stands of existing vegetation, as the majority of the landscape consists of pasture lands with isolated clumps of either remnant or historic cultural planting. The soft landscaping approach would draw from this existing landscape character blending the new infrastructure with that character. A significant part of the soft landscape will be the reestablishment of pasture grasses disturbed during the construction of the project.