NSW GOVERNMENT

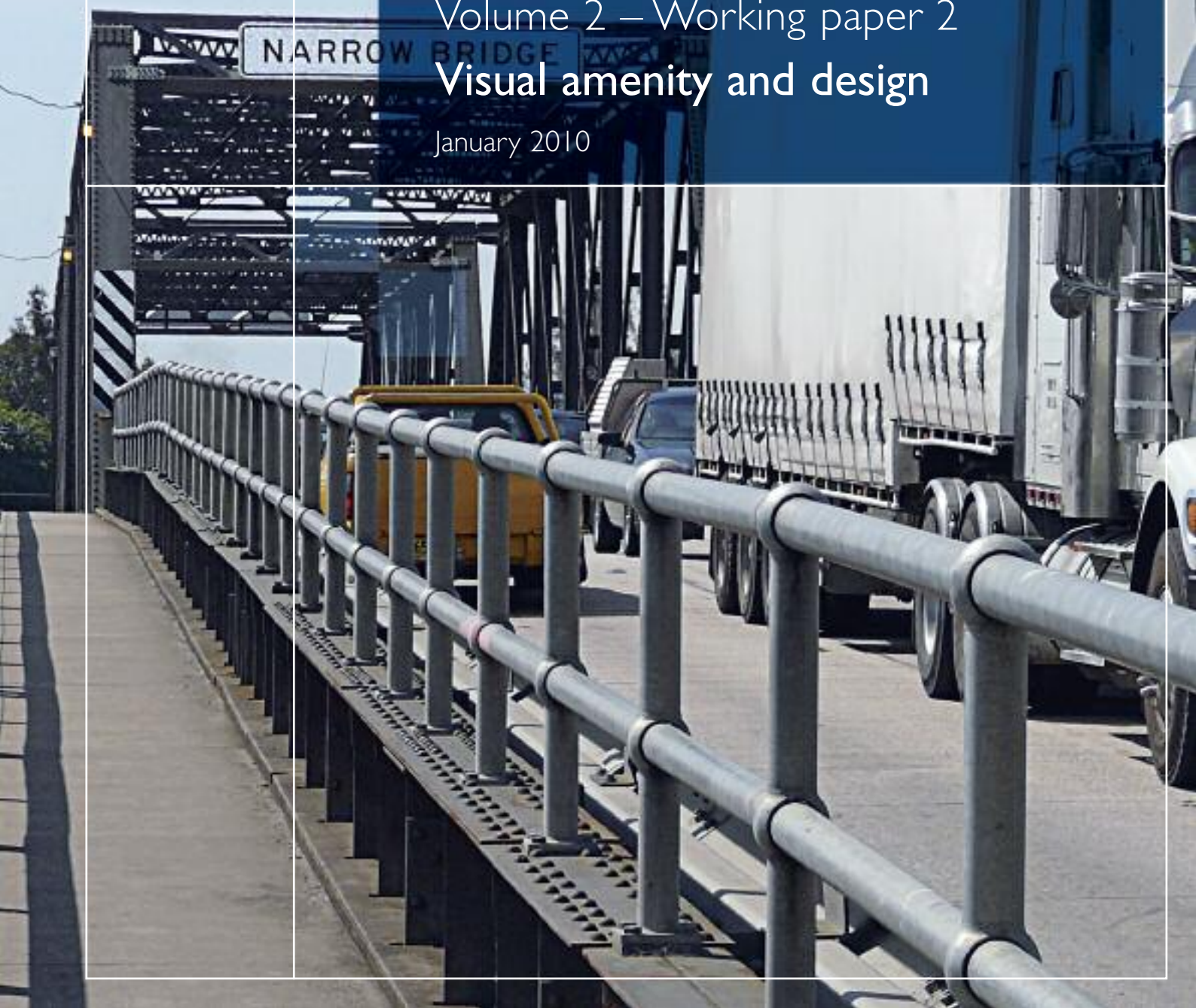
RTA

Upgrading the Pacific Highway

Warrell Creek to Urunga

Environmental assessment
Volume 2 – Working paper 2
Visual amenity and design

January 2010



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STATE HIGHWAY NO 10 – PACIFIC HIGHWAY

Warrell Creek to Urunga

42 km to 87 km NORTH OF KEMPSEY

WORKING PAPER 2 – URBAN AND REGIONAL DESIGN / LANDSCAPE AND VISUAL ASSESSMENT

- Final issue 9
- January 2010

SKM

RTA

Warrell Creek to Urunga Pacific Highway Upgrade

WORKING PAPER 2 – URBAN AND REGIONAL DESIGN / LANDSCAPE AND VISUAL ASSESSMENT

- Final issue 9

January 2010

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Executive summary

The NSW Roads and Traffic Authority (RTA) is upgrading an approximately 45km section of the Pacific Highway between Warrell Creek and Urunga on the mid north coast of New South Wales as part of the RTA's Pacific Highway Upgrading Program. Sinclair Knight Merz (SKM) has been commissioned by the RTA to prepare an Environmental Assessment (EA) for upgrade of this section from the Allgomera deviation (south of Warrell Creek) to Waterfall Way at Raleigh (north of Urunga), which is referred to as 'the Proposal' throughout this document. This report has been prepared to address the urban design, landscape and visual impacts of the Proposal.

The RTA urban design vision for the Pacific Highway is:

'a sweeping, vegetated highway, providing panoramic views to the Great Dividing Range and the rivers, forests, farmlands, and coastline of the Pacific Ocean. Sensitively designed to fit into the landscape and be unobtrusive. Characterised by simple, attractive road infrastructure.'

The RTA urban design objectives for the Pacific Highway are to:

1) 'Provide a flowing road alignment that is responsive and integrated with the landscape.
2) Provide a well vegetated, natural road reserve.
3) Provide an enjoyable interesting highway.
4) Value the communities and towns along the road.
5) Provide consistency-with-variety in road elements.
6) Provide a simplified and unobtrusive road design.'

This report has undertaken an urban and regional design, landscape and visual assessment for the preferred route. The landscape and visual impact assessment identifies the potential impacts of the proposed highway on the existing environment and the viewers within that environment. The visual impact has been identified by assessing the combination of the visual effect, visual sensitivity and view shed analysis. The visual effect is the degree of contrast the highway will have within its setting. The visual sensitivity is the degree that the highway is visible and is determined by its distance from viewers, the nature of the viewers' activity, and the expectations of viewers whilst undertaking that activity. The visual impact is determined by the combination of the visual effect and the visual sensitivity and has been mapped to include the potential view shed for the Proposal. This assessment of the extent of view and the visibility of the proposal, view shed analysis, has been made from field assessment, aerial photography and topographic data. To assess the potential views from residences, the closest street or public area has been visited to estimate the extent of view. In addition aerial photography and topographic assessment has been undertaken to estimate the potential view.

The Proposal has been divided into four sections. Each section has been described in terms of the existing landscape and visual character, the description of the Proposal through the section and identification of key elements that will contribute to the potential visual impact. The visual effect, visual sensitivity and visual impact have then been described for each section.

The following describes the main areas of potential visual impact within each section and outlines areas that would experience a high visual impact requiring careful design consideration and/or mitigation guidelines.

Section 1: Warrell Creek to Nambucca River

The high visual contrast of the Proposal within this predominantly rural valley and the high to very high visual sensitivity of residents within 150 metres of the Proposal, where views are available to the portions of the Proposal that are in fill, combines to create a very high visual impact. Very high visual impacts occur for some residents located within 150 metres of the Proposal on the existing Pacific Highway south of Warrell Creek bridge and near Donnellyville, Cockburns Lane, Albert Drive Donnellyville, Rosewood Road, Bald Hill Road, Kerr Drive, Gumma Road and River Street Macksville. Residents around the Bald Hill Road interchange are highly sensitive to the visual changes associated with this interchange and will require design mitigation of the cut batters and embankments to reduce the potential impacts. High visual impacts occur for some residents located between 150 and 300 metres of the Proposal on Cockburns Lane, Rosewood Road, Scotts Head Road, and Wedgewood Drive. Some residents located within 250 and 500 metres of the Proposal on O'Dells Road would obtain views from an elevated position with a potentially high visual impact.

Residents in Donnellyville with views of the Proposal in fill would experience high visual impacts. Residents in Warrell Creek village, situated greater than 500 metres of the Proposal, would generally experience low visual impacts.

The visual impact of the Proposal on the centre of Macksville township would be low due to the distance of the Proposal beyond 500 metres of Macksville. The areas of Macksville between 150 and 300 metres of the Proposal in Gumma Road and River Street would experience high visual impacts, and areas around Donnelly Welsh Playing Fields would experience a medium visual impact. All other residents located greater than 500 metres of the Proposal, such as Upper Warrell Creek Road, and the old Pacific Highway in Warrell Creek, would also experience low visual impacts. Long views beyond one kilometre to the new bridge over the Nambucca River would be available from the existing traffic bridge at Macksville. The bridge from this viewpoint would be of low visual impact. District views from the new bridge over the valley will also be available providing orientation for drivers. Opportunities to make this view a positive element exist by ensuring that the bridge is a well designed and attractive structure.

Section 2: Nambucca River to Nambucca Heads

The extent of view for this section does not generally extend beyond foreground distance of 500 metres for most of this section. The high visual effect of the Proposal within the rural residential land north of the

Nambucca River and the high to very high visual sensitivity of this area results in a high to very high visual impact for this area. These areas include residents located within 150 metres of the Proposal where it is in fill and views are available from Nursery Road, Old Coast Road, Letitia Close and Mattick Road. Residents located between 150 and 300 metres of the Proposal, in Letitia Close, Mattick Road and Old Coast Road would also experience a high visual impact. Residences located in Bellevue Drive Macksville, at 300-500 metres of the Proposal would experience medium to high visual impacts.

The combination of a high visual effect as the Proposal follows the Old Coast Road through the Nambucca State Forest and the low visual sensitivity results in a low to medium visual impact for this area.

Section 3: Nambucca Heads to Ballards Road

Small areas of clearing within the surrounding landscape enable views of the Proposal where it is in fill and are identified on the View Shed Analysis Plan. The residences located within these pockets would obtain views of the Proposal and potentially would experience a medium to high visual impact. Approximately 36 residences are located within 150 metres of the Proposal with potential views. As areas of this landscape frequently have dense tree groups and undulating levels the extent of view is generally limited. Landscape works should be undertaken to screen views by including planting within the road corridor, carefully located to complement the existing landscape pattern. The existing vegetation adjacent to the existing Pacific Highway provides a forested character and should be retained where possible to reduce the visual impacts, particularly where the Proposal follows the existing highway.

The visual impact of the Nambucca Heads Interchange needs to be mitigated by planting and detailed design consideration within the interchange treatment. The potential to identify this arrival point to Nambucca Heads has been considered in the design through more detailed planting and tree species selection.

Section 4: Ballards Road to existing Raleigh deviation

The visual impact for most of this section through the forested areas would be medium due to the combination of a high to very high visual effect and low visual sensitivity. Very few viewers are located in these forested areas surrounding the Proposal. High visual impacts would be experienced by the users of the road through the deep cuttings.

The visual impact at the Kalang River valley and bridge crossing of the Proposal would be high to very high due to the combination of the very high visual effect and high to very high visual sensitivity, particularly for the residents located within 150 metres of the Proposal, (approximately four). The South West Arm Road scenic road landscape has been identified by Bellingen Shire Council as a high scenic area. Protection of vegetation beyond the immediate roadworks, screen planting and retention of the function of this road as a connector to the properties on this side of the Kalang River are recommended mitigation measures.

The visual impact at the northern portion of this section would be medium to high for the residents on Short Cut Road due to the medium to high visual effect and medium to high visual sensitivity. For residents on

South Arm Road and Ridgewood Drive the visual impact would generally be high due to the medium to high visual effect and the high visual sensitivity. Residents on Ridgewood Drive located greater than 300 metres of the Proposal would experience medium to high visual impacts.

For residents within 150 metres of the modifications to the Waterfall Way interchange at Raleigh the visual impact would be medium, due to the low visual effect and the high visual sensitivity.

Landscape strategy, concepts and mitigation guidelines

Following the visual impact assessment the urban design and landscape strategies and concepts have been developed. The urban design objectives have formed the basis of development of the concept design in addition to the economic, safety, engineering and environmental objectives adopted for the Proposal. These have then been achieved by adopting principles and guidelines to address key issues within the concept design. The guidelines describe mitigation measures to reduce the visual impact. These include guidelines for interchanges, bridges, noise attenuation, cuttings and embankments, fauna crossings, landscape and planting.

Planting to screen the Proposal will to be carried out with careful placement of tree clusters to integrate planting with the character of the existing landscape. Revegetation of the forest landscape adjacent to the Proposal, where it passes through the north coast forests, will reduce the visual contrast of the Proposal in these areas. Reducing the visual contrast of the Proposal in the cuttings and fill areas by revegetation of cut batters and embankments with grasses will visually integrate the landscape colours and textures. All mitigation measures are described in more detail in the relevant sections of this report.

The urban design and landscape strategic plans and concepts have been developed in conjunction with the engineering concept plans. These were prepared following the environmental assessment phase and integrate the mitigation guidelines into the full length of the Proposal. Urban design and landscape concepts for the interchanges have been identified to mark destination areas and town entries by utilising locally significant trees to punctuate the road corridor. These plans would form the basis for the development of detailed design for the Proposal.

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Contents

Executive summary I

1 Introduction 1

1.1 RTA Pacific Highway urban design objectives 2

2 Visual impact assessment methodology and the Proposal 3

2.1 Character areas of the region 3

2.2 Visual Impact Assessment Methodology 5

2.3 Overview of the Proposal 6

2.3.1 Description of the Proposal 7

3 Visual impact assessment of the Proposal 8

3.1 General 8

3.2 Section 1 Warrell Creek to Nambucca River 8

3.2.1 Existing landscape and visual character 8

3.2.2 The Proposal 10

3.2.3 Visual Assessment 11

3.3 Section 2 Nambucca River to Nambucca Heads 19

3.3.1 Existing landscape and visual character 19

3.3.2 The Proposal 20

3.3.3 Visual assessment 21

3.4 Section 3 Nambucca Heads to Ballards Road 23

3.4.1 Existing landscape and visual character 23

3.4.2 The Proposal 23

3.4.3 Visual assessment 23

3.5 Section 4 Ballards Road to existing Raleigh deviation 25

3.5.1 Existing landscape and visual character 25

3.5.2 The Proposal 25

3.5.3 Visual assessment 26

3.6 Impacts on landscape character areas 30

4 Urban design and landscape strategies and concepts 31

4.1 Principles and Guidelines 31

4.2 Landscape and urban design, protection and mitigation measures 32

4.2.1 Interchanges and grade separation 32

4.2.2 Bridges, viaducts and road furniture 33

4.2.3 Noise attenuation 36

4.2.4 Cuttings and Embankments 37
4.2.5 Landscape and planting 42
4.2.6 Erosion and sediment control 45
4.2.7 Preservation of visual and ecologically significant areas 45
4.2.8 Incorporation of mitigation measures into proposal design 48
4.3 Urban design and landscape strategies and concepts 48
4.3.1 Urban design and landscape strategic plans 48
4.3.2 Urban design and landscape concept plans 49
4.4 Simulated views 53
4.4.1 Potential views experienced by local residents and community 53
4.4.2 Potential views experienced by drivers 53

References 55

Appendix A 57
A.1 View Shed Analysis Drawings – Sheets 1-9 57

Appendix B 59
B.1 Table 2 – Visual Impact Summary 59

Appendix C 66
C.1 Potential Drivers Experience Sections 1-4 66

Appendix D 68
D.1 Urban Design and Landscape Strategic Concept: Sheets 1 to 4 68
D.2 Urban Design and Landscape Strategy: Sheets 1 to 9 70

Appendix E 72
E.1 Urban Design and Landscape Concept: Sheets 1 to 12 72
E.2 Urban Design and Landscape Concept: Interchanges 74
E.3 Typical Cross Sections of the Proposal 76

Appendix F 78
F.1 Simulated aerial views from selected viewpoints 78
F.2 Simulated views from selected viewpoints 80

List of Figures and Tables

Figure 1 – Character Areas 4

Table 1- Landscape Species Selection LIst 50

Table 2 – Visual Impact Summary 59

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1 Introduction

The NSW Roads and Traffic Authority (RTA) is upgrading an approximately 45km section of the Pacific Highway between Warrell Creek and Urunga on the mid north coast of New South Wales as part of the RTA's Pacific Highway Upgrading Program. Sinclair Knight Merz (SKM) has been commissioned by the RTA to prepare an Environmental Assessment (EA) for upgrade of this section from the Allgomera deviation (south of Warrell Creek) to Waterfall Way at Raleigh (north of Urunga), which is referred to as 'the Proposal' throughout this document. This report has been prepared to address the urban design, landscape and visual impacts of the Proposal.

This report has been prepared to address the urban design, landscape and visual assessment of the Proposal.

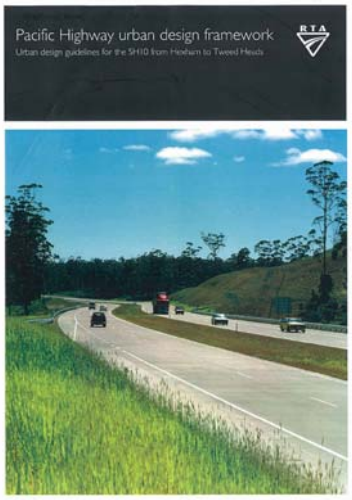
The Project brief for this component of the study is to:

- Undertake a landscape/visual assessment and urban/regional design process through all stages of the project.
- To provide a road that is integrated into the surrounding environment by addressing the landscape in a wider context.
- To apply urban design principles and treatments that maintain or enhance the existing environmental, visual and aesthetic value of the landscape and community through which the road passes.
- Ensure the landscape and associated urban and regional design aspects are fully integrated in the engineering design.
- Identify opportunities to enhance the environmental, visual and aesthetic elements of the landscape through which the road passes.

The extent of the Investigation Area for the Proposal covers a corridor approximately 45 kilometres in length, from the existing Allgomera deviation north of Kempsey, to the completed Raleigh deviation, north of Urunga. The width of the Investigation Area for the environmental assessment of the route options has covered a varied width between one kilometre up to three kilometres. The average width of the corridor would be100 metres along the route – 50 metres either side of the centre line. There would be some variation in this width based on surrounding topography, and land uses. The width of the corridor would be wider at interchanges.

1.1 RTA Pacific Highway urban design objectives

The RTA has prepared an urban design framework for the Pacific Highway, (Pacific Highway urban design framework, RTA March 2005), identifying a vision and overarching design objectives that should be factored into route selection and project development. The framework identifies the urban design vision and six urban design objectives to help achieve the vision.



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The RTA urban design objectives for the Pacific Highway are to:

1) 'Provide a flowing road alignment that is responsive and integrated with the landscape.
2) Provide a well-vegetated, natural road reserve.
3) Provide an enjoyable interesting highway experience.
4) Value the communities and towns along the road.
5) Provide consistency-with-variety in road elements.
6) Provide a simplified and unobtrusive road design.'

This report applies the urban design objectives to the Proposal through principles and guidelines to ensure that these objectives are considered throughout all phases.

2 Visual impact assessment methodology and the Proposal

2.1 Character areas of the region

A number of character areas have been identified, to ensure that the character of the local environment and potential changes to it are considered in the concept design and impact assessment of the Proposal. Landscape character is generally determined by a particular combination of topography, vegetation and land use. The combination of natural and cultural influences on the environment creates a distinctive character that will exhibit varying impacts from the Proposal. As much of the Proposal is located away from the existing Pacific Highway these character areas assist in determining design objectives, principles and guidelines for enhancement and mitigation of the Proposal within its setting. Urban design and landscape concepts can be effectively grouped within character areas, to assist in the development of the urban and landscape concept design for the Proposal. This will be more apparent in the later sections of this report.

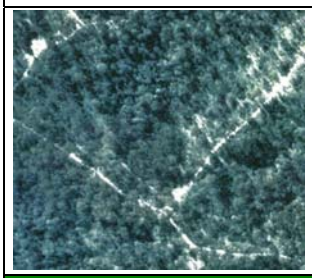
Six character areas have been identified. Most of these character areas are present to some extent within each section. Some sections of the study area are, however, dominated by one or two of the character areas. Each character area has varied sensitivities to the siting of a new highway and would experience different visual impacts. This is described in more detail within the next section.

The following photographs within Figure 1 assist in defining and recognising the character areas representative of the investigation area.

- **Figure 1: Character Areas**




Character Area 1	Character Area 2
River valley & open floodplain rural areas. Undeveloped, semi-developed, scattered residences and buildings	Undulating semi-open rural areas. Undeveloped, semi-developed, scattered residences and buildings




Character Area 3	Character Area 4
Steep to moderately undulating forests (includes state forests, parks, nature reserves, scenic destination areas). Undeveloped.	Semi-rural areas, rural residential. Semi-developed




Character Area 5	Character Area 6
Villages & Towns Developed	Industrial areas Developed

2.2 Visual Impact Assessment Methodology

The landscape and visual impact assessment identifies the potential impacts of the Proposal on the existing environment and the viewers within that environment. The visual impact has been based on the combination of the following factors.

Visual Effect

The visual effect is the degree of contrast the Proposal will have within its setting. It is determined by the way the highway integrates with the topography, the amount of cut and fill required and the amount of contrast with the existing vegetation, the local villages and towns, other land uses and the scale of the landscape. The character areas described previously are impacted by the visual effect of the Proposal.

Visual Sensitivity

Visual sensitivity is the degree that the highway is visible and is determined by the potential observer or viewer to the Proposal. Sensitivity is determined by the nature of the viewers' activity, the expectations of viewers whilst undertaking that activity and by the distance of potential viewers. Character areas also impact the visual sensitivity of the Proposal. For example viewers in a residential area will have higher expectations of the view than viewers in industrial areas.

View Shed Analysis and Visual Impact

The extent that the Proposal is visible within the landscape is the view shed. The view shed analysis for the Proposal has been divided into each section and is illustrated in a series of sheets, illustrated in Appendix B. An assessment of the extent of view and the visibility of the Proposal has been made from field assessment, aerial photography and topographic data. To assess the potential views from residences in some cases the closest street or public area has been visited to estimate the extent of view, or an estimation of the view has been made by professional judgement utilising the data available.

The view shed analysis has concentrated on the areas within 500 metres from the Proposal. For the purposes of the distances to potential viewers, the edge of the overall road corridor, as detailed in Section 1.2, has been taken. Where potential views beyond 500 metres are possible, these have been identified in the view shed analysis plans or descriptions. Where intervening vegetation may screen or partially screen the view the extent of view shown on the view shed analysis plans has assumed the larger view shed as a precautionary measure.

Where potential long distance views beyond one kilometre may be possible, these have been identified. Potential long views may occur from a high or prominent vantage point. Some areas that may view the Proposal from these distances include views along the rivers to the new bridge crossings, or views from residential areas located on a ridge overlooking the Proposal.

2.3 Overview of the Proposal

Following environmental and community input to the assessment of route options a preferred route was defined. Urban design, landscape and visual impact assessment reports have been prepared and input to the route selection phase of the project. The preferred route is referred to as the Proposal within this report and is divided into sections and described as follows. A more detailed description of the Proposal is included in the visual impact assessment for each section.

Section 1: Warrell Creek to Nambucca River

The Proposal within the Warrell Creek to Macksville section commences at the northern end of the existing Allgomera Deviation north of Kempsey. It deviates to the east of the existing highway near Cockburns Lane and runs parallel to the existing highway west of Donnellyville and east of Warrell Creek. At Albert Drive Donnellyville, the route veers eastwards from the existing highway just south of Bald Hill Road. It travels north-east through predominantly cleared agricultural land. It passes close to SEPP14 wetland No 388 and generally avoids adjacent vegetation. It crosses the Nambucca River immediately downstream of the confluence with Newee Creek. (Commences 100 metres south of Browns Crossing Road, and finishes at the Nambucca River.

Section 2: Nambucca River to Nambucca Heads

This section commences on the northern bank of the Nambucca River, where the Proposal traverses rural and rural residential land and then passes into Nambucca State Forest. It generally follows the ridgeline in the vicinity of Old Coast Road and avoids impacts on the Newee Creek wetland (SEPP 14 wetland No 383) and crosses the North Coast Railway Line at its northern end. (Commences 250 metres north of Albert Drive at Williamsons Creek, and finishes at the crossing of the North Coast Railway Line at Nambucca Heads.)

Section 3: Nambucca Heads to Ballards Road

North of the North Coast Railway Line the Proposal would involve the construction of a new dual carriageway to the west of the existing highway up to Ballards Road, as this area is highly constrained by wetlands to the east and significant forested areas to the west. The existing highway would be utilised as a local service road. (Commences at the crossing of the North Coast Railway Line at Nambucca Heads, and finishes at Ballards Road.)

Section 4: Ballards Road to existing Raleigh deviation

From Ballards Road the Proposal would require construction of approximately 11.4 kilometres of new dual carriageway from Mines Road to the existing Pacific Highway north of Urunga and one kilometre duplication of the existing highway before joining the southern end of the existing dual carriageway at Raleigh. This route involves construction of a new bridge of approximately 130 metres length over the Kalang River, approximately 2.5 kilometres west of Urunga. Floodplain culverts and/or bridges would also be required. It

also passes through a small section of State Forest and traverses approximately 200 metres east of the existing Raleigh industrial area. (Commences at Ballards Road, and finishes at Waterfall Way, Raleigh.)

2.3.1 Description of the Proposal

The Proposal includes the design components listed below. Cross-sections of the typical road footprint and at various locations along the Proposal and are shown Appendix E.

- Width of road footprint: 3.5 metre wide lanes, 2.5 metre left hand shoulder and 0.5 metre right hand shoulder. The median would be variable width (minimum 12 metres).
- Width of overall corridor: The average width of the corridor is 100 metres along the route – 50 metres either side of the centre line. The width would be wider at interchanges.
- Local access roads where present: 10 metres wide, one lane in each direction.
- Proposed interchanges occur south of Warrell Creek, Bald Hill Road, Nambucca Heads, Ballards Road, and Waterfall Way in Raleigh.
- Rest areas: A major rest area is proposed to be located between the existing highway and the upgrade at the Nambucca Interchange. The expected extent would be approximately 600 metres long and up to 80 metres wide, although clearing is unlikely to be required for the full area.
- Lighting: Lighting would be required at interchanges and rest areas. Lighting at interchanges would cover the extent of the ramps (start at off ramp to finish at on ramp).

Structures would include:

- Numerous bridges and culverts: There are proposed bridges over the main rivers, (including Warrell and Deep Creeks, Nambucca and Kalang Rivers), culverts along the floodplains and for cross drainage. More descriptions of these structures are included in Section 4.2.2
- Fauna underpasses combined with culverts and waterway crossings.
- Noise mitigation would be provided by barriers and/or planted mounds. This is described in more detail in Section 4.2.3 and Technical Paper No 7.
- Pedestrian and bicycle access is proposed across the highway by the use of overbridges for local connector roads, to reduce community severance. Generally overbridges will include combined pedestrian and bicycle access paths.

3 Visual impact assessment of the Proposal

3.1 General

This section applies the methodology and existing site context described in the previous sections and describes the visual impact assessment for the Proposal. It has been divided into the four sections of the highway and describes the context within each section, the proposal and the potential visual impact.

The drawings in Appendix A illustrate the view shed analysis for each section. The residences with potential visual impacts, are described in this chapter are identified on the view shed analysis drawings. A summary of the visual impacts for each area is included within Appendix B.

These should be referred to in conjunction with the Visual Assessment text for each Section.

3.2 Section 1 Warrell Creek to Nambucca River

3.2.1 Existing landscape and visual character

The Warrell Creek valley is a fine grained landscape, characterised by many visual changes and contrasts of vegetation patterns, topography, residential clusters, road and rail alignments, within an enclosed river valley. The main valley is centred around Warrell Creek village and Warrell Creek. It is a highly picturesque landscape of intimate scale visually enclosed by the foothills of Mount Yarrahapinni to the south and east, and the mountains of the Great Dividing Range to the west. The existing Pacific Highway and the North Coast railway line are the main interventions in this landscape scene. Residences are generally evenly scattered amongst the landscape, in the undulating rural areas to the east of the existing Pacific Highway. They are more evenly spaced along the main access roads of Upper Warrell Creek Road to the west of the creek and Rosewood Road to the east. These residences are often sited to take advantage of the valley views and are focussed towards Warrell Creek and the grassed river valley.

Existing view from Pacific Highway at the southern approach to Warrell Creek Village looking east towards the proposed location of the Proposal beyond the railway line.

Donnellyville village is located in the middle of this section, and is characterised by a small subdivision of houses scattered around two main streets, located immediately east of the existing Pacific Highway. O'Dells Road is located to the south of Donnellyviille with residences situated along this ridgeline with views over the valley to the west.

The main character areas within the Warrell Creek area are character area 1, river valley and open floodplain, character area two, undulating and semi open rural areas, and character area 5, villages and towns.

Beyond Warrell Creek the landscape character is predominantly character area 1, river valley and floodplain rural areas. The floodplain of the Nambucca River is much broader than the Warrell Creek valley, resulting in a larger scale within the landscape. Broad, areas of open flood plain with scattered trees are present to the east of Macksville.

The Nambucca River is a wide river of high scenic quality, providing a recognisable feature on the journey along the existing Pacific Highway. Residences around Macksville take advantage of the river views and are clustered on both sides of the river with the southern sides more densely populated, particularly along River Street. The view from the existing traffic bridge at Macksville for motorists provides an important visual orientation along this portion of the Pacific Highway. This opportunity should be recognised for the new bridge over the Nambucca River where district views should be maximised.

Existing view from existing traffic bridge at Macksville east down the Nambucca River towards the location of the Proposal's bridge. Views between both bridges should be retained as an orientation and marking of this milestone crossing of the Nambucca River. (Refer Principles and Guidelines, Section 4.2.2)

Within this section rural residential areas of clustered residences, (character area 4), occur at Kerr Drive, Bald Hill Road and Wedgewood Drive. These occur in discrete clusters with undulating topography and tree clusters semi enclosing the views from many of the residences.

Macksville is the major town in the section, situated on both sides of the Nambucca River in a picturesque setting with views to the mountains to the west and towards the river. The existing Pacific Highway approach into Macksville provides a pleasant entry to the town with views to the Golf Course and a treed alignment of Liquidambers along the east.

The Nambucca Council depot with associated buildings is located on River Street/Gumma Road to the east of Macksville. This depot is situated on the river floodplain and represents character area 6, industrial land use. The Donnelly Welsh Playing Fields are located in east Macksville.

3.2.2 The Proposal

The Proposal in this section is located east of the existing Pacific Highway, Warrell Creek, Warrell Creek village and the North Coast Railway. It is situated in the scattered treed and grassed slopes, above Warrell Creek Village.

The Proposal deviates to the east of the existing highway with a new long bridge over Upper Warrell Creek and the railway line near Cockburns Lane. Warrell Creek interchange is located on the existing Pacific Highway west of Warrell Creek and the new bridge. As the Proposal crosses over the North Coast Railway it passes through the forested areas to the east of the sawmill. It is located in cut at the edge of the forested areas with some deep areas of cut, up to eight metres in this section. Small areas of fill occur as the Proposal traverses the semi- open grassed hill slopes and emerges out of cut as it straddles the slopes. These areas are short in length, being some 100 to 300 metres, except where the Proposal emerges out of cut at Rosewood Road and is located above existing ground level for approximately 800 m.

Rosewood Road bridges over the Proposal. As the Proposal extends towards Albert Drive it is located in a deep cut of some 12 metres, with a revised alignment for Albert Drive bridging over this cutting. It emerges in fill to the east of Albert Drive and extends in cut until it parallels the existing Pacific Highway just south of Williamsons Creek. The Proposal extends the existing cutting at the existing intersection of the Pacific Highway with Scotts Head Road. Adjacent to the quarry the cutting is some 30 metres deep on the eastern side of the Proposal.

The Proposal then follows east of the existing Pacific Highway utilising the existing bridge over Warrell Creek as a local access road. Two new bridges are provided for northbound traffic parallel to the east of the existing bridge. An interchange is located in cut at Bald Hill Road to service Macksville and Scotts Head. The

interchange has an enlarged footprint with an overbridge for Bald Hill Road and a five way roundabout west of the interchange. Impacts of the interchange and mitigation proposals are included in the next sections.

Beyond Bald Hill Road the Proposal passes east of the existing Pacific Highway and travels through predominantly grassed and open agricultural land, with clustered areas of swamp forest and freshwater wetlands. As it passes along the floodplain south of the Nambucca River it is elevated above flood level, some three metres, with culvert structures providing drainage and fauna underpasses. This elevation increases to approximately seven metres at the bridge abutments over the Nambucca River.

View from Bald Hill Road adjacent to the existing Pacific Highway looking north

3.2.3 Visual Assessment

Visual Effect

Due to the length of this section and the varied character of the existing landscape the visual effect is varied. The visual effect for the southern section around Warrell Creek would be high. The Proposal would contrast with the existing landscape character of the Warrell Creek valley. It has been located adjacent to forested edges in the south and is in cut for much of its length, reducing the visual effect in this area. The visual effect of the cuttings and the visual impact to viewers will be determined by the availability of views to the cuttings. The areas of cut can be reduced in their visual contrast by landscape revegetation. As much of the visual contrast is formed by colour contrast of the cuttings with the surrounding grassed areas, particularly when viewed from a distance, revegetation with grasses can mitigate these impacts. This is described in more detail in Section 4.2.4.

The visual effect of the Proposal in the centre around Donnellyville would be medium, due to the reduced visual contrast with the existing land uses in this area. This northern area of the Warrell Creek valley has more developed land uses, with more roads, built form and the existing Pacific Highway located in this area.

The contrast of the Proposal with the river valley and floodplain areas of the Nambucca River would be high. The elevation of the Proposal increases the contrast. The visual effect on the northern side of the Nambucca River at the bridge crossing would be potentially high, as a crossing of the river in this area would provide built form impacts on an area that is currently less developed. By locating the Proposal adjacent to the Nambucca Council Depot and Sewage Treatment Plan, on the southern side of the Nambucca River, the visual effects of these man made elements are combined in order to reduce the contrast with the surrounding land uses. The contrast however, with the residences located on River St within close proximity to the Proposal in this area, remains very high.

Visual Sensitivity Warrell Creek Valley

The visual sensitivity or visibility of the Proposal is generally high in this area. Most of the potential viewers of the Proposal are residents located in Warrell Creek village, Donnellyville, or on rural properties. Potential minor visual benefits occur for the Warrell Creek village and the residences located along the southern approaches to the village. The residents in these areas will benefit from the reduced traffic on the existing Pacific Highway passing immediately adjacent to their properties. Some residents will obtain views of the Proposal, at approximately 500-600 metres distance, as it emerges out of the cuttings on the slopes of the surrounding farmland. The distance of the view reduces the visual impact, and the extent of view will potentially be reduced by intervening elements in the landscape. One of these elements is the North Coast Railway Line, which is located between the Proposal and residences in Warrell Creek village and those located on the Pacific Highway. The presence of the railway and vegetation ensures that areas of the Proposal that are located in fill would not be visible as a long uninterrupted view from these residences. Where intervening vegetation is located between the viewer and the Proposal, the visual sensitivity would be reduced.

Existing view of part of existing Warrell Creek Village on the existing Pacific Highway

The residents located within 500 metres and closer to the Proposal are the most visually sensitive. These are identified on the view shed analysis plan, Sheet 1 in Appendix A. A number of residences are located within

100 to 150 metres of the Proposal. The viewers in these residences have a very high visual sensitivity to the Proposal. Where the Proposal is located in cut the visual sensitivity would be reduced, as the extent of the proposal that would be visible is reduced.

At the Warrell Creek interchange three residences are located on the western side of the existing Pacific Highway. These residences would obtain views of the interchange and the proposed bridge crossing over Warrell Creek and have a high visual sensitivity. Revegetation of the Proposal in this interchange is important to reduce the extent of the interchange that is visible from these residences. To the east of the bridge crossing two residences would obtain views of the elevated Proposal from 150 to 250 metres distance. Mitigation measures, including tree planting adjacent to the Proposal, should be included to reduce the visibility. Refer to Section 4.3 for recommended landscape works at the interchange.

Two residences (A at approximately 150 metres, B at approximately 300 metres) located to the west of the proposal between chainage two kilometres and three kilometres, would potentially gain oblique views to the portion of the Proposal that is in fill. At Rosewood Road two residences (C, D) are located within 50-100 metres of the Proposal. One residence at Rosewood Road west of the Proposal (E) is located at approximately 200 metres, and one at Albert Drive west of the Proposal (F), is located at approximately 150 metres. These residences would gain views of the area of the Proposal located on embankment and would require screen planting to reduce the extent of view. The potential viewers in these residences have a very high visual sensitivity to the Proposal. Further north the closest residences to the Proposal are located on Albert Drive east of the Proposal as it approaches Donnellyville. Three residences (M) and one (O) are within approximately 200 and 100 metres of the Proposal where it is in fill, with these residences on the ridgeline of Albert Drive potentially obtaining views over the Proposal where it is in cutting. One residence on O'Dells Road (N) will also obtain views over the Proposal from a distance of approximately 250 metres. Six residences, located on O'Dells Road, (G-L) would obtain views of the portion of the Proposal where it is in fill, from a distance ranging between 350 and 500 metres and have a high visual sensitivity to the Proposal as

Existing view from O'Dells Road towards the valley where Proposal would be located

they would be looking down onto the Proposal.

Another residence located on the northern end of O'Dells Road is on the lower side of the ridge facing Williamsons Creek and should not see the Proposal due to the ridge screening their view. Residences beyond 500 metres of the Proposal on the southern end of O'Dells Road are distanced from the Proposal and have a medium visual sensitivity due to this distance.

Existing View from Albert Drive Donnellyville to area where the Proposal would run parallel to the existing Pacific Highway

Residences in Donnellyville are located between 25–250 metres of the Proposal and have a potentially very high visual sensitivity to the Proposal. Not all residents would obtain views of the Proposal, due to the topography and location of the residences. Some residences obtain views of the existing Pacific Highway and the amplification of the highway in width in this area will increase their visual sensitivity. Two residences in Donnellyvile are located within 25–30 metres of the Proposal and would experience very high visual sensitivity. The residences described, are identified on the View Shed Analysis Sheet 1, in Appendix A.

View from Rosewood Road to the west over Warrell Creek Valley

Four residences located to the west of Donnellyville and the existing Pacific Highway would obtain views of the Proposal from approximately 80–250 metres. One residence is located on a ridge adjacent to the existing

cutting south of the existing lower Warrell Creek bridge. As the cutting would be increased in height, this residence would experience very high visual sensitivity to the Proposal as it also would obtain views north, east and south towards the Proposal. The two residences off Scotts Head Road would obtain views of the Proposal, and the northern residence would gain views of the new bridges crossing Lower Warrell Creek.

The visual sensitivity of residents located on Upper Warrell Creek Road is low. Although some of these residents will gain views of the Proposal where it is located in fill, the distance of the view and the intervening landscape elements, including vegetation, reduce the extent of the available view and hence the visibility.

View looking towards Warrell Creek Village from Upper Warrell Creek

Residents located along Rosewood Road at a greater distance beyond those previously mentioned will experience low visual sensitivity to the Proposal for the same reasons.

Visual Sensitivity Donnellyville to Nambucca River

The visual sensitivity or visibility of the Proposal is generally high to very high in this section, where it is located within 150 metres of residences situated either on rural residential properties or adjacent to the Nambucca River.

Visual benefits for the residents in most areas of the township of Macksville will occur due to the reduced traffic passing through the town. This traffic provides a major disruption to Macksville and is dangerous for the local pedestrian activities within the town, the riverbank parks and the bridge over the Nambucca River. By diverting through traffic away from Macksville the urban design, streetscape and visual benefits for Macksville will be significant. There is potential to revitalise the town character and visual benefits of its setting on the river without the noise, disruption and pedestrian hazard of the highway passing directly through the town.

The Nambucca Shire Draft 20-year Structure Plan, November 2006 identifies future land release areas west of Macksville, to be developed as the Macksville and Congarinni Future Urban Area. This is distanced from the Proposal and would not be affected by it.

The Proposal is located beyond 500 metres to the east of Macksville. The visual sensitivity of the Proposal from the residents in Wall Street and East Street Macksville is low. The distance of these residences and the clusters of vegetation between them and the Proposal would reduce their visual sensitivity. Residents located on River Street/ Gumma Road have a high visual sensitivity to the Proposal. Where these residences are within 150 metres of the Proposal the visual sensitivity would be very high. Views from the rear of the properties would be available to the Proposal in fill along the floodplain, and the raised approaches to the bridge over the Nambucca River. Views from the front of the property would be over the river towards the bridge. As these residences are located to maximise the views over the river their existing setting will be highly impacted by the location of the Proposal in this area.

Residents located within 500 metres and closer to the Proposal are the most sensitive to the visual changes associated with the Proposal. Residents along Bald Hill Road and Kerr Drive, within 150 metres of the Proposal have a very high visual sensitivity. Where the Proposal is located in cut the visual sensitivity is reduced, and where the Proposal is in fill, but screened by existing clusters of trees within the surrounding agricultural land, the visual sensitivity is also reduced.

View from Bald Hill Road to north west in the direction of the Proposal

Five residences located in Kerr Drive (P-T) at approximately 100 to 150 metres of the Proposal will experience a very high visual sensitivity to the Proposal due to their close proximity to the Bald Hill interchange. Although most of the Proposal is located in approximately six metres of cut, the ramps and local access roads increase

the road footprint and potential views from residences. The two southern residences (S-T) would not view the Proposal where it is in cut, however views to the southbound entry ramp would be available. Residence S is located within 80 metres of the southbound entry ramp, would be very highly sensitive to the Proposal and requires mitigation screening. Two residences to the south on Kerr Drive are located closer to Warrell Creek, with their views to the east. These should not gain views of the Proposal. The residences surrounding the Bald Hill Road interchange are very highly sensitive to the visual changes associated with this interchange and mitigation measures will be important to reduce these potential impacts. One residence (U) located within 150 metres west of the Pacific Highway near Bald Hill interchange would potentially gain views of the Proposal, and would experience high visual sensitivity and visual impact. Another residence (V) located immediately west of Bald Hill Road interchange at approximately 250 metres from the western roundabout would potentially gain views from its ridge location over the interchange. Protecting existing vegetation along the existing Pacific Highway would provide some visual screening.

Four residences located in Wedgewood Drive (W) are located within approximately 250 to 300 metres of the Proposal, with views from an elevated location over the rural pasture towards the location of the Proposal in fill. These residences are highly sensitive to the visual impacts of the Proposal where it is in fill. Some trees located within the residential properties would screen some of the view, however the Proposal would be potentially visible for approximately 600 metres within foreground views from these residences. Screen planting at the base of the embankments and landscape treatment to the embankments of the fill areas of the Proposal will be important to reduce these impacts.

View from Donnelly Welsh Playing Fields looking to the east, to the location where the Proposal would cross the floodplain

The visual sensitivity of the Donnelly Welsh Playing Fields located east of Macksville is low to medium due to the distance of the Proposal, over 500 metres. Some additional planting adjacent to the Proposal would reduce the visual impact. Potential additional planting along the eastern edge of the playing fields could assist in screening the Proposal and could be discussed with Nambucca Council whereby the RTA provides some plant material for the Council to plant.

Visual Impact and View Shed Analysis

Warrell Creek Valley

The combination of the visual effect and visual sensitivity has identified the visual impact for this section of the proposal. The high visual contrast of the Proposal within this predominantly rural scene and the high to very high visual sensitivity of residents within 150 metres of the Proposal, where views are available to the portions of the Proposal that are in fill, combines to create a high to very high visual impact. Where residents are located within 100 metres of the Proposal the visual sensitivity is very high and the potential resulting visual impact is very high.

Mitigation measures should be adopted to reduce the visual impact. Planting to screen the Proposal should be carried out with careful placement of tree clusters to integrate planting with the character of the existing landscape. Reducing the visual contrast of the Proposal in the cuttings and fill areas also needs to be carried out by revegetation of cut batters and embankments with grasses to visually integrate the landscape colours and textures. These mitigation measures will be described in more detail in Section 4.2 of this report.

Donnellyville to Nambucca River

The medium to high visual contrast of the Proposal within the predominantly agricultural land of scattered trees and open floodplain, combined with the high visual sensitivity of the residences within 300 metres of the Proposal creates a medium to very high visual impact. Areas of vegetation groups and the wetlands on the Nambucca River floodplain would provide a visual screen for some of the views in this area and reduce the length of the Proposal that is visible from any one place.

For a number of residences located within 150 metres of the Proposal the combined high visual effect and very high visual sensitivity creates a high to very high visual impact.

Mitigation measures should be adopted to reduce the visual impact on these residences. Planting to screen the Proposal should be carried out with careful placement of tree clusters to integrate planting with the character of the existing landscape. Reducing the visual contrast of the Proposal in the cuttings and fill areas also needs to be carried out by revegetation of cut batters and embankments to visually integrate the Proposal with the surrounding landscape colours and textures. These mitigation measures will be described in more detail in Section 4.2.

The visual impact of the Proposal at Macksville is low due to the distance of the Proposal, beyond 500 m of Macksville. Residences located on River St/Gumma Rd within 150 m of the Proposal would experience a very high visual impact due to the very high visual effect and very high visual sensitivity of views at this distance to the Proposal. Residences located between 150 and 300 m of the Proposal along River St/Gumma Rd would experience high visual impacts. Long views beyond one kilometre to the new bridge would be available from the existing traffic bridge at Macksville along this straight section of the Nambucca River. For recreational users of the river itself, long views to the bridge would also be available. Opportunities to make this view a positive element exist by ensuring that the bridge is a well-designed and attractive structure. This is dealt with

in more detail in Section 4.2.2. The visual impact of this bridge and its design will be very important in the perception of these views and the impacts it has on the locality.

The potential to maintain views of the river and Macksville beyond from the bridge for drivers will maximise the tourist benefits to Macksville. Views between the new bridge and the existing Pacific Highway bridge at Macksville should be retained as an orientation and marking of this milestone crossing of the Nambucca River for drivers on both bridges.

The non-indigenous heritage assessment working paper identifies two items near the proposed bridge crossing of the Nambucca River. These include the former Boulton Hotel, located on the north-west side of the proposed bridge, and the site of the ferry/punt crossing of the river near the former Boulton Hotel. Both of these have local heritage significance. The former Boulton Hotel is now a private residence and is the closest residence on the north side of the proposed bridge crossing. The ferry/punt crossing is located within 50 metres of the centre line of the bridge, with remnant wooden piles and timber beams evident on the southern side of the river, and the northern launch point on the river being visible. The visual impact on both of these items would be very high due to the very high visual contrast and very high visual sensitivity. Recommendations for protection and recording of these sites are included in the non-indigenous heritage working paper. The proposed location of the bridge crossing within close proximity to the original ferry/ punt crossing provides a valuable urban design link to the historic settlement of the region and its early association with the development of the area and early transport. This has been utilised in interpretive data such as local pedestrian routes and foreshore walks undertaken by Nambucca Shire Council.

3.3 Section 2 Nambucca River to Nambucca Heads

3.3.1 Existing landscape and visual character

This section commences at the northern bank of the Nambucca River and extends to the point where the Proposal crosses the North Coast Railway Line at Nambucca Heads.

To the north of the Nambucca River the river valley and rural areas situated on the flood plain, (character area 1), follow the river as it bends east and then north towards Nambucca Heads. The existing Pacific Highway follows the river, providing a highly scenic journey with frequent views over the river. Some rural residential areas, (character area 4), north of the river are located on the Old Coast Road and in Letitia Close, Mattick Road and further north along Florence Wilmont Drive. The houses in Letitia Close and Mattick Road are located to take advantage of the views over the rural landscape. Remaining areas to the east of the Old Coast Road in the southern section are undulating, semi-open rural areas with scattered residences (character area 2). The majority of the area to the north of this section is forested and undulating, particularly along the Old Coast Road and areas east of the road in the Nambucca State Forest (character area 3).

3.3.2 The Proposal

The proposed bridge over the Nambucca River and the approaches to the bridge on both sides of the river are elevated, with the bridge elevated some 10 to 11 metres. The Proposal is also located on a bridge over the existing Pacific Highway north of the Nambucca River. It then generally follows the ridgeline in the vicinity of the Old Coast Road, being located to the east and west of this road as the Old Coast Road meanders along the ridgeline. It is located in cut adjacent to Letitia Close and Mattick Road, with both of these local roads bridging the Proposal.

Existing view of Old Coast Road through undulating forest where the Proposal is located to the right (east)

As the Proposal passes through the undulating forested areas towards Nambucca Heads it is situated in cut and fill, with some areas of fill between eight and 13 metres. Fauna underpasses are provided in some of the areas of fill. The Proposal is located approximately 500 metres south of where the Old Coast Road crosses the existing Pacific Highway. For approximately 2.5 kilometres within the Nambucca State Forest the Proposal would be divided with a wider median to allow for fauna crossings. The Proposal bridges over the North Coast Railway.

Existing view of Old Coast Road where the Proposal would follow east (to the right) from this viewpoint. It will be important to retain existing vegetation along the Old Coast Road to avoid open views of both roads in this setting

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3.3.3 Visual assessment

Visual Effect

Due to the length of this section and the varied character of the existing landscape the visual effect is varied. The visual effect on the floodplain north of the Nambucca River is high due to the high contrast and elevation of the Proposal. The visual effect as the Proposal follows the Old Coast Road is generally high, due to the visual contrast of a wider road corridor and straighter alignment than the existing and meandering Old Coast Road cutting through this forested landscape.

Visual Sensitivity

The visual sensitivity is high to very high in the areas of rural residential property on Nursery Road, Letitia Close, Mattick Road, and part of Old Coast Road where residences are located within 150 metres of the Proposal. Beyond chainage 15,500 the visual sensitivity is generally low as the Proposal is located through forested areas with no residences close with potential views.

The residences along Florence Wilmont Drive have very low visual sensitivity to the Proposal as they are beyond 300 metres to the Proposal, are separated by dense forest and will not obtain views of the Proposal.

Very high visual sensitivity occurs for one residence (A) on Nursery Road where the Proposal is located in approximately 10 metres of fill on the northern approaches to the bridge. The potential visual impact on this residence is very high, and the potential to mitigate the impacts of such a high structure is very difficult. Although some existing trees on the riverbank will assist in providing visual screening to the bridge over the Nambucca River, the residence would obtain views of the bridge and the approaches on both sides of the river.

The caravan park on Nursery Road is situated at 450–500 metres distance from the Proposal, with potential views available to the bridge and the fill embankments. The visual sensitivity would be medium as the distance and scattered vegetation present between the Proposal and the caravan park reduces the visual sensitivity and the extent of the Proposal that would be visible.

Residences (C) located on the north-western side of the bridge over the Nambucca River in Bellvue Drive would gain some views of the bridge from approximately 300 metres distance and greater. The visual sensitivity from this viewpoint is medium to high, as the vegetation present along the riverbank would provide partial screening. As the distance of the residences along Bellvue Drive increases beyond 500 metres from the Proposal the visual impact would decrease.

Within North Macksville residences in areas that are elevated near Glenmore Crescent generally have low visual sensitivity to the Proposal. Due to their elevation, they may obtain some distant views of the bridge and the elevated approaches to it, being located beyond 700 metres.

Viewpoints from recreational areas are available around the bridge crossing of the Nambucca River at the boat ramp near the caravan park and the pedestrian bridge over Newee Creek, near its confluence with the Nambucca River. From both of these locations the bridge would be within view, but would have a high visual sensitivity and medium visual impact at the pedestrian bridge over Newee Creek, where it would be located approximately 150 metres away. The boat ramp is approximately 750 metres away and the visual sensitivity and impact would be low.

Existing view from Mattick Road looking south at location where the Proposal would cross Mattick Road

Some of the residences within 150 metres of the Proposal in Letitia Close (D,E,F), and Mattick Road (H-K) have a very high visual sensitivity to the proposal where it is located in fill. The visual sensitivity of these residences is also very high due to their generally elevated position with potential views over the Proposal as it passes through this valley. Residences adjacent to the areas in fill on the Old Coast Road (B, G, M, O-Q) within 150 metres also have a very high visual sensitivity. Residence N, although just over 150 metres from the Proposal, would also experience very high visual sensitivity to the Proposal, as it shares an enclosed valley with Residence Q with potential views directly over the Proposal.

Residences between 150 and 300 metres in Letitia Close (approximately four residences) and Mattick Road (approximately two residences) with potential views of the Proposal where it is in fill, would experience high visual sensitivity. Residences between 300 and 500 metres with potential views of the Proposal where it is in fill, in Letitia Close (approximately three residences) and Mattick Road (approximately four residences), would experience medium to high visual sensitivity. Some existing vegetation and landform undulations will reduce the extent of view from the residences at these distances, and where the residences are not located higher than the Proposal, the extent of the potential view is reduced and the visual sensitivity reduced. Screening and other mitigation measures are essential to reduce the extent of the Proposal within view. These are discussed further Section 4.2.

Visual Impact and View Shed Analysis

The extent of the surrounding area with potential views to the Proposal is identified in the View Shed Analysis Sheet 3 and 4, in Appendix A for this section. The extent of view does not generally extend beyond

foreground distance of 500 metres for most of this section. The combination of visual effect and visual sensitivity has identified the visual impact for this section of the Proposal. The high visual effect of the Proposal within the rural residential land north of the Nambucca River and the high to very high visual sensitivity of this area result in a high to very high visual impact for this area. Where the residences are located at a greater distance than 300 metres of the Proposal, and where they are not higher than the Proposal with potential views looking down onto the Proposal the visual sensitivity and potential visual impact is reduced. Mitigation measures are discussed for the areas south of the Nambucca River and need to be adopted for these areas also.

The combination of a high visual effect as the Proposal follows the Old Coast Road through the Nambucca State Forest and the low visual sensitivity results in a low to medium visual impact for this area.

3.4 Section 3 Nambucca Heads to Ballards Road

3.4.1 Existing landscape and visual character

The landscape and visual character through section 3 consists predominantly of undulating semi open rural areas, character area 2, and dense steeply undulating forests, character area 3, all located adjacent to the existing Pacific Highway. Due to the varied topography and dense areas of vegetation it is not possible to obtain long views over the landscape in many areas within this section. Most views from the existing Pacific Highway are within 100 to 200 metres, therefore resulting in an enclosed landscape of frequently changing viewpoints and vistas.

3.4.2 The Proposal

The Proposal generally follows the existing Pacific Highway, with the highway functioning as a local access road. A rest area would be provided in the vicinity of the Nambucca Heads interchange north of the bridge over the existing North Coast Railway. An underpass for Valla Road is located where the Proposal is in fill, and a bridge over Cow Creek and Deep Creek is duplicated to provide for the Proposal. Frequent combined fauna underpasses/drainage culverts would be located in this section. Also overbridges for local roads and connections across the Proposal have been included to reduce the severing effects of the new highway.

3.4.3 Visual assessment

Visual Effect

The visual effect of the Proposal through most of this area would be medium. As the Proposal generally follows the existing Pacific Highway the degree of contrast with the existing land uses would be low to medium. The Proposal has been located to follow where possible the existing landform, with more steeply undulating sections of cut and fill occurring in the north of the section. As many of the residences within this section are located adjacent to the existing Pacific Highway they are within a modified landscape, impacted by existing roads and level changes.

Visual Sensitivity

Visual sensitivity in this section is low to medium for much of its length. Residences in the section are generally located evenly along the Proposal on adjacent properties or clustered around streets. A high visual sensitivity occurs where these residences are within 150 metres of the Proposal in fill, with a low visual sensitivity where the Proposal is in cut. Approximately 36 residences are located within 150 metres of the Proposal where foreground views to areas in fill would be possible. The visual sensitivity of these residences is cumulative as they generally obtain some views of the existing Pacific Highway. Many of these residences are located adjacent to the existing Pacific Highway.

Visual impact and view shed analysis

Areas along the existing highway and within the view shed of the Proposal are identified on the attached View Shed Analysis Sheets 5 and 6, in Appendix A. Generally the residences located within 150 metres of the Proposal would obtain some views and would potentially experience a medium to high visual impact. As areas of this landscape frequently have dense tree groups and undulating levels the extent of view is generally limited. Areas where residences are clustered adjacent to the Proposal and would experience high visual impacts are located at a number of positions along the Proposal. This includes cumulative impacts due to existing views to the Pacific Highway. Some residents located within 150 metres of the Proposal in the following areas would experience high visual impacts- Auld Close, Valla Road, Deep Creek Road and East-west Road. Oyster Creek subdivision is located north-east of Burkes Lane. This subdivision is separated from the Proposal by the existing Pacific Highway and should not obtain views of the Proposal, if existing vegetation along the Pacific Highway is retained. It will be important to restrict clearing in this area to maintain the existing screening provided by this existing vegetation.

Landscape proposals should be undertaken to screen views by mounds and planting, carefully located to complement the existing landscape pattern. In some cases mounds may be located where excess fill is available and where the space required to provide mounds will not require additional clearing of existing vegetation. This is discussed in more detail in Section 4.2.3.

The visual impact of the Nambucca Heads Interchange requires mitigation by planting and detailed landscape treatment. The potential to identify this arrival point to Nambucca Heads as a milestone and orientation point along the Proposal needs to be considered in the design. This will be described in the Section 4.2.1.

Cow Creek Reserve is identified as an area of high local significance within the Non-aboriginal Heritage Working paper. The visual impacts on this reserve would be high due to the close proximity to the Proposal. Mitigation measures to reduce this impact include screen planting adjacent to the reserve and the Proposal. A former stock route has also been identified to the north of the reserve, and was assessed as having local heritage significance. A Statement of Heritage Significance was prepared, and the heritage significance was down-graded. Irrespective of this, the visual impacts on this route are low due to the dense existing vegetation adjacent to the Proposal in this area.

Visual impact on future urban areas

The Nambucca Shire 20 year Structure Plan, November 2006–2026 identifies Boggy Creek as the proposed future town centre. This includes a proposed area dedicated to heavy industry, bulky goods and inter-modal transport. The location of the proposed industrial component is on both sides of the Pacific Highway, north of Nambucca Heads. The proposed industrial area starts where the Proposal crosses the existing North Coast Railway line and extends on the western side of the existing Pacific Highway until Deep Creek. The area to the immediate east of this, around Cow Creek is proposed as rural residential land. The visual impact of the Proposal on these future land uses is low for the industrial area due to the low visual effect and low visual sensitivity. As the industrial area will be a further built intervention within the landscape in this area the Proposal can be designed to provide adequate landscape treatment within the corridor and to accommodate the future land use activities. The rural residential area will experience medium visual impacts due to the medium visual effect and sensitivity.

3.5 Section 4 Ballards Road to existing Raleigh deviation

3.5.1 Existing landscape and visual character

The existing landscape character of this section varies considerably as the Proposal passes from the steeply undulating and densely forested areas of Little Newry State Forest, (character area 3), down to the Kalang River valley, (character area 1). Where the Proposal crosses the Kalang River valley, a fine grained landscape of high scenic value is enclosed on both sides of the river by the forested areas on the surrounding ridges. The side slopes of the valley are scattered with residences on rural properties, (character area 2), taking advantage of the views and picturesque rural scene. This area has been identified in Bellingen Shire Council's planning provisions as a Conservation Area, and includes the South West Arm Road Scenic Road Landscape. The sequences of views of the river and native vegetation contrasting with the cultural landscape of small dairy farms has been identified as having high local significance.

The landscape character, approximately 900 metres north of the river, returns to dense forested areas of the Tarkeeth State Forest, character area 3. The northern portion of the section includes rural residential areas, character area 4, the Raleigh industrial areas, character area 6, and small portions of open undulating semi-rural areas.

3.5.2 The Proposal

The proposal includes approximately 11.4 kilometres of new dual carriageway extending from Ballards Road to the existing Pacific Highway north of Urunga, and one kilometre of duplication of the existing highway before joining the southern end of the Raleigh deviation.

Constantly changing areas of cut and fill occur through the Newry State Forest, with a very deep cutting of 20 metres occurring at approximate chainage 32,600. Fauna underpasses and two overbridges provide local access through this area with one at Ballards Road and one at Martells Road. The Proposal is elevated as it emerges from the forest area to the floodplain south of the Kalang River.

View North of the Kalang River. The Proposal would be left of South Arm Road, passing through the saddle in the ridgeline

The bridge over the Kalang River is approximately 8 metres high, with approaches on both sides in fill of approximately four to five metres. An overbridge for local property access occurs north of the River where the Proposal is in cut.

The Proposal passes through the dense forest areas of Tarkeeth State Forest, west of the wetlands located in this area. It is located in cut as it passes adjacent to the residences on the southern end of Ridgewood Drive, and emerges into fill as it crosses Short Cut Road. It then passes south of the Raleigh industrial area and joins the existing Pacific Highway at the Raleigh deviation. Alterations to the on and off ramps at the Waterfall Way interchange at Raleigh are required, with an interchange to the east of the existing interchange, providing southbound entry and exit to the old Pacific Highway.

3.5.3 Visual assessment

Visual Effect

The visual effect of the Proposal as it passes through the forested areas in this section would be high to very high due to the visual contrast. The built form of the Proposal and its associated deep cuts, fill and the potential scarring would contrast with the natural character of the forest in this area. The visual effect through the Kalang River floodplain and crossing would also be very high due to the contrast of the Proposal with this rural scene.

The Proposal would pass directly through the South West Arm Road scenic road landscape, would contrast with this landscape and have a very high visual impact. The Non-Indigenous Heritage Working Paper has

identified specific mitigation measures, including screen planting, and retention of the function and character of the road to mitigate the Proposal's impacts. This will be discussed in Section 4.2.7.

In the north of this section the visual effect would be medium to high in the area of fill at Short Cut Road and further north, due to the elevation of the road in fill.

Existing view: Short Cut Road residences located on the northern side. The Proposal would be located beyond the ridgeline.

Visual Sensitivity

The visual sensitivity in the areas through forest would be low due to the lack of potential viewers of the Proposal and the screening provided by the forest. The visual sensitivity or visibility of the Proposal would be high in the middle portion of the section, where it would be visible from rural residences in the Kalang River valley and side slopes. To the south of the Kalang River two residences (A,B) would be highly sensitive to the Proposal and would gain views of the approaches and bridge over the river. One residence (A) is located within 100 metres of the Proposal on the eastern side and would be experience very high visually sensitivity and resulting very high visual impact to the Proposal. Another residence (B) is located within approximately 300 metres of the Proposal on the western side, overlooking the river and bridge crossing, and would potentially obtain foreground views of the Proposal as it passes through this valley.

Approximately six residences (C-H) north of the Kalang River, located within 500 metres of the proposal, would potentially gain views of the Proposal. Two residences on the eastern side (C,E) are within 150 metres of the Proposal, are highly sensitive to the changes in the landscape from the Proposal, and would experience a very high visual impact. One residence (F) is located approximately 180 metres away from the area in cut and it is expected would gain some oblique views through trees over the Proposal through the valley, the bridge and areas in fill. The existing vegetation should reduce the extent of the Proposal that is within view and would result in a high visual sensitivity and impact. One residence (G) is located west of the Proposal at

approximately 30 metres above the Proposal where it is in cut, and would potentially gain views of the cutting. Although the residence is surrounded by vegetation on most sides the visual impact of the Proposal in cutting at this distance would be very high. Screening and revegetation are required to reduce these impacts. One residence (H) is located west of the Proposal at approximately 230 metres, and would potentially gain views of the bridge and approaches over the Kalang River, experiencing high visual sensitivity and a high visual impact. Residence D is located at approximately 350 metres from the Proposal and would potentially obtain views of the Proposal on both sides of the Kalang River as it emerges through the forest in the south and crosses the Kalang River. It would also experience high visual sensitivity and high visual impact. Mitigation measures, to reduce the potential visual impacts on these residences, are discussed in Section 4.2.

The expected view shed is identified on View Shed Analysis Sheets 7-9, in Appendix A. These also identify areas on the Kalang River where potential long views from one kilometre and more may be available along the river to the bridge. This would mostly be available to recreational viewers boating on the river.

Residences on the southern end of Ridgewood Drive (J) are closest to the Proposal and those within 150 metres of the Proposal, are highly sensitive to the changes occurring as a result of the Proposal. The Proposal would be located in cut in this area, and has some adjacent existing vegetation where it is within 150 metres of the residences. However, due to the close proximity and the elevation of the residences, the visual sensitivity of these residences would be high. Four residences are located further north on Ridgewood Drive, between 150 and 300 metres of the Proposal. They would gain views of the Proposal in fill as it approaches Short Cut Road, and would experience high visual sensitivity and impacts. Those located further north on Ridgewood Drive (K), are distanced between 300 and 500 metres, and would gain views of the Proposal in fill and as it bridges over Short Cut Road, potentially experiencing medium to high visual sensitivity and visual impact to the changes.

Residences on South Arm Road near the intersection with Short Cut Road have a high visual sensitivity to the proposal due to their distance within 150 metres of the Proposal. Although some of their views would be screened by the Proposal's location in cut in this area, and existing trees, they would gain some views of the Proposal. As the intersection of South Arm Road with Short Cut Road requires modifications to the road alignment, the visual sensitivity from these residences, within 150 metres of the Proposal would be high. One residence on the south side of Short Cut Road, within 150 metres of the Proposal, would also experience high visual sensitivity and high visual impact. Maintaining existing vegetation adjacent to Short Cut Road would reduce this potential impact. Other mitigation measures to reduce the potential visual impacts on residences located on Ridgewood Drive and South Arm Road near Short Cut Road include potential visual mounds and screen planting. This is discussed in Section 4.2.3.

The visual sensitivity for the residences on the ridge on the northern side of Short Cut Road, between 150 and 300 metres of the Proposal is high and combined with the medium visual effect would experience a medium to high visual impact. These residences have views of the existing Pacific Highway as it approaches the Raleigh deviation. Some of them would potentially obtain views of the Proposal as it passes adjacent to the vegetated

area surrounding the Raleigh industrial area. Residences located on the ridge at Short Cut Road at a distance greater than 300 metres would experience medium visual sensitivity and impact. No residences are located on the northern side of Short Cut Road at a distance less than 150 metres.

Residents surrounding the interchange at Raleigh have a medium to high sensitivity dependent on their distance to the Proposal. Those within 150 metres would experience a high visual sensitivity to the changes around the existing interchange. Generally long views, beyond 500 metres, would be limited to the Proposal in this area.

Visual impact and view shed analysis

The visual impact for most of this section through the forested areas would be medium due to the combination of a high to very high visual effect and low visual sensitivity. Very few viewers are located in these forested areas surrounding the Proposal.

The visual impact at the Kalang River valley and bridge crossing of the Proposal would be high to very high due to the combination of the very high visual effect and high to very high visual sensitivity, particularly for the residents located within 150 metres of the Proposal.

The visual impact at the northern portion of this section is generally medium to high for the residents on the northern side of Short Cut Road with views to the Proposal, due to the medium visual effect and medium to high visual sensitivity. For residents on South Arm Road within 150 metres of the Proposal and Ridgewood Drive within 150 metres, the visual impact would be high due to the high visual effect and the high visual sensitivity.

For residents within 150 metres of the modifications to the Waterfall Way interchange the visual impact would be medium, due to the low visual effect and the medium to high visual sensitivity. The interchange would be modified to include realignment of on and off ramps. These ramps on the eastern side would be closer to residences on Old Pacific Highway near the interchange. Revegetation adjacent to the ramps would screen the Proposal and reduce the impacts.

Visual impact on future urban areas

The Bellingen Shire Growth Management Strategy, 2006–2026, identifies areas north of the Kalang River for rural residential land use. This is within the areas of Short Cut Road, South Arm Road, and Ridgewood Drive. The potential visual impact of the Proposal on the areas adjacent to Ridgewood Drive would be high due to the medium to high visual effect and high visual sensitivity for the areas adjacent to the Proposal in fill. The design of the Proposal where it crosses Short Cut Road and is in fill needs to consider the future rural residential areas in this location with the provision of screening and landscape works.

3.6 Impacts on landscape character areas

The Proposal has been designed to consider the existing landscape character zones in the ongoing development of the design to avoid impacts where possible and include mitigation measures where impacts cannot be avoided. Whilst the Proposal will affect the existing character zones the impacts have been addressed by the design of the Proposal and the landscape measures proposed. In some cases the proposal will provide positive impacts. For example, visual benefits for the central township of Macksville will occur due to the reduced traffic passing through town. This will improve the visual amenity of the streets, river side parks and existing bridge. The reduction in the noise, disruption and pedestrian hazard of the highway passing directly through Macksville will provide positive amenity impacts.

Where the Proposal passes through forested areas the existing character area is to be retained by continuing the dense vegetation within the road verges, whilst maintaining the required clear zones for safety.

The Proposal passes through the wide open flood plain of the Nambucca River valley, as well as the more enclosed valleys of Warrell Creek and the Kalang River. Whilst impacts on these character areas will occur, mitigation of these impacts is addressed by the landscape treatment at the interchanges, bridges, cuttings and embankments. The Proposal follows existing landscape edges where possible or compatible land uses, such as the Nambucca Sewage Treatment works. Protection of the existing landscape pattern within these valleys has been addressed by extending the character of the existing landscape tree clusters and utilising the topographic features within the character area to screen the proposal. Maintaining the existing road connections and pedestrian networks will assist in reducing the character area impacts.

The character of the Valla Beach hinterland, Deep Creek, Cow Creek and Boggy Creek area consists of a highly varied landscape of undulating topography, residences set within treed enclosures and frequently changing views. The impacts on this character area are minimised by the varied nature of the landscape and its screening capabilities. By retaining existing vegetation and topographic enclosures within this area the impacts of the Proposal are reduced.

As the character areas are determined by the combination of the natural, built and cultural character of the area the impacts on these factors have been minimised where possible and mitigation measures proposed where necessary.

4 Urban design and landscape strategies and concepts

4.1 Principles and Guidelines

The urban design objectives for the Pacific Highway as a whole and the specific project urban design objectives have been outlined in the Introduction of this report. The objectives have formed the basis of the development of the concept design for the Proposal and should be 'used to evaluate the success of the design proposals.' These objectives 'are to be considered in addition to the economic, safety, engineering and environmental objectives adopted for the Pacific Highway upgrade.' (RTA Pacific Highway urban design framework, March 2005.)

The overarching objectives for the Pacific Highway can be achieved by adopting the following principles and guidelines for the Proposal. The guidelines are illustrated and described in Section 4.2 for the key components of the design. These are then illustrated and applied to the highway concept and strategy plans within this section. The urban design objectives, principles and guidelines have been applied throughout the development of the Proposal. They have been integral in shaping the Proposal design to minimise visual impact and to maximise opportunities for integrating the existing landscape characters.

The Principles applied to the objectives build on the Principles established for the Pacific Highway framework as a whole and are more specific to this section of the highway upgrade.

- 'Provide a flowing road alignment that is responsive and integrated with the landscape
  - Where possible use landscape edges, including forest edges, boundaries to properties or land uses, and saddles in valleys for road alignment.
  - Consider the landscape scale and integrate the Proposal with the surrounding landscape through sound landscape and urban design guidelines.
  - Avoid consistent slopes in favour of grading out and varying fencing boundaries and planting areas that are independent of the corridor.
  - Minimise contrast with the landscape by integrating the colour and form from the surrounding landscape within the road corridor.
- Provide a well vegetated, natural road reserve
  - Plant the road corridor extensively using native seed and local provenance plant material where possible.
  - Plant all cut batters, embankments and medians to integrate the Proposal with the local context.
  - Provide planting in conjunction with all built elements within the road corridor of the Proposal.
- Provide an enjoyable interesting highway

  - Maximise orientation for the motorist by providing visual connections with the scenery and locality beyond the Proposal.
  - Provide orientation by highlighting the approach to towns and interchanges through landscape and urban design treatment and visual cues.
  - Recognise the scenic potential and tourist opportunities that exist for the Pacific Highway, as well as encouraging drivers to visit the adjacent towns by clear interchanges.
- Value the communities and towns along the Proposal
  - Ensure the surrounding towns to the Proposal benefit from the upgrade through reduced through traffic and increased amenity.
  - Provide clear visibility and orientation to town exits where this does not conflict with required reduction in visual impacts.
  - Ensure local access is retained and property access is not severed by the Proposal.
  - Minimise visual impacts on local residents and reduce the extent of the Proposal that is visible to residents
- Provide consistency-with-variety in road elements
  - Provide a coherent family of design elements that are consistent for the Proposal whilst reflecting the varied cultural, landscape and visual environment.
  - Utilise landscape tree species to reflect varied landscape characteristics.
- Provide a simplified and unobtrusive road design
  - Design elements to be functional and to achieve simplicity in their parts, and the whole.
  - Provide a coherent set of built elements that are linked by their detail, materials and colour.
  - Avoid significant statements in designs for bridges, walls, and underpasses as the Proposal needs to be perceived as a part of the Pacific Highway upgrade as a whole, and these statements usually increase the visual impact of these structures within the community.

4.2 Landscape and urban design, protection and mitigation measures

4.2.1 Interchanges and grade separation

The interchanges along the Proposal are important nodes for the orientation of drivers and assist in maintaining driver concentration as well as providing clear legibility. Guidelines for the interchange design ensure they are compatible with the landscape context and impacts are minimised. The interchanges for the Proposal occur at the following locations:

- South of Warrell Creek interchange.
- Bald Hill Road interchange: providing access for Macksville and Scotts Head.

- Nambucca Heads interchange: providing access for Nambucca Heads and Valla Beach (from the south).
- Ballards Road interchange: providing access to Urunga and Valla Beach (from the north).
- Waterfall Way interchange at Raleigh: providing access for Urunga, Bellingen and connection to the existing Pacific Highway.

The design of interchanges are to follow these measures:

- Provide uncluttered, simple and consistent interchange design with logical connection to the local road network.
- Interchange design is to be compatible with the topography and minimise large cuttings and fill. The interchanges for the Proposal have been sited to minimise impacts on topography and have been revegetated to reduce the impacts.
- Interchanges have the potential for the greatest visual and landscape impacts on the local community and are to be sited and designed to minimise the footprint. The footprint for the interchanges in the Proposal has been minimised where possible. This is to be reviewed during detailed design to determine areas where improvements in extent of footprint can be made.
- Planting and screening to reduce negative impacts is to be included to recognise adjacent land uses and compatibility in the interchange design.
- Where noise barriers are required at interchanges the design guidelines outlined in noise attenuation have been followed and incorporate mounding where possible and excess fill is available.
- Landscape planting is required to provide a clear uncomplicated interchange. Planting is to reflect the local landscape character. Trees provide visual cues of the destination and to mark the interchange as a milestone on the journey. Feature trees marking an interchange also provide positive benefits in identifying the interchange and encourage drivers to visit the adjacent town. Refer to Section 4.2.5 for further details.
- All landscape planting of non-frangible species are to be located outside clear zones of interchanges.
- The cost and maintenance of all urban design and landscape treatment of interchanges is to be considered in the detailed design and designs are to ensure that maintenance is achievable.

Pedestrian Bridge at Newee Creek

4.2.2 Bridges, viaducts and road furniture

The character of existing bridges within the Warrell Creek to Urunga context varies. The pedestrian bridge at the crossing of Newee Creek provides a significant landmark bridge in this location for pedestrians. The bridge at Macksville is a steel truss bridge, and links with many of the older bridges along the Pacific Highway on the north coast.

Bridges in the recently completed Bonville project provide visual guidelines for the clean, simple and complimentary bridge design elements Photo by Brett Boardman

The design of bridges should complement the existing bridges along the Pacific Highway, and conform to the RTA guidelines outlined in 'Bridge Aesthetics', July 2003. A number of bridge types exist along the Proposal including overbridges (where the Proposal bridges over existing features such as rivers, creeks, railway line and existing roads), and underbridges (where the Proposal is located under existing features such as local roads). The main areas where bridges are located include the rivers, floodplains, creek lines, railway crossings, local roads and wildlife underpasses.

Opportunities to view the proposed bridges from local and district vantage points should be considered in the bridge design. This has been utilised successfully in other areas of the Pacific Highway upgrade, such as the views available between the two bridges at Karuah. These long distance views between the existing bridge within the Karuah township and the new Highway bridge provide valuable orientation and punctuation points for drivers along the Highway, as well as providing a visual connection between the existing Karuah township and the Highway link. This concept can be utilised at Macksville between the existing Pacific Highway bridge through Macksville township and the Proposal's bridge further east.

Areas higher than the proposed bridges will also enable views over the bridges in areas such as North Macksville and north of the Kalang River bridge. The design of these bridges is important in reducing their impact on local residents.

Options for the bridges within the Proposal have been considered by the design team, and the following measures are to be adopted for bridges.

- Bridge designs are to be simplified, unobtrusive, and refined.
- Bridges will avoid adornment and clutter that is not functional.

Bridge parts including safety screens and pier junctions in the recently completed Bonville project illustrate well considered junctions and detailing *Photos by Brett Boardman*

- Parapets are to be continuous, single plane surfaces with complimentary abutments.
- Bridge parts will be simple and complementary elements to be integrated within a suite of design elements.
- Safety screens and noise walls, where required, are to be designed with similar and complementary design profiles.
- Views will be available from the bridges over the major rivers to the mountains, rivers or key landmarks within the locality to assist in orientation of motorists and to improve the quality of the journey.
- Low rail barriers are required, in combination with parapets, to a height that allows views over the top from a driver and passenger's viewpoint.
- Spill through abutments will utilise local stone characteristic of the area.
- Abutments are to be open to maximise views, for residents through and under bridges to the water and landscape features beyond. Open abutments on bridges over the Proposal will also maximise views for the motorist either travelling on the Proposal or on local roads.
- Where bridge abutments are required to be walled vertical elements, the abutment material will complement the bridge parapet materials.
- Piers are to be well considered and uncluttered, with preference for blade wall piers over multiple circular piers as they are less visually cluttered, and avoid the need for visible headstocks.
- Headstocks are not to be visible on the major bridges with high visibility.
- Where possible the pier is to be tapered to create a more slender and articulated structure.

- Central piers to bridges over the Proposal within the median are to be located parallel to the two adjacent carriageways, or as close to parallel as possible.
- Where the bridge for the Proposal includes two parallel bridges the piers to the bridge are to be aligned. The exception to this is if the bridge is oblique to a river crossing and it is necessary to stagger the piers to maintain river flow.
- Bridges over the rivers and creeks are to reduce the impacts on riparian vegetation by reducing the footprint of construction affected areas and ensuring the hydrology is maintained.

Through consultation between the engineering design team and the urban designers the preliminary bridge designs for the Proposal follow these guidelines and have resulted in achieving the bridge design objectives. Whilst there are many designs and construction methods for bridges the guidelines set out base level requirements that will achieve consistency across the Pacific Highway projects and must be followed in any ongoing detailed design stages for the Proposal.

4.2.3 Noise attenuation

Noise attenuation will be required in areas as outlined in the acoustic working paper. The locations of noise attenuation measures have been carefully considered through integration of the engineering, acoustic and landscape concepts for the Proposal. As noise attenuation has the potential to screen views, as well as provide a visual screen to unwanted views, the location of any barriers needs to be coordinated with the potential visual impacts of these barriers. The maximum height of any noise wall has been limited to 4.5 metres, due to the potential visual impact.

Noise Barriers

- Where possible, noise barriers should be achieved by mounding and earthworks to reduce the presence of walls and built elements in the landscape context.
- Where possible, noise barriers should be achieved by mounding and earthworks to reduce the presence of walls and built elements in the landscape context.
- Where possible avoid noise walls on bridges due to their high visual impact. The potential for raised parapets on bridges to reduce noise emission from car exhausts whilst maintaining views has been considered.
- Planting in combination with noise walls is to be included to reduce the visual impacts of noise walls.
- Low noise pavement has been proposed in areas outlined in acoustic engineer's working paper at high noise impact locations.
- For areas of very high visual impact and where visual and noise barriers are required, additional planting outside the road boundary close to the residences may be beneficial. Although planting does not reduce noise, screen planting to the source of the noise has been proven to assist in reduction of the perception of the noise. Maintenance of views for the residences, where the major view is not directly towards the Proposal, is important. This may be practically achieved by supplying tubestock plant species to property

owners for their own planting in their desired locations to supplement planting within the road corridor. This approach needs to occur through mutual agreement between the residents and the RTA.

- The Pacific Highway preferred noise wall design is unobtrusive and combined with vegetation. Designs with logos and symbols are not preferred. Where any adornment of the noise walls occurs, it should be abstract.
- No incremental small steps in noise wall profiles are to occur. Larger steps or curved transition is to be provided on the top profile of noise walls where level changes are required.
- The end profile of noise barriers is to integrate with the surrounding landscape and structures, cuttings and embankments. Noise walls will feather out into the natural ground or mounds, and be incorporated into planted areas.

Visual Barriers and Mounds

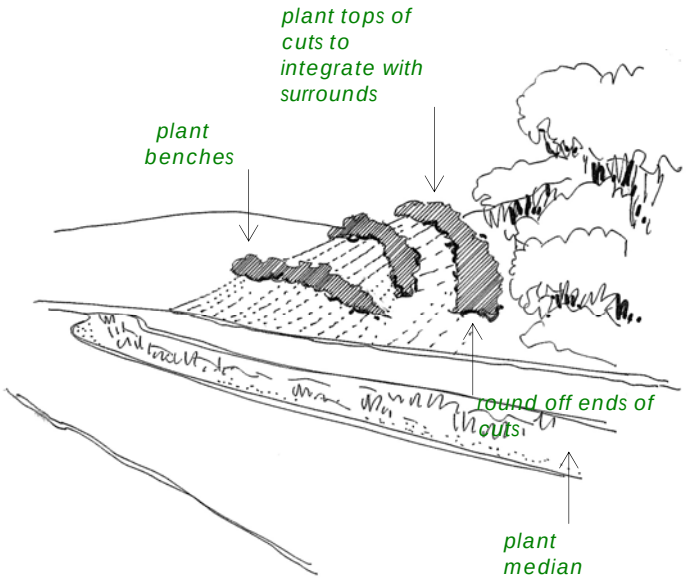
As discussed previously noise barriers may be achieved through mounding. Mounding requires significant quantity of fill material to achieve the profiles and heights of mounds and should be considered for noise barriers where the amount of fill material is available. In some cases existing vegetation occurs adjacent to the Proposal and it would be counter productive to provide mounds as a preferred visual outcome as they would require the removal of the existing vegetation, which would potentially provide the same screening. Areas where mounds are proposed to reduce visual impact, have been included in the Landscape Concepts in Section 4.3. These are planted to integrate with the surrounding landscape. In most cases these mounds provide some acoustic reduction and have been adopted as part of the proposed design. Some areas where mounds would only achieve visual screening and provide little benefit to noise levels have also been suggested as possible areas for mounding within the Landscape Concepts in Section 4.3. These would only occur as part of the Proposal where material is available for fill.

4.2.4 Cuttings and Embankments

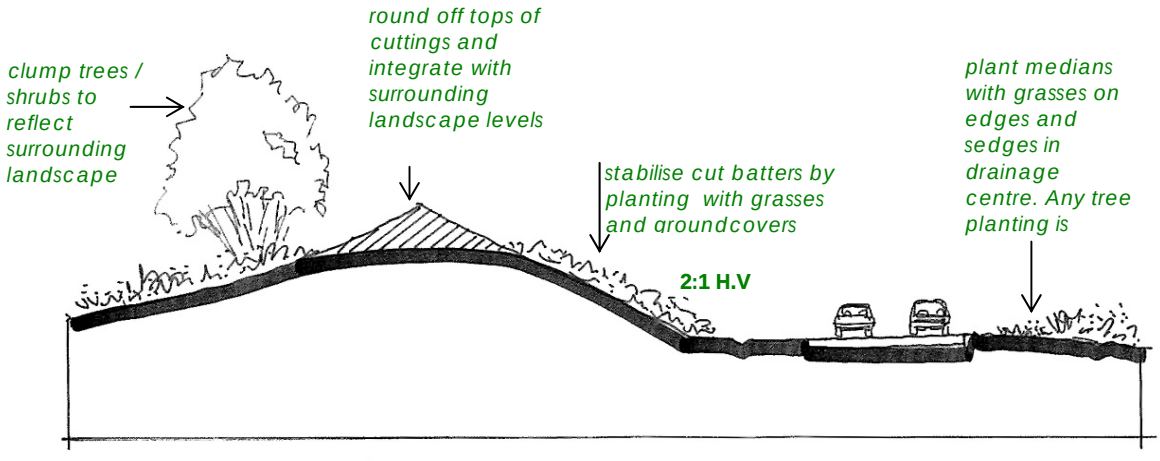
The treatment of cuttings and embankments is to carefully coordinate the civil engineering, geotechnical requirements with the urban and landscape design desirable outcome. All treatments are to be cost effective and are to consider maintenance.

Cuttings

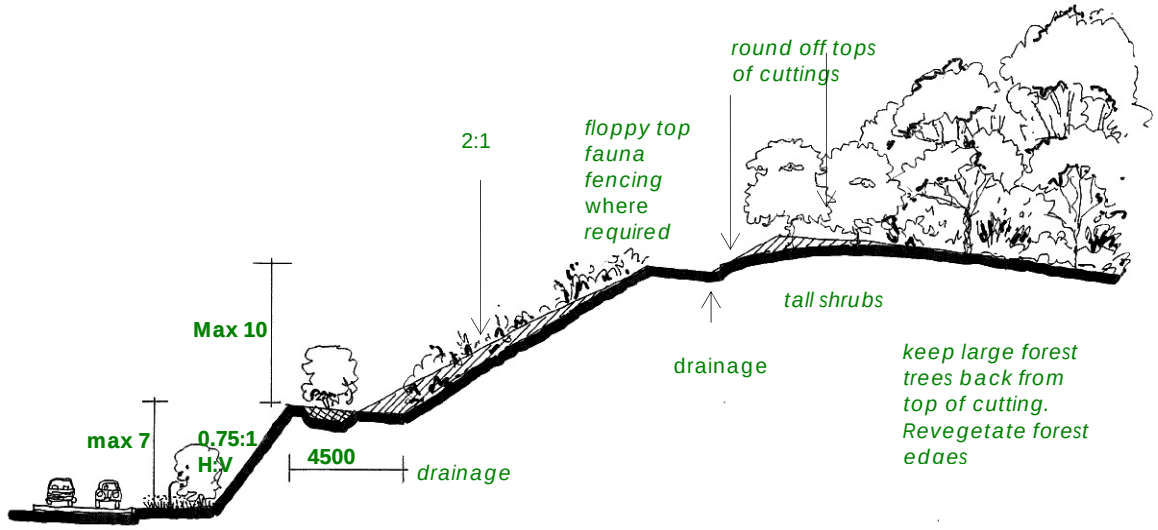
- Where possible allow sufficient space is to be provided at the base of cuttings to allow for revegetation of native grasses and frangible low shrubs, (minimum 2 metres). This requires consideration of 'Clear Zones' and safe access for maintenance



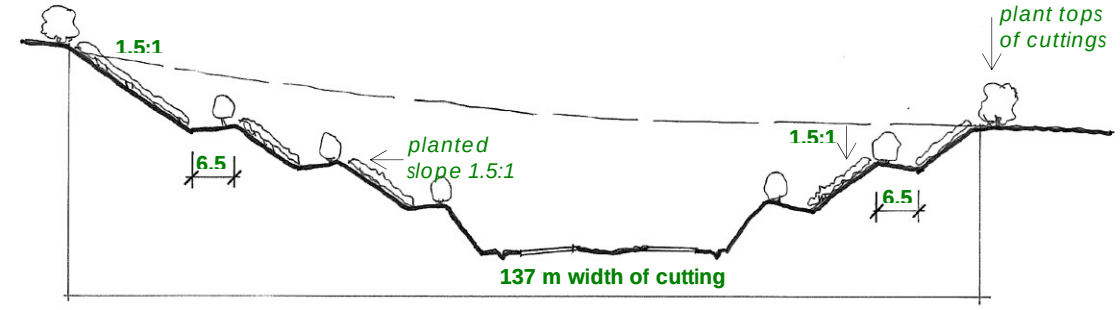
- Slope cuttings in stable rock preferable 2:1 H:V, 1:0.75 H:V requires geotechnical confirmation of acceptable stable slope. Where cutting batters are greater than 1.5:1 H:V incorporation of a rock catching fence is required. These need to be incorporated into the detailed design as the cuttings and the visual impact of the fences should be considered.
- Round off tops of cuttings with the adjacent landscape to avoid sharp level changes.
- Where cuts are required through forested areas screening of the cuttings at the top and bottom through planting will provide visual integration.
- Particular detail at the ends of the cuttings steeper than 3:1 H:V is required to ensure that the cuttings integrate with the surrounding topography. Round off ends of cuttings to the required length of 50m to RTA design guidelines.
- Where stable bedrock exists use this as a feature within cuttings. This will provide interpretive information relating to the geology of the region.
- Incorporate drainage requirements at the top and bottom of cuttings to ensure the cut batter is protected from overland flow from surrounding landscape and potential erosion.
- Follow the guidelines relating to shotcrete from the RTA 'Shotcrete Design Guidelines' in all cutting design. Avoid shotcrete where possible and particularly around bridge abutments.
- The impact on the slope of the cutting with the required land take is shown in Alternatives 1, 2 and 3 in the following page. This is to be assessed against the geotechnical requirements for cuttings.



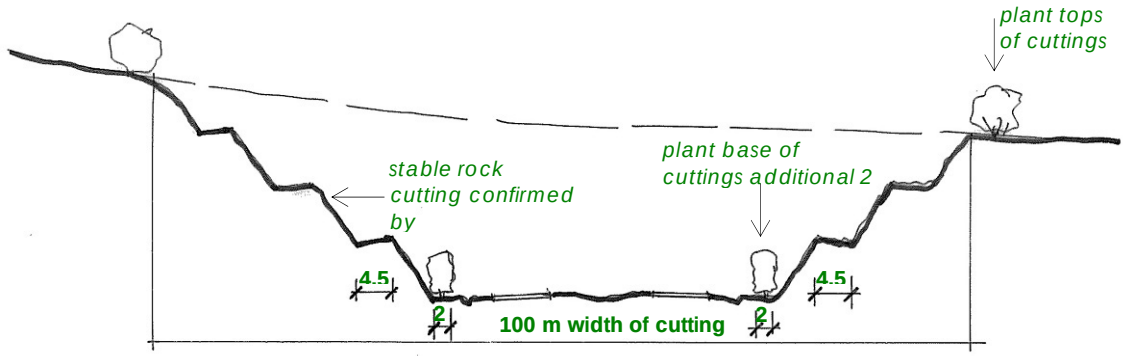
Typical Shallow Cutting



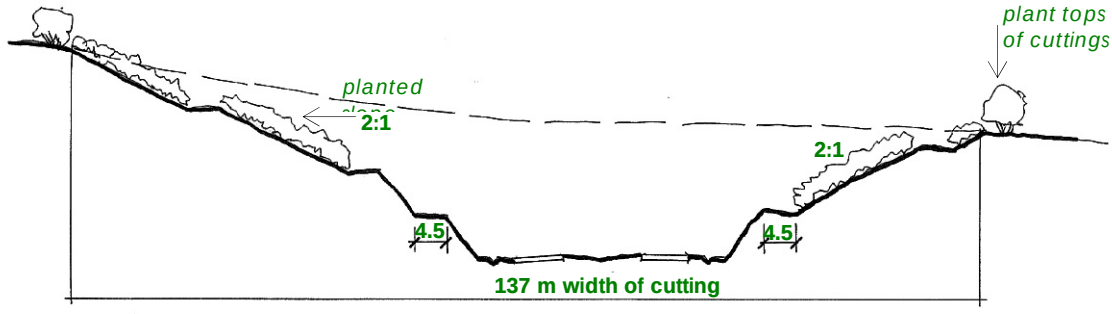
Typical Deep Cutting



Deep Cutting : Alternative 1



Deep Cutting : Alternative 2

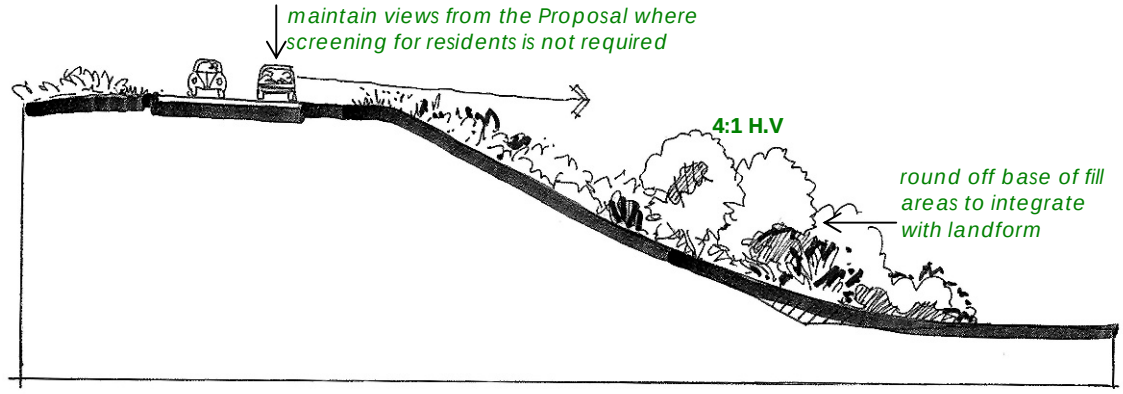


Deep Cutting : Alternative 3

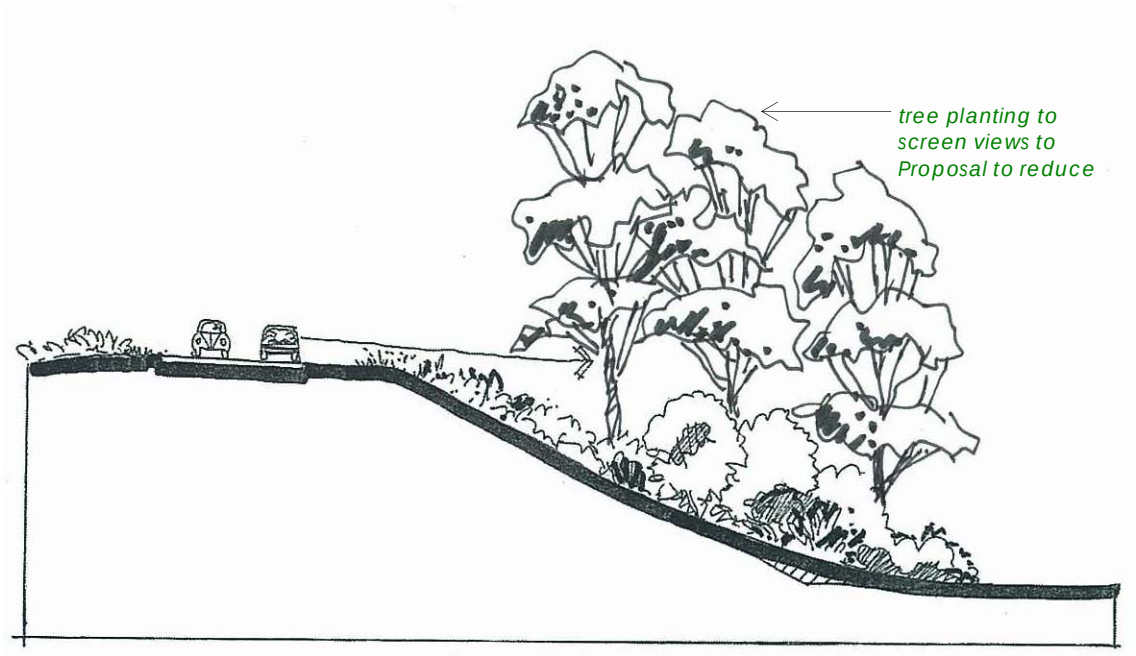
Embankments

- Stabilise embankments of 2:1 H:V slope and flatter by hydroseeding with mixed planting and grasses. Ensure planting is consistent with the surrounding landscape character. (Refer to Section 4.2.5).
- Stabilise embankments of 2:1 H:V and steeper by grass seeding and erosion control matting. Maximum preferred slope of embankments is 2:1 H:V. Slopes any steeper require retaining walls, or confirmation of stable slopes by the geotechnical engineer.

- Embankments within floodplain areas are preferred at a slope of 4:1 H:V for embankments up to 2.5 metres in height. Vary the grade of embankments along with fence boundaries and planting to respond to the surrounding topography.
- Where retaining walls are required materials and/or colours that are complimentary to the existing bedrock are to be used.
- Incorporate drainage requirements at the top and bottom of embankments to ensure that the slope of the embankment does not erode.
- Refer to landscape and planting guidelines in Section 4.2.5 for more detailed treatment.



Typical embankment where screen planting is not required



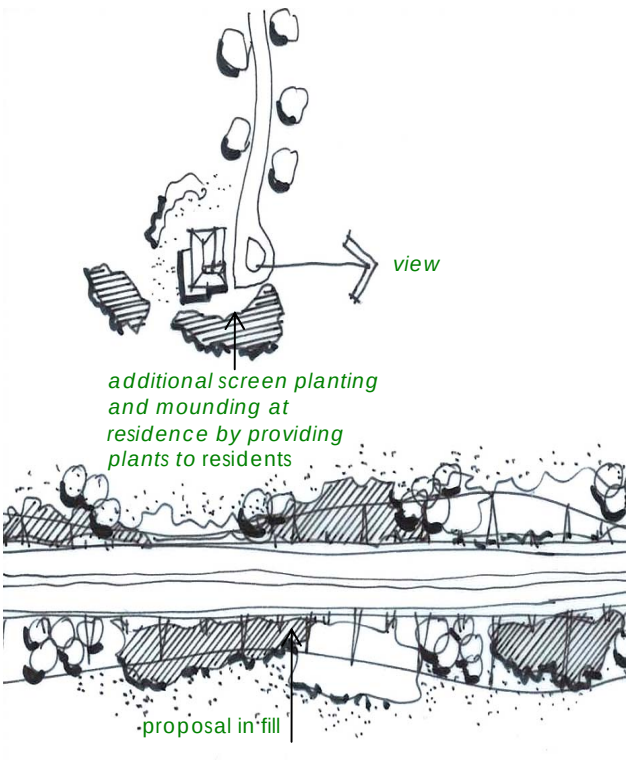
Typical embankment where screen planting is required to reduce impacts

4.2.5 Landscape and planting

Planting works are to consider the existing natural and cultural landscape character of the region described earlier in this report. Particular attention to the character areas is required to ensure the Proposal responds to the existing environment and achieves the objectives and principles previously outlined. Plant species within the Proposal adjacent to endangered ecological communities and forest areas should utilise indigenous plants from seed collected within the locality (of local provenance). The landscape planting is to be closely coordinated with the indigenous vegetation communities within the study area and should not pose any weed threat to these communities.

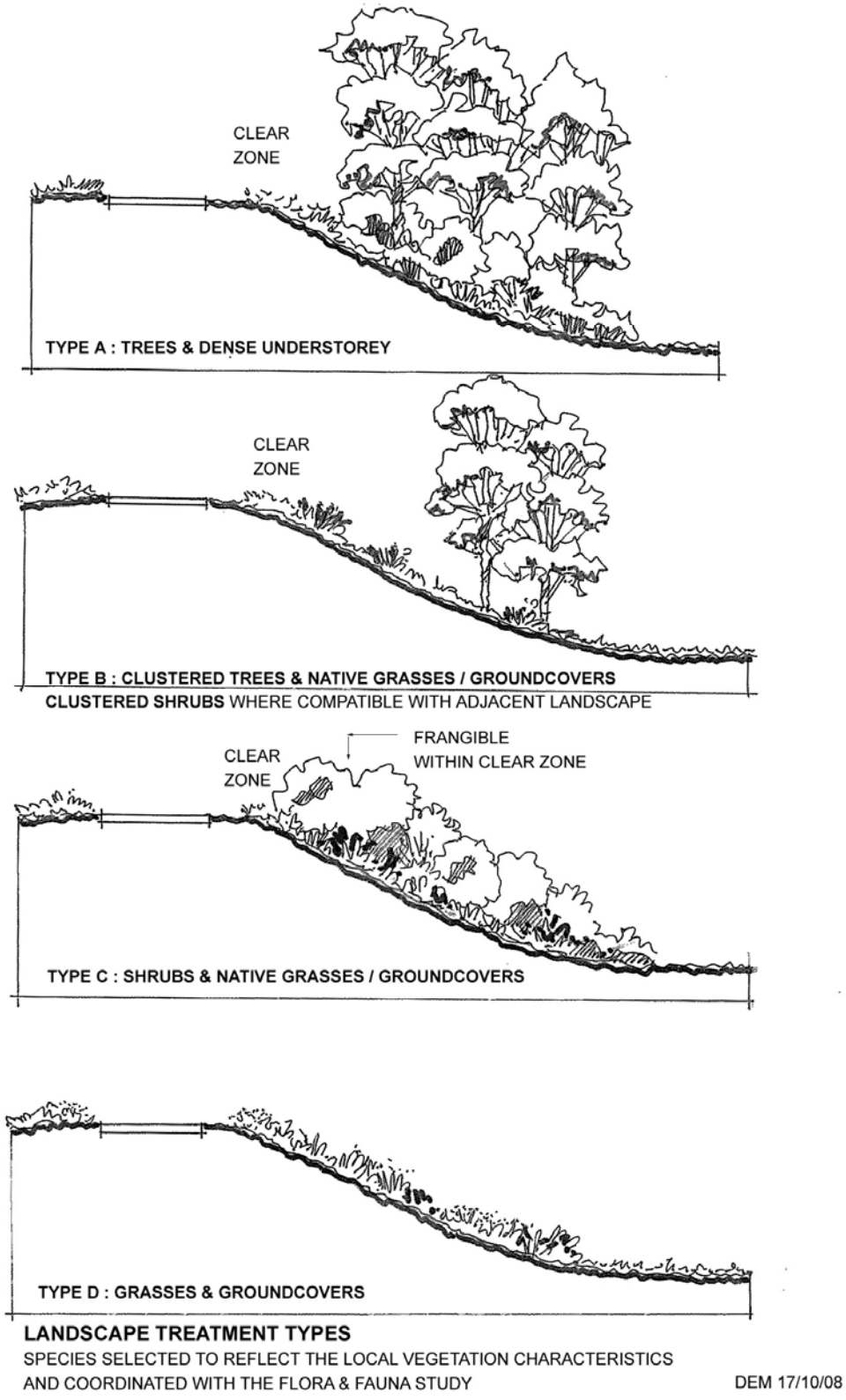
The plant communities on the North Coast are amongst some of the most diverse in Australia and provide a unique opportunity to showcase the varied forest and plants characteristic of the region. Plant species for the varied communities that the Proposal passes through will be utilised for revegetation and as feature planting at the interchanges. The proposed landscape design strategy and concept, included in Section 4.3 provide plant species selection lists for the various areas of the Proposal. The following outlines mitigation measures for the landscape works and revegetation of the construction affected areas of the Proposal.

- The extent of clearing for the Proposal is to be minimised to ensure that existing vegetation is retained and protected to the maximum possible.
- Revegetation is to be utilised to screen the Proposal from residential views. When screening, selection of plant species will reflect local vegetation patterns.
- Cluster screen planting is preferred to strip planting adjacent to the Proposal. Where dense screening is required it will be necessary to strip plant within the boundary of the roadworks, however trees are to be grouped.
- Provision of tubestock plants to property owners that would experience high visual impacts for their own planting within their properties, where agreement between parties is obtained, should be considered during the detailed design stage.



- Maintain views where important by avoiding screen planting that will block regional and local views.

- Existing tree planting at town entries along with locally significant trees to punctuate the interchange, has been reinforced to reflect new entries, eg Macksville entry from the south is characterised by Liquidamber trees. Utilisation of these trees at the interchange south of Macksville will provide a visual and contextual link to Macksville. Nambucca Heads is recognised by Norfolk Island Pines and these landmark trees could punctuate the Nambucca Heads interchange.
- Revegetate medians to reduce headlight glare and to break visually reduce the scale of the dual carriageways of the Proposal. Where medians are planted a minimum width of four metres is required. Sight distance on curves is to be considered in the placement of median planting. Frangible planting is to be provided in medians.
- Where medians are wider than six metres, a mown grass verge adjacent to the carriageway is preferred for maintenance and litter collection with shrub planting central to the median. Planting of medians would generally include Type D; grasses and groundcovers, D1; clustered low shrubs to 2 metres, grasses and ground cover planting, and Type C: shrubs and native grasses/groundcovers as illustrated in the following diagrams.
- Maximise revegetation of the entire road corridor to visually integrate the Proposal with the surroundings. This will include extending existing grassed areas into the road verges to maintain open views where they are important.
- Planting of tubestock and virotube trees and shrubs should be treated as an additional measure to revegetation (seeding) to achieve a well vegetated road corridor and should be concentrated in areas of high to very high visual impact.
- Trees are to be planted at interchanges as an orientation element for both drivers and the surrounding community. Sight lines need to be considered.
- Planting layouts will not be overly complicated or rigid.
- Revegetation species selection is to maintain key views from the Proposal to ensure the long term character and scenic journey through this highly diverse landscape is retained.
- The Nambucca Interchange Rest Area should be designed as a desirable park rest stop with the following attributes:
  - Protect and retain existing trees outside the required area of cut and fill of the Proposal.
  - Locate picnic shelters within shade areas.
  - Provide toilet facilities that are within open view for safety
  - Provide a children's play area with clear sight lines for surveillance by parents at picnic tables and the car park.
  - Allow for clear views from the adjacent road for safety and surveillance of the rest stop.
  - Be clear in layout for motorist's use.
  - Be easily maintained.



Landscape Treatment Types

- A series of landscape treatment types have been developed for the proposal. These include recommended landscape types that will assist in the integration of the Proposal with the surrounding landscape and provide the required visual screening for the Proposal. Frangible planting is to be provided in the clear zone in accordance with RTA guidelines.

4.2.6 Erosion and sediment control

The treatments of cut batters and embankments are to consider erosion and sediment control both during construction and long term. Sediment control basins are to be designed to fit within the landscape and are to be treated as visually important structures. Planting is to be included around all structures to integrate with the surrounding landscape. Planting of stormwater treatment facilities is to integrate the ecological requirements of filtering stormwater run off and sustainability of the system by planting with indigenous wetland plant species.

- Detention pond and sediment basin surrounds should be seeded with native seed at the application rates identified within the RTA Landscape Guidelines. Plant species are to include local endemic species present within the existing wetlands and coordinated with species lists within the Flora and Fauna Working Paper.(Refer Section 4.3.2 for potential plant species lists).
- Detention ponds and wetlands will include local rocks, trees, groundcovers and wetland species around the margins of the ponds to provide an attractive, landscape element.
- Stormwater catch drains and road margins are to be vegetated to assist water filtering and sediment control as well as to visually and ecologically integrate these edges with the native vegetation surroundings.
- Embankments and cuttings are to be stabilised as outlined in Section 4.2.4.

4.2.7 Preservation of visual and ecologically significant areas

Visually significant areas have been identified within the view shed analysis. Ecologically significant areas have been identified within the Flora and Fauna Working Paper. Generally the ecologically significant areas include the SEPP14 wetlands and other endangered ecological communities (EEC), areas of threatened and vulnerable species, and areas of significance to the aboriginal community. These areas have been identified and measures for protection are outlined in the specialist working papers. It is important that the ongoing detailed design recognises these areas and protects them through specific urban design guidelines and mitigation measures. These measures have been coordinated for the Proposal between the engineering design, flora and fauna requirements, environmental constraints, landscape and urban design.

Visually significant areas require the treatments as outlined in the Section 4.2.5 as well as the following guidelines.

South West Arm Road scenic road landscape

This area has been described in Section 3.5.1 and has been identified in Bellingen Shire Council's planning provisions as a Conservation Area, and includes the South West Arm Road Scenic Road Landscape. This area is the south western portion of South Arm Road, where it follows the north bank of the Kalang River. The sequences of views of the river and native vegetation contrasting with the cultural landscape of small dairy farms, has been identified as having high local significance. The proposed mitigation measures to assist in retaining the character of this scenic road landscape include:

- Selective planting to partially screen the Proposal. This is to be grouped to reflect the surrounding vegetation patterns within the landscape of the Kalang river valley and slopes.
- South Arm Road, adjacent to the Kalang River bridge crossing, is to be maintained in its current historic location and continue to function as linking properties on the north bank of the Kalang River. The bridge will need to extend on the northern shoreline over the road to allow the existing alignment of South Arm Road to be retained.
- The views from the river farms on the northern side of the Kalang River need to be retained to the river, and the impacts of the Proposal reduced by planting the embankments and edges of the Proposal with grouped trees, dense shrubs and groundcovers. In the final grading of the embankments the profile of the slopes of the embankments needs to be detailed to round off and integrate with the slopes and landforms adjacent to South Arm Road as it descends the ridge towards the river. Special attention and care is required in the detailed embankment profiling and planting of both the east and western sides of the Proposal from its emergence from the forest areas south of the river around Chainage 35100 to Chainage 36500, where it extends into cutting.

Existing view: South Arm Road scenic landscape from ridge on north side of the Kalang River.

Cultural planting and significant trees

In some cases individual significant trees that contribute to the overall landscape character, and that would provide screening of the Proposal have been identified in the Landscape Concept Plans within Section 4.3.2. These may include large *Ficus sp*. or rows of trees that align a fence, road or driveway. Where it is possible to protect and retain these trees they have been identified on the plans and recommended for protection. In some cases these trees are cultural plantings and contribute to the character of the cultural landscape, particularly where the pattern of indigenous and exotic trees is located within the surrounding farm land.

Protection of Flora and Fauna

The Proposal incorporates a number of measures to minimise the disturbances to EEC, threatened and vulnerable species. These include dividing the carriageways with a wider median to avoid threatened plant species or to provide for fauna crossings. Habitat fragmentation has been identified as a threat in the Flora and Fauna Working paper, particularly the fragmentation of the State Forest areas of Nambucca and Newry State Forest, and land north of the Kalang River. Re-establishing links with historically isolated fragments of habitat in proximity to the Proposal, has been identified, along with increasing the size of smaller remnant fragments adjoining the Proposal. Mitigating the disruption to wildlife corridors has also been identified as

important guidelines for the Proposal (Flora and Fauna Working Paper). These measures have been included in the landscape strategy and concept in Section 4.3.

A native swamp, listed as Conservation Area under Bellingen Shire Council's Local Environment Plan (LEP), is located on either side of South Arm Road in Raleigh, 50 metres to the east of the Proposal. This area is also identified as an EEC and is included in the mitigation measures identified for these areas. This includes erosion and sediment control, minimising removal of existing vegetation and revegetation where appropriate. Remnant forest on the eastern side of the existing Pacific Highway, just south of Waterfall Way, is a Conservation area under Bellingen Shire Council's LEP. Protection of this forest area adjacent to the Proposal is required and impacts are to be minimised.

Requirements for fauna crossings are to be accommodated in accordance with the ecological requirements. The design of crossings must be integrated with the overall road and landscape design. Fauna crossings have been provided by underpass structures and exclusion fencing. These crossings are provided for species of high conservation value as well as other fauna present in the area. Detailed planting around fauna crossings must be designed in association with the fauna expert to ensure fauna movements are taken into consideration. Some of these requirements are listed within this section.

Fauna crossings for Glider populations have been provided with a wide median. This median would either be planted with indigenous trees and understorey to allow for their movement across the Proposal, or the existing trees have been retained and protected within the wider median. These wider medians are provided in Nambucca State Forest, Newry State Forest and forest areas north of the Kalang River. It is important to maintain the existing hydrological regime to these areas to ensure that the existing vegetation is protected in the long term and does not deteriorate due to changed drainage characteristics. Fauna underpasses have been provided by dedicated underpass structures as well as at drainage culverts and bridge structures with fauna passage capabilities. Where culverts are included for fauna passage they would be designed with raised outer cells and internal ledges to enable passage during wet periods. The sizes of the underpasses have been outlined to allow for large and smaller macropods, (Working Paper Flora and Fauna). Fauna underpasses are to include:

- Clear line of sight to light and vegetation at both ends of the crossing.
- Provision of protective cover and structures for smaller species, such as ledges or horizontal logs that are designed to restrict access by larger predators.
- Good visibility at the approaches that is not obscured by dense vegetation.
- Cells raised above flood level for passage during wet periods.
- Fauna exclusion fencing each side of the widened medians, (internal and external), and up to 500 metres on either side of the dedicated fauna underpass structure.

Fauna exclusion fences are provided where outlined in the Flora and Fauna Working Paper. All other areas of the Proposal are to be fenced to prevent livestock from entering the corridor.

Trees of indigenous heritage significance

A tree of indigenous heritage significance exists at Rosewood Creek and is not impacted directly by the Proposal. Management measures for the tree are outlined in Section 15.4 of the environmental assessment.

4.2.8 Incorporation of mitigation measures into proposal design

All of the recommended mitigation measures described in this Chapter have been considered and incorporated into the following urban design and landscape strategies and concept designs for the Proposal. It will be important that they are recognised and further developed in the detailed design for the Proposal.

4.3 Urban design and landscape strategies and concepts

4.3.1 Urban design and landscape strategic plans

The urban design and landscape strategic plans for the Proposal apply the design objectives and principles to the full length of the Proposal. Guidelines for mitigation measure have been developed to reduce the impacts on residents and to integrate the Proposal with its surroundings. These have also been applied to the plans. The urban design and landscape strategy identifies the design approach for each of the major interchanges and bridges, and provides for the Proposal to be integrated with the local environment.

The importance and high visibility of the Nambucca River bridge has been identified and visual reduction measures have been proposed. The approaches and embankments to the bridge have been integrated with the surrounding valley by clustered tree and shrub planting, reflecting the pattern and character of the existing tree clusters. The bridge is to be refined and uncluttered in its design to maintain visibility to the river for the surrounding residences. The abutments are to incorporate local stone.

The Kalang River bridge similarly is to include uncluttered design, whilst impacts of the approaches are to be reduced by protecting all existing vegetation immediately beyond the road works. The existing forested edges on the northern and southern approaches to the Kalang River valley are to be extended to the embankments and cuttings utilising similar plant species. The shaping and profiling of the embankments are also to be rounded and planted to reflect the colours of the surrounding valley landscape.

The landscape seeding and planting scheme has been developed having regard to the existing plant communities and species present along the alignment to ensure the new planting extends and integrates with the existing landscape pattern.

Planting and revegetation has been located to mitigate visual impacts by providing dense screen planting where views to the Proposal from surrounding residents would be available. Where possible, mounds and/or additional profiling of embankments have been included to provide screening for these residents. In particular where the adjacent resident's major view would be towards the Proposal particular attention to mounding and screen planting has been included.

The areas requiring noise attenuation are identified along with proposed treatment. As described in Section 4.2.3. Noise barriers may be achieved through mounding. Mounding requires significant quantity of fill material to achieve the profiles and heights of mounds. Where fill material would be available, mounds are to be used as noise barriers due to their softer appearance and better integration with the surrounding landscape.

For areas of very high visual impact and where visual and noise barriers are required additional planting outside the road boundary close to residences may be beneficial. Maintenance of views for residents, where the major view is not directly towards the Proposal, is important. This may be practically achieved by supplying tube stock plant species to property owners for their own planting in order to supplement the planting proposed within the road corridor of the Proposal. This approach would occur through mutual agreement between residents and the RTA.

The urban design and landscape strategic plans also detail the extent of landscape revegetation required within cuttings and embankments, as well as proposed street trees for markers and orientation.

Revegetation of medians within the road verge has been proposed to include dense clustered shrubs and grasses where sight distances and safety allow. This will visually reduce the scale of the dual carriageway as well as reduce headlight glare.

The requirements for fauna crossings would be developed in consultation with fauna experts to ensure fauna movements are taken into consideration. In addition to the fauna benefits associated with the planting at fauna crossings, visual/amenity benefits would also be achieved. Where wider medians have been provided for fauna crossings the additional tree planting and revegetation within these medians will reduce the visual impacts of the Proposal by providing additional screening. Important cultural heritage elements have also been incorporated such as the scar tree adjacent to the Proposal corridor and scenic routes as identified in the Non Aboriginal heritage section in Chapter 19 – *Management of other issues*. The landscape treatment associated with these cultural elements will improve the visual amenity and greening of the road corridor

Refer to the Appendix D and E, Urban Design Strategy and Concept Sheets, for the application of these design principles and mitigation measures for the Proposal.

4.3.2 Urban design and landscape concept plans

The urban design and landscape concept plans apply the urban design and landscape strategy in more detail for the Proposal and include specific landscape treatment types for each area. The treatment types have been identified in Section 4.2.5. The urban design and landscape concepts are included in Appendix E1. Sections are also included for various areas of the Proposal to further illustrate the recommended treatment. These are included in Appendix E3. Detailed plans associated with the interchanges are included to illustrate specific treatment at these important areas. These are included in Appendix E2. These plans are to form the basis for the development of detailed design for the Proposal.

The following landscape species selection list is to apply to the Sections along the Proposal. The species list identifies the species that occur within the major vegetation communities present along the corridor of the Proposal. These species are to be utilised for revegetation of the Proposal adjacent to these vegetation communities.

Table 1: Landscape Species Selection List

Botanic Name	Common Name	Rainforest & Wetland	Moist Sclerophyll Floodplain Forest Flooded Gum Forest, White Mahogany, Grey Gum & Ironbark Forest	Dry sclerophyll Forest-Blackbutt Open Forest	Swamp Sclerophyll Forest-Mahogany, Paperbark, Swamp oak
Canopy Trees					
Corymbia intermedia	Pink Bloodwood		x	x	
Eucalyptus acmenoides	White Mahogany		x		
Eucalyptus grandis	Flooded Gum		x		
Eucalyptus pilularis	Blackbutt		x	x	
Eucalyptus resinifera	Red Mahogany		x		
Eucalyptus robusta	Swamp Mahogany				x
Eucalyptus siderophloia	Grey Ironbark		x		
Eucalyptus microcorys	Tallowwood		x	x	
Eucalyptus propinqua	Grey Gum		x	x	
Ficus sp.	Fig	x			
Lophostermon confertus	Brush Box		x		
Syncarpia glomulifera	Turpentine		x		
Feature Trees for Interchanges					
Selected from indigenous Canopy Trees for each					
Araucaria heterophylla	Norfolk Is. Pine				
Brachychiton	Illawarra Flame				

Botanic Name	Common Name	Rainforest & Wetland	Moist Sclerophyll Floodplain Forest Flooded Gum Forest, White Mahogany, Grey Gum & Ironbark Forest	Dry sclerophyll Forest-Blackbutt Open Forest	Swamp Sclerophyll Forest-Mahogany, Paperbark, Swamp oak
acerifolium					
Ficus sp.	Fig				
Liquidamber styraciflua	Liquidamber				
Subcanopy-Understorey					
Acacia melanoxylon	Blackwood	x			
Acmena smiithii	Lilly Pilly	x	x		
Alphitonia excelsa	Red Ash	x	x		
Allocasuarina torulosa	Forest Oak			x	
Archontophoenix cunninghamiana	Bangalow Palm	x	x		
Casuarina glauca	Swamp Oak				x
Backhousia myrtifolia	Grey Myrtle	x			
Endiandra discolor	Rose Walnut	x	x		
Elaeocarpus reticulatus	Blueberry Ash		x		
Elaeocarpus obovatus	Hard Quandong	x			
Glochidion ferdinandii	Cheese Tree		x		x
Livistona australis	Cabbage Tree palm	x	x		
Melaleuca quinquenervia	Swamp Paperbark				x
Melaleuca styphelioides	Prickly Paperbark		x		x
Melaleuca linariifolia	Snow in Summer				x
Syzigium spp.	Lilly Pilly	x			
Tristaniopsis laurina	Water Gum	x			
Waterhousia	Water Gum	x			

Botanic Name	Common Name	Rainforest & Wetland	Moist Sclerophyll Floodplain Forest Flooded Gum Forest, White Mahogany, Grey Gum & Ironbark Forest	Dry sclerophyll Forest-Blackbutt Open Forest	Swamp Sclerophyll Forest-Mahogany, Paperbark, Swamp oak
floribunda					
Shrub and Groundcovers					
Acacia spp.	Wattle		x	x	x
Baumea juncea		x			x
Callistemon salignus	Bottlebrush			x	x
Carex appressa	Tall Sedge	x	x	x	x
Cissus hypoglauca	Water vine	x	x		
Dianella spp.			x	x	x
Dodonaea triquetra	Hop Bush			x	
Gahnia clarkei	Saw Sedge	x	x		x
Hibbertia aspera	Guinea Flower			x	
Indigofera australis	Native Indigo			x	
Isolepis inundata		x	x		x
Leptospermum polygalifolium	Yellow Tea-tree			x	
Juncus usitatus	Common Rush	x	x		x
Lomandra longifolia	Mat Rush		x		
Polycias sambucifolia	Elderberry Panax			x	
Phragmites australis	Common Reed	x	x		x

4.4 Simulated views

A series of simulated views of the potential views to be experienced by the local residents, community and drivers has been developed concurrently with the concept design. The views provide a graphic representation as a photomontage of the anticipated views from a number of selected viewpoints. These viewpoints have been selected on the basis of providing a representative example of the range of views to be experienced along the Proposal. These include areas of high visual impact and provide a graphic illustration of the treatment to the Proposal, including the urban design and landscape works detailed within the concepts.

4.4.1 Potential views experienced by local residents and community

The potential views that may be experienced by local residents and the community are provided as artist's impressions of the Proposal, including how it will be viewed within the selected viewpoints. The landscape objectives, principles and mitigation guidelines, described previously are included within these viewpoints. They are provided as a photomontage of the potential views.

4.4.2 Potential views experienced by drivers

The views experienced by drivers are an important consideration of the RTA in the urban design framework for the Pacific Highway with design objective three being to 'provide an enjoyable interesting highway.' The danger in providing dual carriageway for the full length of the Pacific Highway between Newcastle and Tweed Heads is monotony for drivers and a loss of driving experience. The Proposal is designed to provide safe driving for this important part of the Pacific Highway, which is also interesting and stimulating. Essential components of this part of the journey are the presence of the mountains, views over the floodplains and farmlands, the rivers and travelling through the forests.

Uncluttered and clear interchange design has been provided with feature trees as visual cues. The interchange at Warrell Creek sets the proposed bridge in a forest settling to introduce the subtropical character of flooded gum forest for drivers, whilst the interchange at Bald Hill has been designed to create a recognisable approach to Macksville and Scotts Head. Other interchanges along the Proposal similarly introduce a visual character to mark the destinations along the highway. The purpose of the visual cues is to introduce the local character to drivers that may encourage them to visit the locality, as well as enhance the journey experience along this part of the Pacific Highway. The driver's experience has been considered in the development of the urban design, landscape strategy and concept plans for the Proposal.

Appendix C includes an outline of the potential driver's experience along the journey. The key components of this experience are the maintenance of long views to the rivers and mountains, the impending interchanges and the enclosed forests. The potential driver's experience has been considered in the development of the urban design and landscape strategy and concept plans.

The simulated views shown on aerial photographs have been included to provide potential views of the context of the Proposal within the landscape. Aerial views have also been provided to illustrate how the Proposal would integrate with its surroundings at various locations. These views are included in Appendix F.

References

DEM, April 2006. Pacific Highway Upgrading Program, Warrell Creek (Preliminary).

DEM, May 2005. Macksville to Urunga, Preferred Route.

DEM, October 2004. Macksville to Urunga, Draft Route Options Development Report, Working Paper No 3.

DEM, August 2004. Pacific Highway Upgrading Program, Macksville to Urunga.

DEM, December 2003. F3 to Sydney Orbital Link Study, Draft Working Paper No 3.

GHD, September 2005. Bellingen Shire Growth Management Strategy.

RTA, July 2006. Upgrading the Pacific Highway, Upgrading Program beyond 2006, Design Guidelines (Draft).

RTA, March 2005. Pacific Highway Urban Design Framework.

RTA, April 2004. SH10 Pacific Highway, Urban Design Framework, Kariong to Doyalson.

RTA, May 2003. Noise Wall Design Guidelines- Design Guidelines to improve the appearance of noise walls in NSW.

RTA, May 2003. Bridge Aesthetics- Design Guidelines to improve the appearance of bridges in NSW.

RTA, 26 July 2002. Environmental Impact Assessment Policy Guidelines Procedures.

RTA, September 1999. Beyond the Pavement, Urban and Regional design Practice Notes.

RTA, 1998. Roadscape Guidelines.

RTA, June 2005. Shotcrete Design Guidelines.- Design Guidelines to avoid, minimise and improve the appearance of shotcrete.

SKM, June 2003. Pacific Highway Upgrading Program Options Investigations Phase, Macksville to Urunga Planning Focus Meeting Draft Report.

Smardon, C Palmer, E and Felleman, J Foundations for Visual Project Analysis. New York: John Wiley and Sons, 1986.

Sutherland Koshy, November 2006. Nambucca Shire Draft 20 Year Structure Plan.

Williams, E W & Massa, A K 1983. Siting of Major Facilities, New York, McGraw Hill Book Company.

Appendix A

A.1 View Shed Analysis Drawings – Sheets 1-9

VISUAL IMPACT : LOW
- FOR RESIDENTS LOCATED ON OLD PACIFIC HIGHWAY IN WARRELL CREEK VILLAGE & APPROACHES > 500m FROM PROPOSAL

VISUAL IMPACT : LOW
- FOR RESIDENTS ON UPPER WARRELL CREEK RD WITH VIEWS TO THE AREAS IN FILL. AREAS IN CUT SHOULD NOT BE VISIBLE
- ELEVATION OF RESIDENTS INCREASES VISIBILITY

VISUAL IMPACT : HIGH TO VERY HIGH
- FOR RESIDENTS ON ALBERT DRIVE WITHIN 250m OF THE PREFERRED ROUTE
- LOW IMPACT FOR RESIDENTS ON WESTERN SIDE OF RAILWAY LINE DUE TO INTERVENING LANDUSES AND VEGETATION

JOIN LINE REFER SECTION 1, SHEET 2

UPPER WARRELL CREEK ROAD

EXISTING PACIFIC HIGHWAY

WARRELL CREEK BRIDGE

ALBERT DRIVE

ODELLS ROAD

ROSEWOOD ROAD

DONNELLYVILLE

QUARRY

SCOTTS

A B C D E F G H I J K L M N O

TP0.000 TP534.897 TP482.489 TP659.972 TP1203.625 TP2220.414 TP2820.331 TP3546.985 TP5160.200 TP4734.966 TP4859.276 TP5162.771

1000 1500 2000 2500 3000 3500 5500 6000

VISUAL IMPACT : VERY HIGH
- FOR RESIDENTS LOCATED BETWEEN THE RAILWAY & THE PROPOSED ROUTE.
- MITIGATE IMPACTS BY SCREEN PLANTING AREAS IN FILL. PLANT TREE GROUPS ON BATTERS.

VISUAL IMPACT : VERY HIGH
- FOR RESIDENTS LOCATED ON ROSEWOOD ROAD WITHIN 150m WHERE PROPOSED ROUTE IS IN FILL
- MITIGATE VIEWS BY PLANTING TO SCREEN ROAD, INTEGRATE PLANTING WITH CHARACTER OF LANDSCAPE AT PRESENT (TREE CLUSTERS & SOME TREE ROW PLANTINGS.)

VISUAL IMPACT : HIGH
- FOR RESIDENTS IN DONNELLYVILLE, ALBERT DRIVE, AND & ON ODELLS ROAD WITH VIEWS TO PROPOSAL WHERE IT IS IN FILL
- VISUAL IMPACT- VERY HIGH FOR RESIDENTS ON ALBERT DRIVE WITHIN 150 METRES OF PROPOSAL

JOIN LINE REFER SECTION 1, SHEET 2

LEGEND

SELECTED VIEWPOINT FOR PHOTOMONTAGE.

POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.

POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.

RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.

POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.

500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

AREA OF RESTRICTED VIEWS DUE TO INTERVENING TOPOGRAPHY & VEGETATION.

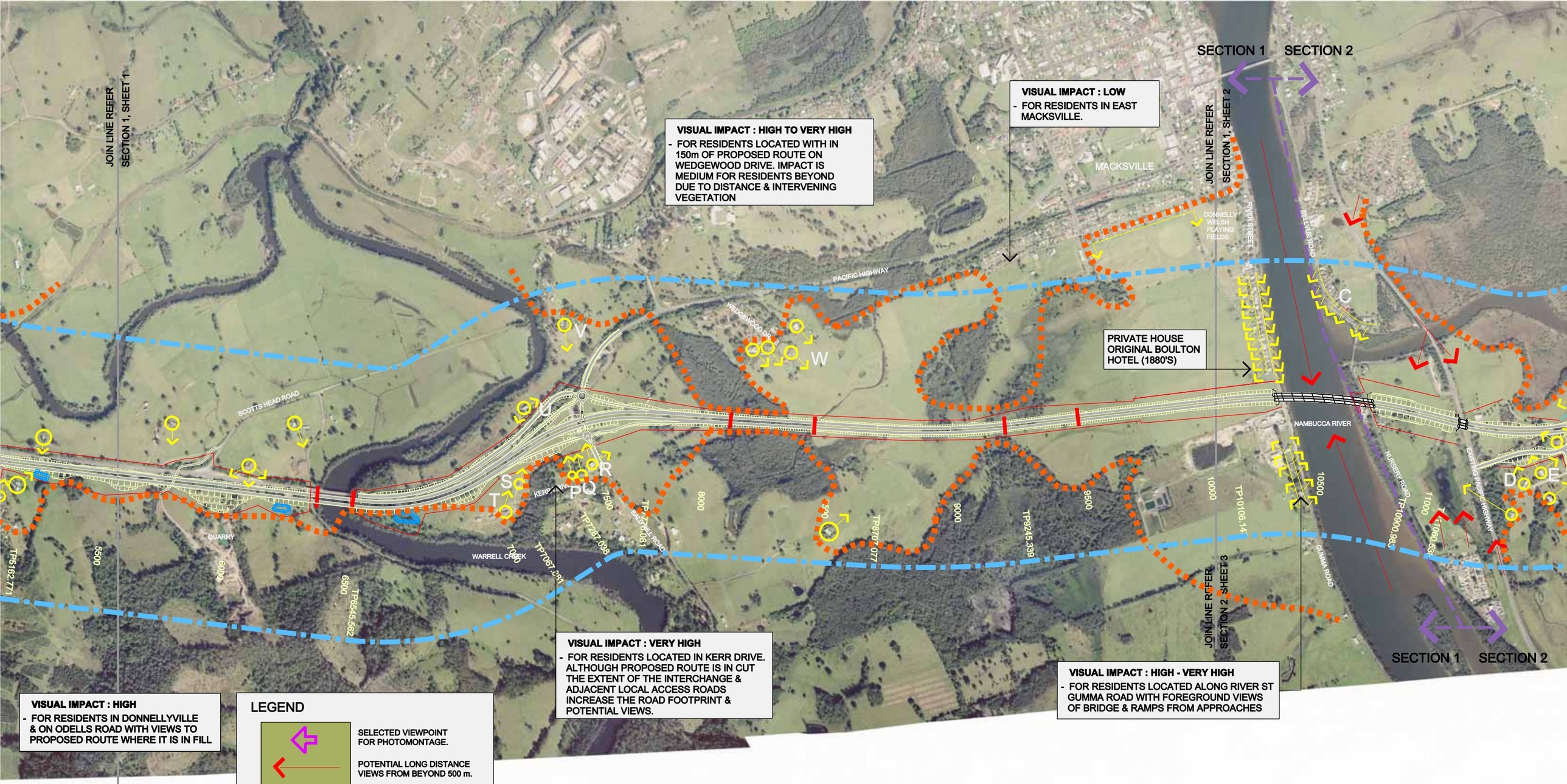
NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

ISSUE C

SCALE 1:15000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 1 / SHEET 1 : VIEW SHED ANALYSIS



SECTION 1 / SHEET 2 : VIEW SHED ANALYSIS

SECTION 1 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 2

VISUAL IMPACT : VERY HIGH TO MEDIUM HIGH
- FOR RESIDENCES ALONG PACIFIC HIGHWAY, & NURSERY ROAD.
- RESIDENTS ALONG BELLVUE ROAD HAVE POTENTIAL VIEWS OF THE BRIDGE OVER THE NAMBUCCA RIVER & ELEVATED APPROACHES & WOULD EXPERIENCE MEDIUM VISUAL IMPACTS

VISUAL IMPACT : HIGH
- FOR RESIDENTS ADJACENT TO THE PROPOSED ROUTE OBTAINING FOREGROUND VIEWS WHERE PROPOSAL IS IN FILL

JOIN LINE REFER SECTION 2, SHEET 4

VISUAL IMPACT : VERY HIGH TO HIGH
- FOR RESIDENTS ON MATTICK ROAD, LETITIA CLOSE & OLD COAST ROAD. THE ROAD IS IN FILL FOR SOME DISTANCE & WOULD BE WITHIN FOREGROUND VIEWS FROM THESE RESIDENCES. SOME INTERVENING VEGETATION WILL PARTIALLY SCREEN VIEWS

VISUAL IMPACT : LOW TO MEDIUM
- THROUGH FOREST DUE TO UNDULATING TERRAIN & DENSE VEGETATION. THE ROAD IS IN CUT FOR MUCH OF THIS AREA.
- LOW VISUAL IMPACT FOR RESIDENTS LOCATED ALONG FLORENCE WILMONT DRIVE DUE TO DISTANCE & INTERVENING VEGETATION

SECTION 1 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 2

JOIN LINE REFER SECTION 2, SHEET 4

LEGEND

SELECTED VIEWPOINT FOR PHOTOMONTAGE.

POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.

POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.

RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.

POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.

500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

ISSUE C

SCALE 1:15000 @ A3

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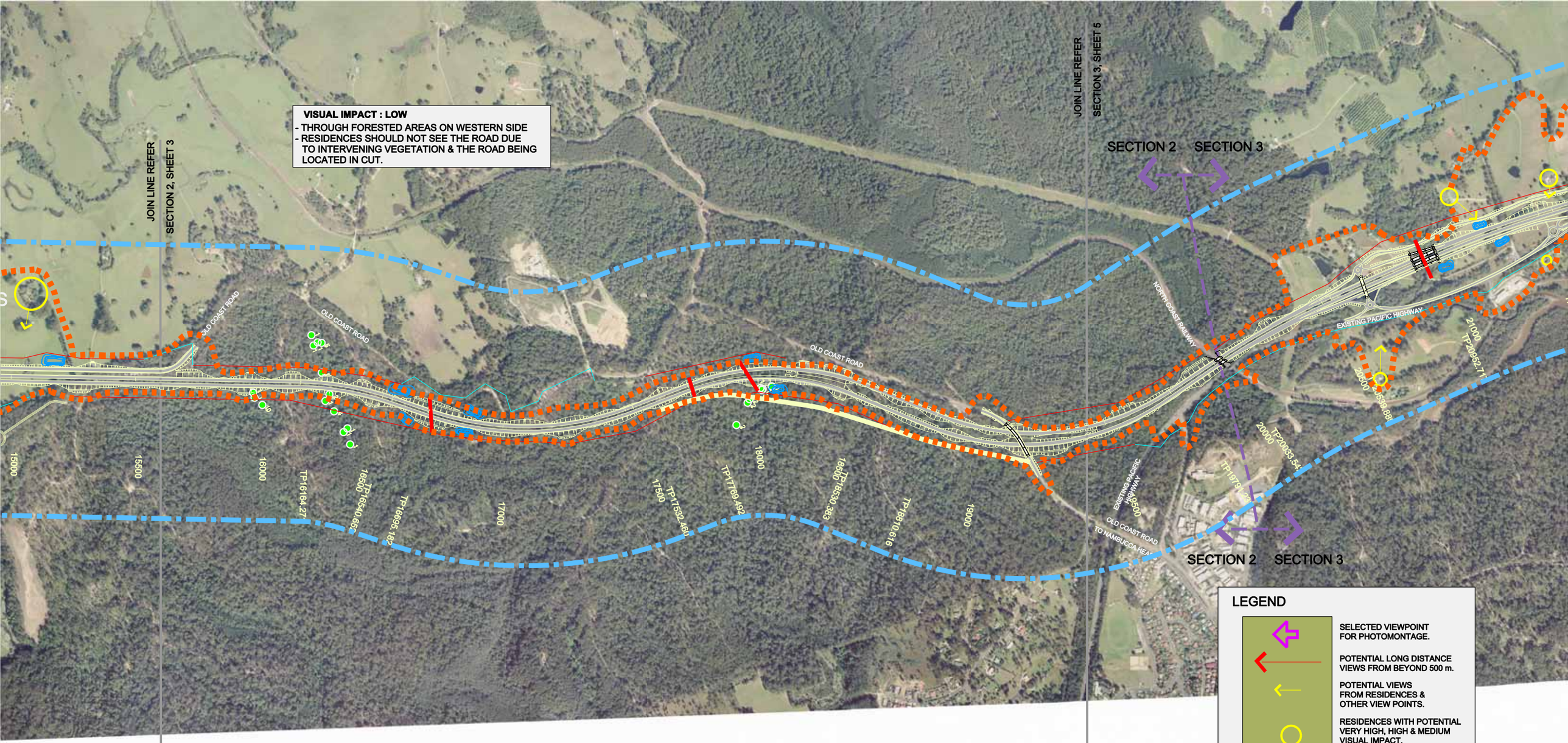
SECTION 2 / SHEET 3 : VIEW SHED ANALYSIS



LEGEND

- SELECTED VIEWPOINT FOR PHOTOMONTAGE.
- POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.
- POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.
- RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.
- POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.
- 500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

SCALE 1:15000 @ A3

ISSUE C

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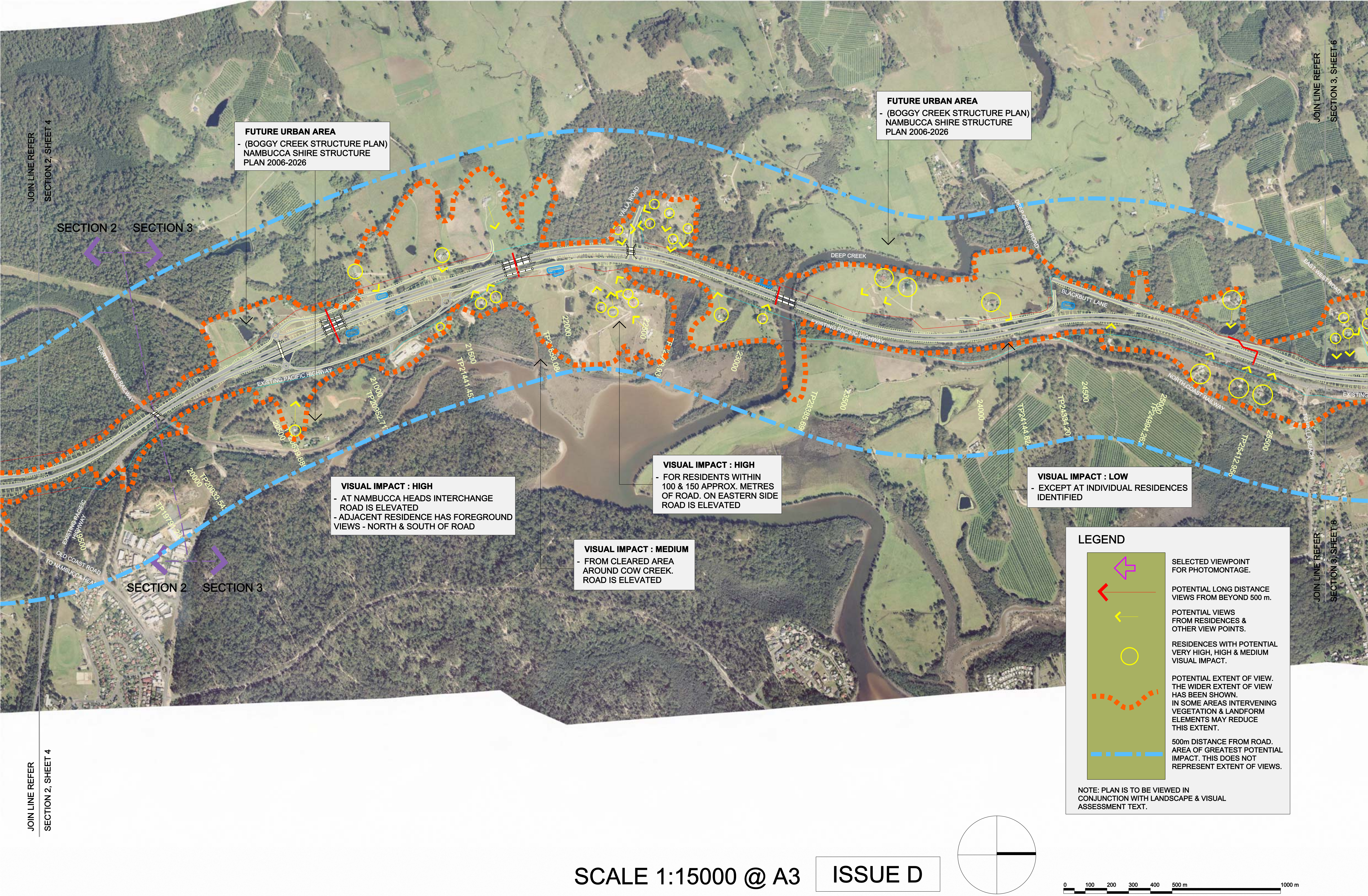
SECTION 2 / SHEET 4 : VIEW SHED ANALYSIS



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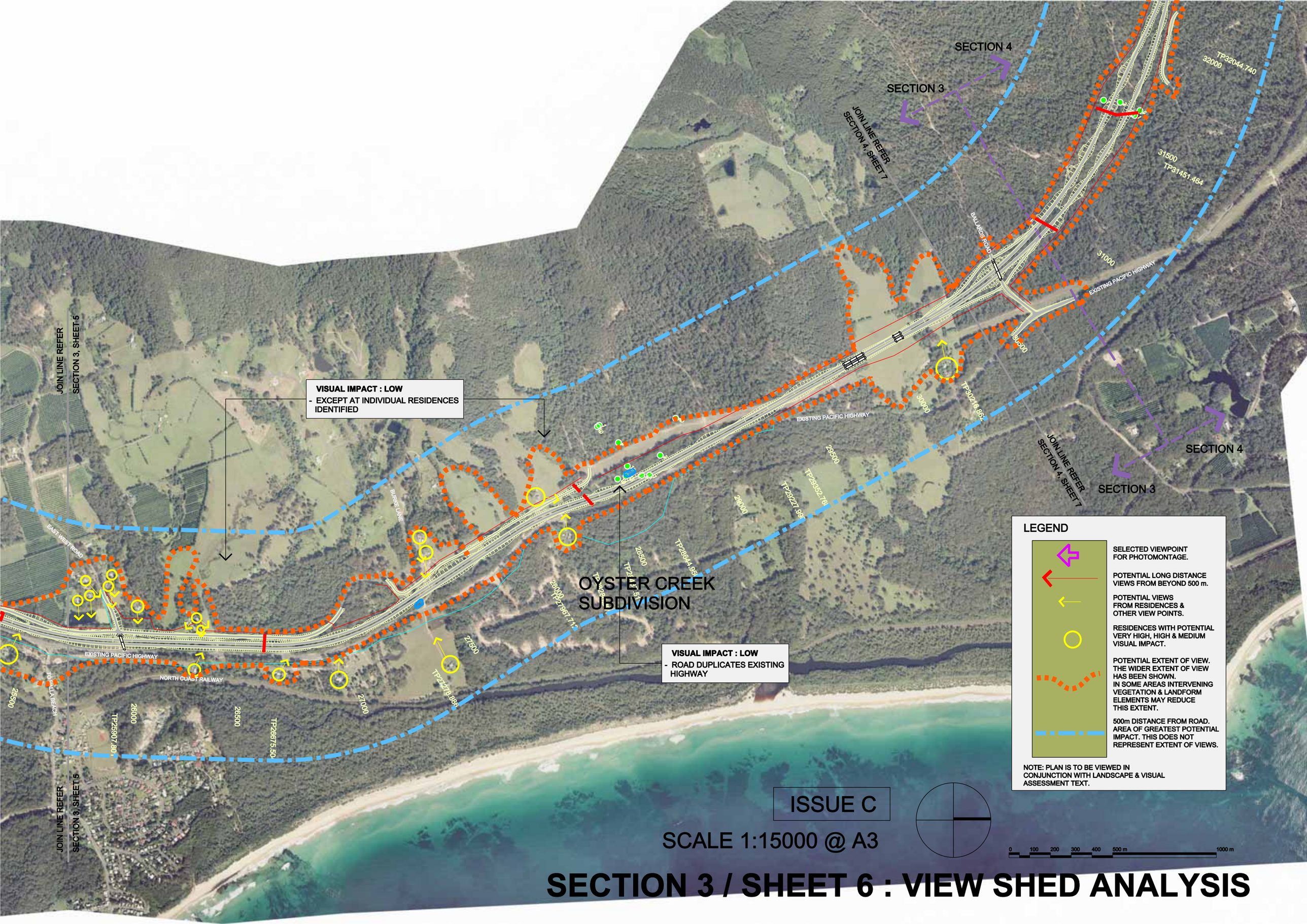
ISSUE D

SECTION 3 / SHEET 5 : VIEW SHED ANALYSIS



SECTION 3 / SHEET 6 : VIEW SHED ANALYSIS

JOIN LINE REFER SECTION 4, SHEET 8

JOIN LINE REFER SECTION 4, SHEET 8

VISUAL IMPACT : LOW

- THROUGH NEWRY STATE FOREST THE STEEPLY UNDULATING TERRAIN & DENSE VEGETATION PROVIDE A VISUAL SCREEN TO THE ROAD

MARTELLS ROAD

34500

TP34431.88

34000

33500

33000

TP32953.580

32500

TP32418.072

32000

TP32044.740

31500

TP31451.464

31000

30500

TP30214.864

30000

29500

TP29952.761

29000

TP29227.995

SECTION 4

SECTION 3

JOIN LINE REFER SECTION 3, SHEET 6

BULLAROO ROAD

EXISTING PACIFIC HIGHWAY

EXISTING PACIFIC HIGHWAY

JOIN LINE REFER SECTION 3, SHEET 6

SECTION 4

SECTION 3

LEGEND

SELECTED VIEWPOINT FOR PHOTOMONTAGE.

POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.

POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.

RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.

POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.

500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

ISSUE C

SCALE 1:15000 @ A3

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SECTION 4 / SHEET 7 : VIEW SHED ANALYSIS

SECTION 4 / SHEET 8 : VIEW SHED ANALYSIS

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SCALE 1:15000 @ A3

ISSUE C

LEGEND

SELECTED VIEWPOINT FOR PHOTOMONTAGE.

POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.

POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.

RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.

POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.

500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

JOIN LINE REFER SECTION 4, SHEET 9

VISUAL IMPACT : HIGH TO VERY HIGH
- FOR RESIDENTS WITH IN 150m WHERE PROPOSAL IS IN FILL

POTENTIAL LONG VIEWS BEYOND 500m ALONG THE RIVER TO THE BRIDGE

VISUAL IMPACT : HIGH TO VERY HIGH
- RURAL RESIDENTIAL PROPERTIES ADJACENT TO THE KALANG RIVER & SOUTH ARM ROAD WOULD GAIN FOREGROUND VIEWS OF THE ROAD & BRIDGE. THE ROAD IS IN FILL IN THE RIVER VALLEY ON BOTH SIDES OF THE RIVER INCREASING ITS VISIBILITY.
- MITIGATION & DETAILED DESIGN REQUIRED TO REDUCE IMPACTS

VISUAL IMPACT : LOW
- THROUGH NEWRY STATE FOREST THE STEEPLY UNDULATING TERRAIN & DENSE VEGETATION PROVIDE A VISUAL SCREEN TO THE ROAD

H G B C E F D A

SOUTH ARM ROAD

KALANG RIVER

MARTELLS

37000 37500 TP37445.082

36000 36500 TP36792.985

35000 35500 TP35330.923

34000 34500 TP34431.88

JOIN LINE REFER SECTION 4, SHEET 8

JOIN LINE REFER SECTION 4, SHEET 7

JOIN LINE REFER SECTION 4, SHEET 7

SECTION 4 / SHEET 9 : VIEW SHED ANALYSIS

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SCALE 1:15000 @ A3

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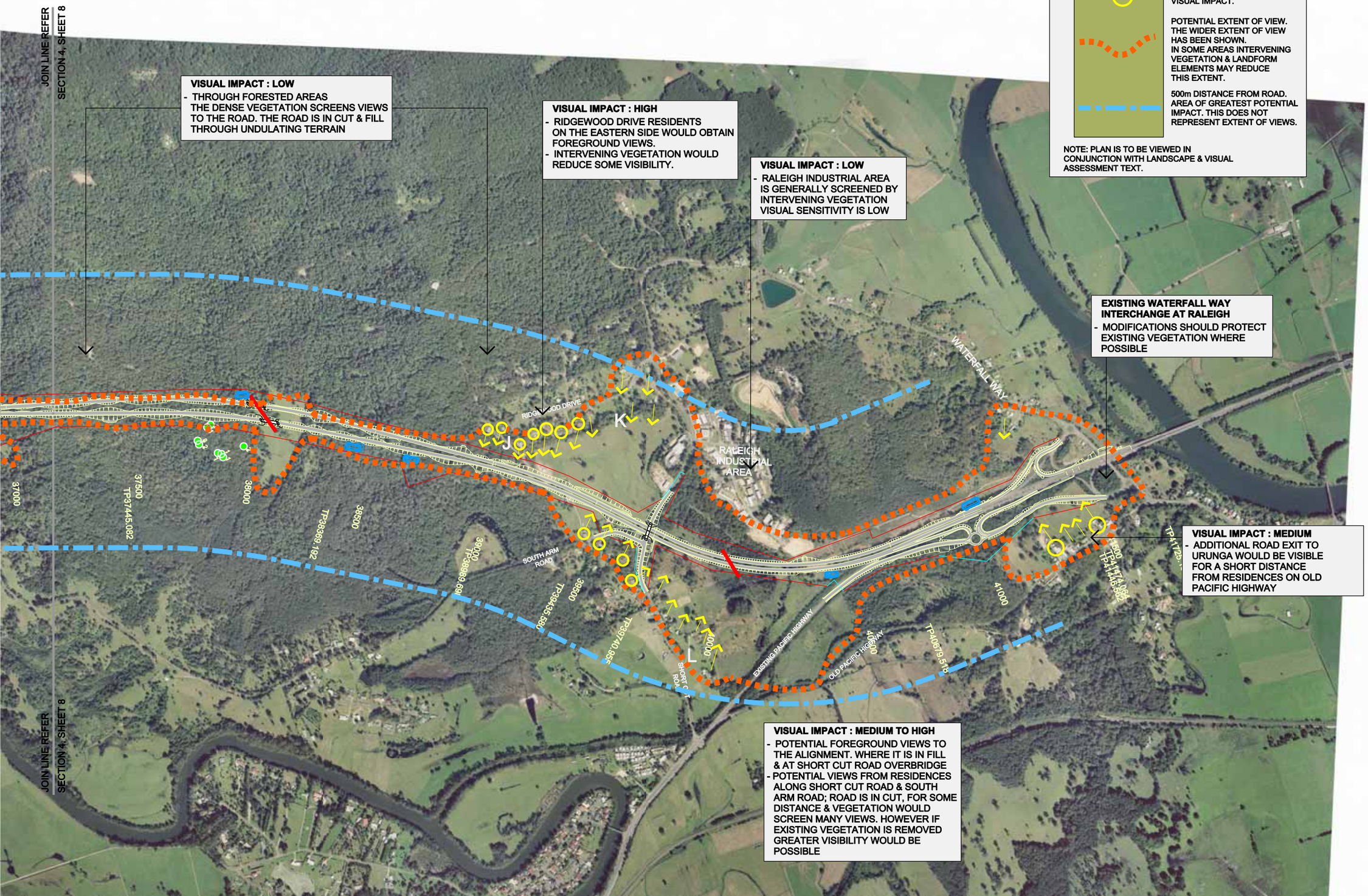

LEGEND

- SELECTED VIEWPOINT FOR PHOTOMONTAGE.
- POTENTIAL LONG DISTANCE VIEWS FROM BEYOND 500 m.
- POTENTIAL VIEWS FROM RESIDENCES & OTHER VIEW POINTS.
- RESIDENCES WITH POTENTIAL VERY HIGH, HIGH & MEDIUM VISUAL IMPACT.
- POTENTIAL EXTENT OF VIEW. THE WIDER EXTENT OF VIEW HAS BEEN SHOWN. IN SOME AREAS INTERVENING VEGETATION & LANDFORM ELEMENTS MAY REDUCE THIS EXTENT.
- 500m DISTANCE FROM ROAD. AREA OF GREATEST POTENTIAL IMPACT. THIS DOES NOT REPRESENT EXTENT OF VIEWS.

NOTE: PLAN IS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE & VISUAL ASSESSMENT TEXT.

Appendix B

B.1 Table 2 – Visual Impact Summary

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
Section 1: Warrell Creek to Nambucca River				
Residences within 150m of Proposal where it is in fill or where residence is elevated and could view Proposal in cut: {existing Pacific Highway south of Warrell creek village (3), Cockburns Lane (1), residence A east of Warrell Creek village, residences C, D on Rosewood Road (3), Albert Drive residences F, M, O (5), existing Pacific Highway near Donnellyville (2), Bald Hill Road (1), Kerr Drive(4), residence U on existing Pacific Highway west of Bald Hill Road (1)}	High	High-Very High	High-Very High	Interchanges at Warrell Creek and Bald Hill Road designed as clear, uncomplicated interchanges, with a reduced footprint and extent of cut and fill minimised. Landscape treatment to the interchanges to provide distinctive landscape character and visual reduction through screen planting within view corridors from surrounding residences. Bridges at Warrell Creek and Bald Hill Road interchange designed as clean, uncluttered structures. Screen planting at base of embankments and at tops of cuts.
Residences between 150–300 m of the Proposal where it is in fill {Cockburns Lane (1),residence E on Rosewood Road (1), residence B east of Warrell Creek Village (1), residences on Scotts Head Road (2), residence V on existing Pacific Highway west of Bald Hill Road (1), Wedgewood Drive(4)}	High	High	High	Same as previous. Screen planting at base of embankments to include dense trees and understorey.
Residences between 250–500 m of the Proposal on O'Dells Road with potential views from an elevated position over the Proposal G-L, N (7)}	High	High	High	Road profile has been kept low. Planted mound to 3 m to provide a visual screen.
Residences between 300–500 m where proposal is in fill {Rosewood Road (1)}	Medium	Medium	Medium	Screen planting with trees and dense understorey provided at base of embankments.

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
Residences > 500 m where Proposal is in fill and visible	Low	Low	Low	Planting provided to integrate Proposal with the surrounding landscape character.
Residences in Donnellyville within 150 m with views to the Proposal in fill	Medium	High -Very High	High	Noise barrier provided as a planted mound with dual function to screen views to the Proposal, and/or noise wall with screen planting where sufficient space for mound is not available.
Residences > 500 m distance that are elevated and view the proposal where in fill due to the elevation (Upper Warrell Creek Road)	Low	Low	Low	Retention of existing trees adjacent to the Proposal. Planting at the top of cuts and on embankments to integrate with the surrounding landscape.
Warrell Creek Village and Macksville township located > 500 m from Proposal	Low	Low	Low	Planting of embankments and edges with clustered trees and shrubs whilst allowing views of the floodplain and river from the Proposal.
Donnelly Welsh Playing Fields	Medium	Low-Medium	Medium	Proposal integrated with the floodplain by reducing its elevation (but out of 1:100 flood levels). Planting with clustered trees and shrubs to reflect floodplain landscape character.
Residents on Gumma Road and River Street (4) within 150 m of proposal with views to the proposed bridge	Very High	Very High	Very High	Refined and uncluttered design for the bridge over the Nambucca River. Abutments kept open to maintain views of the river. Dense tree clusters on approaches to the bridge abutments at base of embankments.
Residents on Gumma Road and River Street (11) between 150-300 m of proposal with views to the proposed bridge and approaches	High	High	High	Same as previous
Former Boulton Hotel and site of ferry/punt crossing	Very High	Very High	Very High	Same as previous

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
Section 2: Nambucca River to Nambucca Heads				
Residences and rural residential areas north of Nambucca River within 150 m of Proposal where it would be in fill, is bridged, or where it would be potentially visible from the adjacent residences. {Residence A on Nursery Road (1), residence B, G, M-S on Old Coast Road (9), residences A1, D, E, F in Letitia Close (4), residences H, I, J, K in Mattick Road(4)}.	High	High-Very High	High-Very High	Planted mound to 2 m with dense trees and understorey to provide visual screen for residents in area of Letitia Close. Noise barrier and screen planting provided near Mattick Road, (install a planted mound if fill is available). Road alignment revegetated with forest landscape character to extent the Nambucca State Forest. Trees along Old Coast Road alignment retained and protected to maintain visual screening.
Residences within between 150–300 m of Proposal where it would be potentially visible, in Letitia Close (4) and Mattick Road-Residence L and another not labelled (2), and Old Coast Road-Residence T (1).	High	High	High	Same as previous
Residences within between 300–500 m of proposal where it would be potentially visible, in Letitia Close (3) and Mattick Road (4).	High	Medium-High	Medium-High	Same as previous
Residences in Bellvue Drive at 300-500 m of Proposal with potential partial views to the Proposed bridge elevated over the Nambucca River.	High	Medium-High	Medium-High	Refined and uncluttered design for the bridge over the Nambucca River. Abutments kept open to maintain views of the river. Dense tree clusters on approaches to the bridge abutments at base of embankments.
Caravan Park on Nursery Road located some 450-500 metres and greater from the Proposal.	High	Medium	Medium-High	Clustered trees at base of embankment and revegetated embankment to integrate the Proposal with the surrounding landscape character.

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
Nambucca State Forest.	High	Low	Low-Medium	Revegetated road alignment with forest landscape characteristic of the Blackbutt forest.
Recreational Areas: - pedestrian bridge and path at Newee Creek at approximately 150 m - boat ramp near caravan park at approximately 750m	Medium Low	High Low	Medium Low	Refined and uncluttered design for the bridge over the Nambucca River. Bridge piers aligned on north and south bound bridges to avoid clutter within the river and maintain views under bridges.
Residences > 500 m where Proposal would be in fill and potentially visible.	Low	Low	Low	Planting provided to integrate Proposal with the surrounding landscape character.
Section 3: Nambucca Heads to Ballards Road				
Residences located with 150 m of proposal where it is either in fill or where views over areas in cut would be available (approx 36)	Medium	High	Medium-High	Planting and screening reinforced adjacent to the Proposal to recognise the existing vegetation and topographic enclosures of the residences.
Residences located between 150 to 300 m of proposal where it is either in fill or where views over areas in cut would be available (approx 8)	Medium	Medium	Medium	Same as previous
Residences located between 300 to 500 m of proposal where it is in fill and where views would be available (approx 1)	Low	Low	Low	Same as previous
Cow Creek Reserve	High	High	High	Screen planting provided to retain the visual enclosure of Cow Creek reserve. Plant fauna underpass to Flora and Fauna expert requirements, to maximise fauna use.
Future Boggy Creek Urban Area (Transport and heavy industrial zoning)	Low	Low	Low	Dense forest vegetation, trees and understorey revegetated along the Proposal and the realigned Pacific Highway.

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
Future Boggy Creek Urban Area (Rural Residential)	Medium	Medium	Medium	Same as previous
Section 4: Ballards Road to existing Raleigh deviation				
Forested areas of Little Newry and Newry State Forest and forest north of river	High to Very High	Low	Medium	Impacts reduced by dense vegetation and screening of the Proposal, using forest species characteristic of the existing forests.
Kalang River Floodplain on the southern side where residences are within 100 m, Residence A (1)and 300 m, Residence B (1)	Very High	High-Very High dependent on distance to the proposal. Very High <150m High150–300m	High-Very High	Dense tree clusters provided at the base of the embankments to screen the proposal and link with the existing vegetation patterns in the valley.
Residences on South Arm Rd near Kalang River, or accessed from it, within 150m of the Proposal, Residences C, E, G.(3)	Very High	Very High	Very HIgh	All vegetation beyond the immediate road works protected and the existing forested edges reinforced and extended to the embankments and cuttings.
Residences on South Arm Rd near Kalang River, or accessed from it, between 150-300 m, that would have views to the Proposal, Residences F, H (2).	High	High	HIgh	Same as previous
Residences on South Arm Rd near Kalang River, or accessed from it, between 300-500 m from an elevated position that would have views to the Proposal, Residence D(1)	High	High	HIgh	Same as previous
South West Arm Road scenic road landscape (Bellingen Shire Conservation Area)	Very High	Very HIgh	Very High	All existing vegetation beyond the immediate road works protected, the alignment of existing South Arm Road adjacent to the Kalang River maintained to protect it as a cultural link.

Area	Visual Effect	Visual Sensitivity	Visual Impact	Mitigation Strategy to reduce visual impacts
				Dense tree clusters grouped adjacent to the Proposal to reflect the surrounding vegetation patterns.
Residences on Ridgewood Drive within 150 metres of the Proposal (4)	High	High	High.	Dense screen planting and mound to 4 m provided to visually screen the Proposal as it approaches Short Cut Road.
Residences on Ridgewood Drive between 150-300 m of the Proposal (4)	Medium-High	High	High.	Same as previous
Residences on Ridgewood Drive between 300-500 m of the Proposal (3)	Medium-High	Medium-High	Medium-High	Same as previous
Residences on northern side of Short Cut Road with potential views to the Proposal (7) Residences between 150- 300 metres (5) Residences between 300-500 metres (2)	Medium	Medium-High High for residents <300m	Medium-High Medium for residents >300m	Screen planting provided adjacent to the Proposal
Residences on South Arm Road near Short Cut Road within 150 metres of the Proposal with potential views (3)	High	High	High.	Screen planting provided adjacent to the Proposal
Raleigh Industrial Area	Low	Low	Low	Same as previous
Residents surrounding Waterfall Way -Raleigh interchange with views over proposed adjustments to interchange	Low	High	Medium	Revegetation of the interchange to reflect the approach to the Bellinger Valley through dense tree clusters of wet sclerophyll forest.
Future rural residential land adjacent to Ridgewood Drive	Medium	High	High	Dense screen planting and mound to 4 m provided to visually screen the Proposal as it approaches Short Cut Road

Appendix C

C.1 Potential Drivers Experience Sections 1-4

DRIVERS WILL OBTAIN SHORT GLIMPSES OF THE WARRELL CREEK VALLEY AS THE PROPOSED ROUTE EMERGES OUT OF THE CUTS.

THESE VIEWS WILL BE INTERMITTENT

LONGER VIEWS ALONG WARRELL CREEK AS PROPOSED ROUTE JOINS EXISTING PACIFIC HIGHWAY

IMPORTANT VIEWS FROM BRIDGE OVER WARRELL CREEK WHEN TRAVELLING NORTH

IMPORTANT APPROACH TO MACKSVILLE MAINTAIN AVENUE OF LIQUIDAMBERS & VIEWS OVER GOLF COURSE

PANORAMIC VIEWS OVER NAMBUCCA RIVER VALLEY FROM PROPOSAL

GLIMPSES OF MACKSVILLE WILL BE AVAILABLE MORE FOR PASSENGERS

SECTION 1 SECTION 2

USE THE BRIDGE OVER WARRELL CREEK AS A VISUAL CUE FOR THE IMPENDING INTERCHANGE TO PROVIDE THE ACCESS TO MACKSVILLE & EXIT FOR SCOTTS HEAD

SECTION 1 SECTION 2

LEGEND

- LONG VIEWS
- INTERMITTENT VIEWS
- ENCLOSED: BY CUTTING OR FOREST
- NODE OR INTERCHANGE

SCALE 1:30000 @ A3

ISSUE C

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SECTION 1 : POTENTIAL DRIVERS EXPERIENCE

PANORAMIC VIEWS OVER NAMBUCCA RIVER VALLEY FROM PROPOSAL

GLIMPSES OF MACKSVILLE WILL BE AVAILABLE. MORE FOR PASSENGERS

DRIVERS VIEWS WILL BE INTERMITTENT SOME OPEN VIEWS IN FILL & CLOSED IN CUT FOR SOME 3 KM. ORIENTATION OF VIEWS WILL BE TO THE WEST VIEWS TO THE EAST WILL BE ENCLOSED DUE TO FOREST.

NAMBUCCA HEADS INTERCHANGE & VALLA BEACH

SECTION 1 SECTION 2

SECTION 2 SECTION 3

SECTION 2 SECTION 3

SECTION 1 SECTION 2

PANORAMIC VIEWS OVER RURAL RESIDENTIAL LAND & RIVER VALLEY AS MOTORISTS EMERGE FROM ENCLOSED FORESTED AREA. THIS WILL HEIGHTEN THE EXPERIENCE DUE TO VISUAL CONTRAST

ENCLOSED VIEWS THROUGH FOREST

GLIMPSES BEYOND THE FOREST AREAS WILL BE AVAILIABLE AT BRIDGE OVER RAILWAY. BRIDGE IS A VISUAL CUE TO INTERCHANGE AT NAMBUCCA HEADS.

LEGEND

- LONG VIEWS
- INTERMITTENT VIEWS
- ENCLOSED: BY CUTTING OR FOREST
- NODE OR INTERCHANGE

SCALE 1:30000 @ A3

ISSUE C

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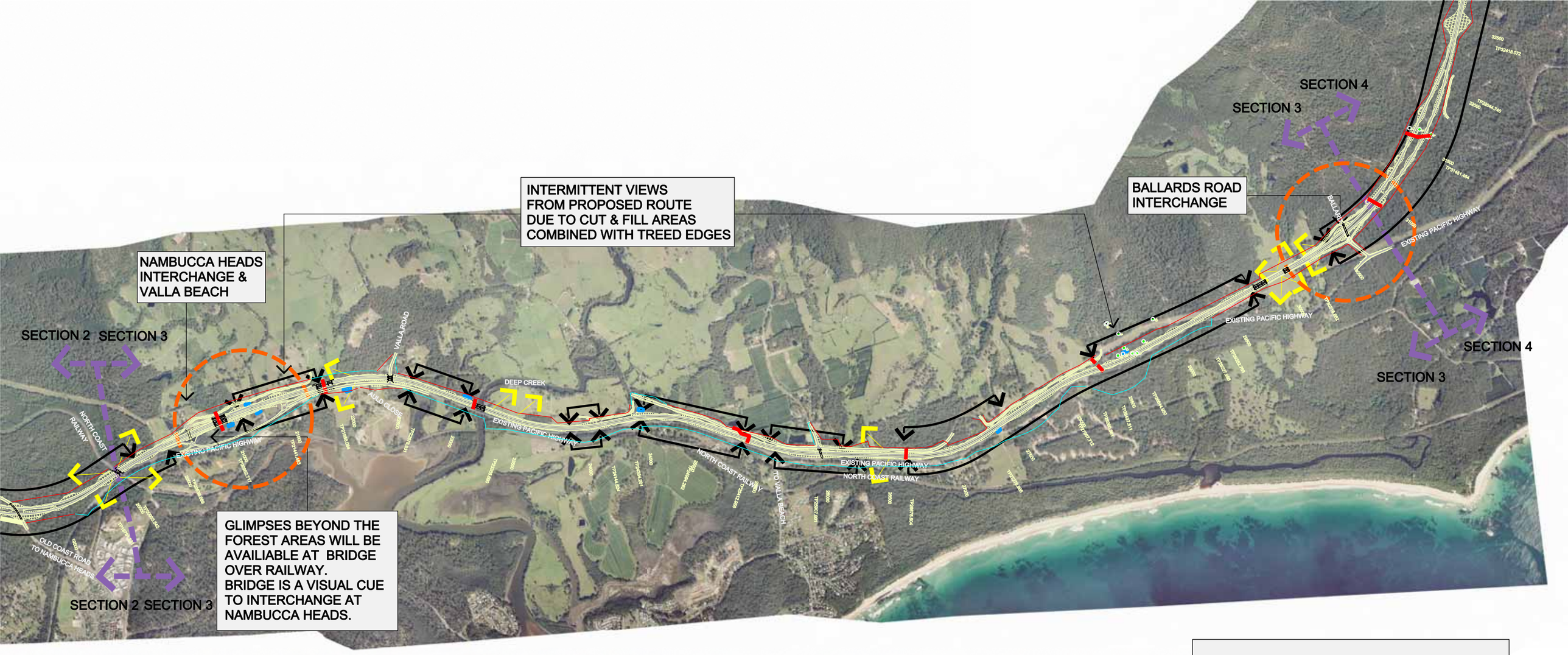
SECTION 2 : POTENTIAL DRIVERS EXPERIENCE



LEGEND

- LONG VIEWS
- INTERMITTENT VIEWS
- ENCLOSED: BY CUTTING OR FOREST
- NODE OR INTERCHANGE

SCALE 1:30000 @ A3

ISSUE C

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SECTION 3 : POTENTIAL DRIVERS EXPERIENCE

PANORAMIC & SCENIC DISTRICT VIEWS FOR DRIVERS. THE ROAD EMERGES FROM FORESTED AREAS INTO THE KALANG VALLEY FROM N & S.

- MAINTAIN OPEN AREAS TO MAXIMISE THIS EXPERIENCE
- NEED TO BALANCE REDUCING THE VISUAL IMPACT OF THE ROAD ON THE FLOODPLAIN & RESIDENTS VIEWS WITH ENHANCING DRIVERS EXPERIENCE

FOR 5 KM FROM THE SOUTH DRIVERS WILL EXPERIENCE ENCLOSED FORESTED SURROUNDINGS WITH SOME DEEP CUTS.

- MAXIMUM CUT (APPROX. 20 m)
- IMPORTANT TO INTEGRATE THE DESIGN OF THE ROAD WITH THE FOREST BY PLANTING OF THE CUT BATTERS

ENCLOSED FORESTED EXPERIENCE THROUGH UNDULATING TERRAIN

SOME LOCAL VIEWS FOR SOUTHBOUND DRIVERS

- MINOR NORTHBOUND VIEWS

WATERFALL WAY INTERCHANGE - RALEIGH IS AN IMPORTANT ACCESS POINT FOR URUNGA & BELLINGEN DESTINATIONS.

- PROVIDE A CLEAR & UNCOMPLICATED DRIVER EXPERIENCE
- APPROACH TO THE INTERCHANGE FROM SOUTH AND NORTH SHOULD REINFORCE THE REMNANT RAINFOREST CHARACTER

BALLARDS ROAD INTERCHANGE

KALANG RIVER

SOUTH ARM ROAD

RIDGEWOOD DRIVE

RALEIGH INDUSTRIAL AREA

WATERFALL WAY

SHORT CUT ROAD

EXISTING PACIFIC HIGHWAY

OLD PACIFIC HIGHWAY

MARTELLS ROAD

BALLARDS ROAD

SECTION 4

SECTION 3

LEGEND

- LONG VIEWS
- INTERMITTENT VIEWS
- ENCLOSED: BY CUTTING OR FOREST
- NODE OR INTERCHANGE

SCALE 1:30000 @ A3

ISSUE C

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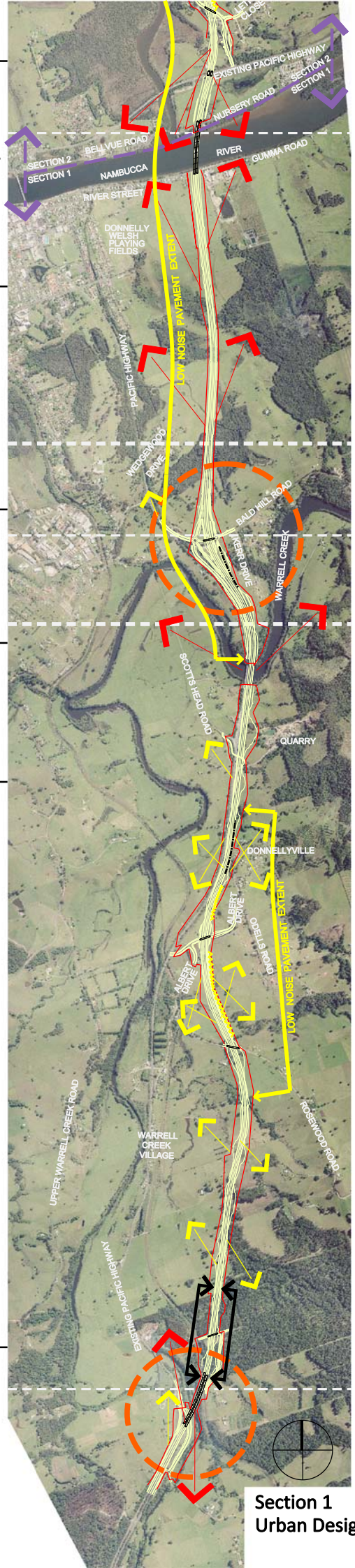
SECTION 4 : POTENTIAL DRIVERS EXPERIENCE

Appendix D

D.1 Urban Design and Landscape Strategic Concept: Sheets 1 to 4

LANDMARK	IMPORTANCE	DESIGN RESPONSE/STRATEGY
NAMBUCCA RIVER BRIDGE CROSSING	The new bridge will be visually significant and visible from Macksville residences on the north and south of the river as well as from the existing traffic bridge	Recognise the importance and high visibility of the Nambucca River bridge by refined and uncluttered design to maintain visibility to the river for the surrounding residences. Maintain views between both bridges to reinforce Macksville as a destination along the highway.
NAMBUCCA RIVER VALLEY	The wide open floodplain contrasts with the smaller scale and enclosed Warrell Creek Valley	Integrate the Proposal by planting the embankments and edges with clustered trees and shrubs, whilst allowing views of the valley from the Proposal
BALD HILL INTERCHANGE	An important arrival point to Macksville and Scotts Head	The interchange design is to reflect the importance of this arrival by designing the landscape treatment to reflect the approach to Macksville and Scotts Head.
LOWER WARRELL CREEK CROSSING	The bridge crossing of Warrell Creek is a scenic point on the journey	Maintain the enclosed character and high quality setting of the Warrell Creek bridge crossing by dense landscaping of the approaches with floodplain forest characteristic of the valley.
WARRELL CREEK VALLEY	The Warrell Creek Valley is surrounded by forest creating an enclosed fine grained landscape of intimate scale. Warrell Creek village is at the centre with residential properties overlooking the valley	Retain the fine grained landscape of the valley by planting cuttings/embankments to visually enclose the Proposal. Protect the scenic views from rural residences by dense screening of the road corridor.
WARRELL CREEK INTERCHANGE	The interchange introduces the high scenic character of the valley	Landscape treatment is to set the proposed bridge in a forest setting representative of the subtropical forest character of flooded gums of Warrell Creek.



LEGEND

- Interchanges
- Proposed Road and Boundary
- Proposed noise barrier
- Proposed mound for visual screening
- Long views from Proposal
- Intermittent views from Proposal
- View enclosed by cutting or forest

Section 1
Urban Design and Landscape Strategic Concept

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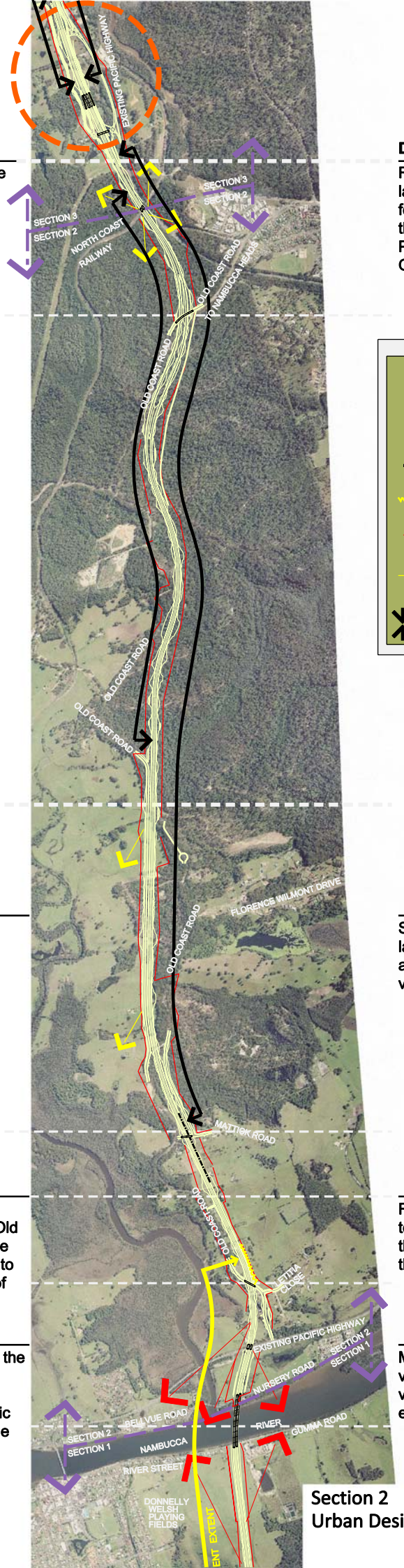
LANDMARK	IMPORTANCE	DESIGN RESPONSE/STRATEGY
NAMBUCCA STATE FOREST	The Proposal follows the Nambucca State Forest and adjacent forested lands for some 7 km.	Revegetate the road corridor with forest landscape characteristic of the Blackbutt forest. Provide visual screening to extend the forest character and to screen the Proposal for residences along Letitia Close, Old Coast Road, and Mattick Drive.
Local Road overbridges provided at Old Coast Road / Letitia Close and Mattick Road.		Set the overbridges into a heavily landscaped setting of planted cuttings and local road approaches to provide visual screening.
RIDGE OF OLD COAST ROAD	The Proposal generally follows the ridgeline of Old Coast Road with the side slopes of Newee Creek to the west and the bend of the Nambucca River to the east.	Recognise the high impacts of the Proposal to the rural residential properties and screen the Proposal to all residences located along the ridge and its slopes.
	The Proposal descends the ridge to the proposed Nambucca River bridge providing potential scenic views towards Macksville and the river	Maintain the driver's experience of these views south over the river whilst screening views from the adjacent residences in the east and west.



LEGEND

- Interchanges
- Proposed Road and Boundary
- Proposed noise barrier
- Proposed mound for visual screening
- Long views from Proposal
- Intermittent views from Proposal
- View enclosed by cutting or forest

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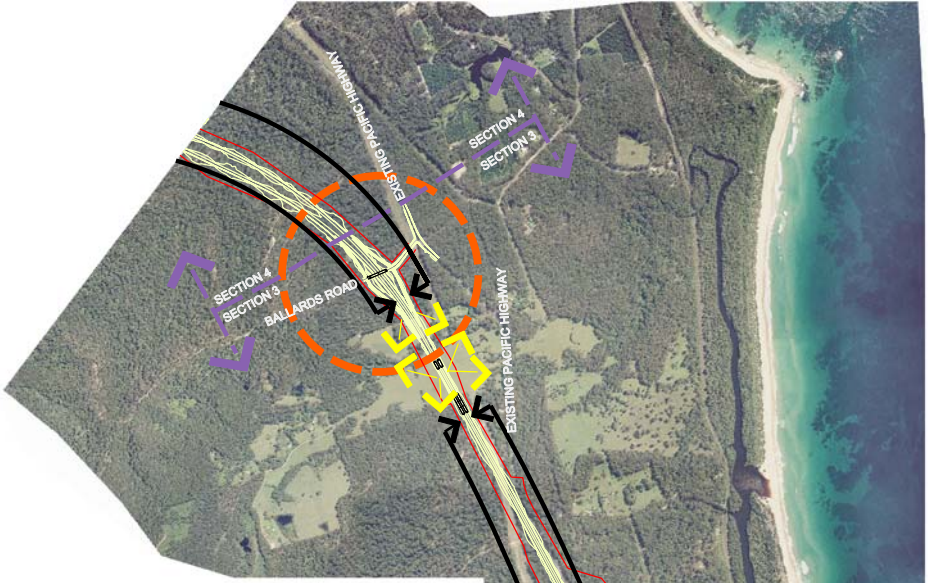
Section 2
Urban Design and Landscape Strategic Concept



LEGEND

- Interchanges
- Proposed Road and Boundary
- Proposed noise barrier
- Proposed mound for visual screening
- Long views from Proposal
- Intermittent views from Proposal
- View enclosed by cutting or forest

LANDMARK	IMPORTANCE	DESIGN RESPONSE/STRATEGY
VALLA BEACH HINTERLAND BOGGY, COW AND DEEP CREEK VALLEYS	The Proposal parallels the existing Pacific Highway with the highway realigned in some areas and local access roads provided on the western side.	Revegetate the Proposal and protect existing vegetation to avoid impacts of four parallel carriageways.
	Residences are set within treed enclosures and fruit / nut plantations	Recognise the important vegetation enclosures / settings of the residences by reinforcing this planting and screening.
DEEP CREEK, COW CREEK AND BOGGY CREEK OVERBRIDGES	The Proposal crosses each creek generally parallel to the existing Pacific Highway	Protect the creek environs and Endangered Ecological Communities and utilise bridges as fauna underpass opportunities. Set each bridge in a landscape setting of revegetated forest extending the existing vegetation communities.
NAMBUCCA HEADS INTERCHANGE AND REST AREA	The interchange is an important milestone and orientation point, providing the arrival point to Nambucca Heads and a rest area	Recognise Nambucca Heads as a destination by designing the landscape treatment to reflect the approach to this beach side town. Treat the rest area by expanding the existing high quality forest trees, locating picnic shelters within the treed environment, whilst maintaining some visual surveillance from the Proposal and the adjacent existing Pacific Highway.

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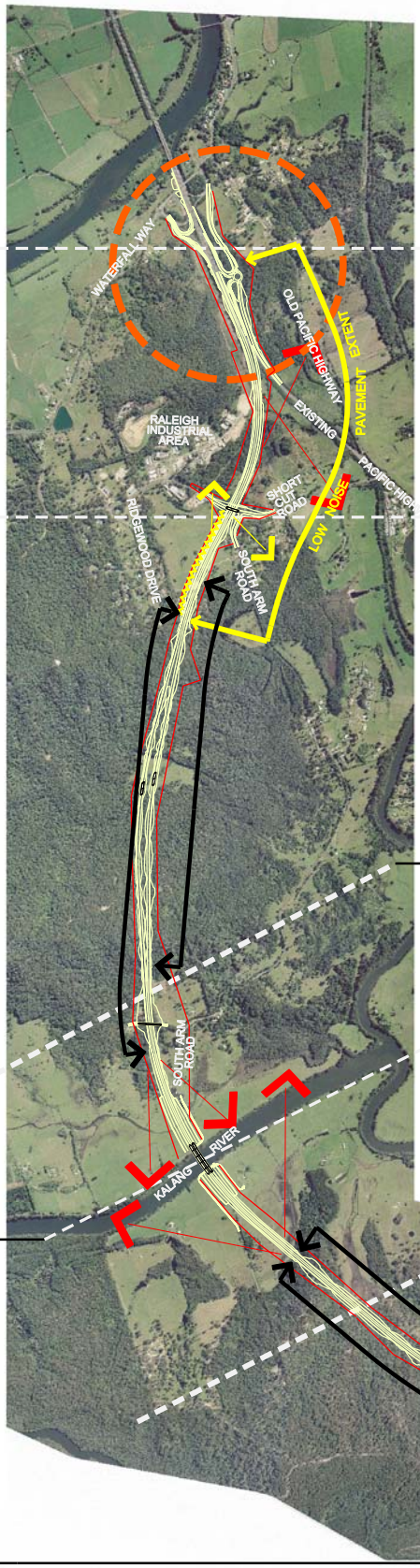
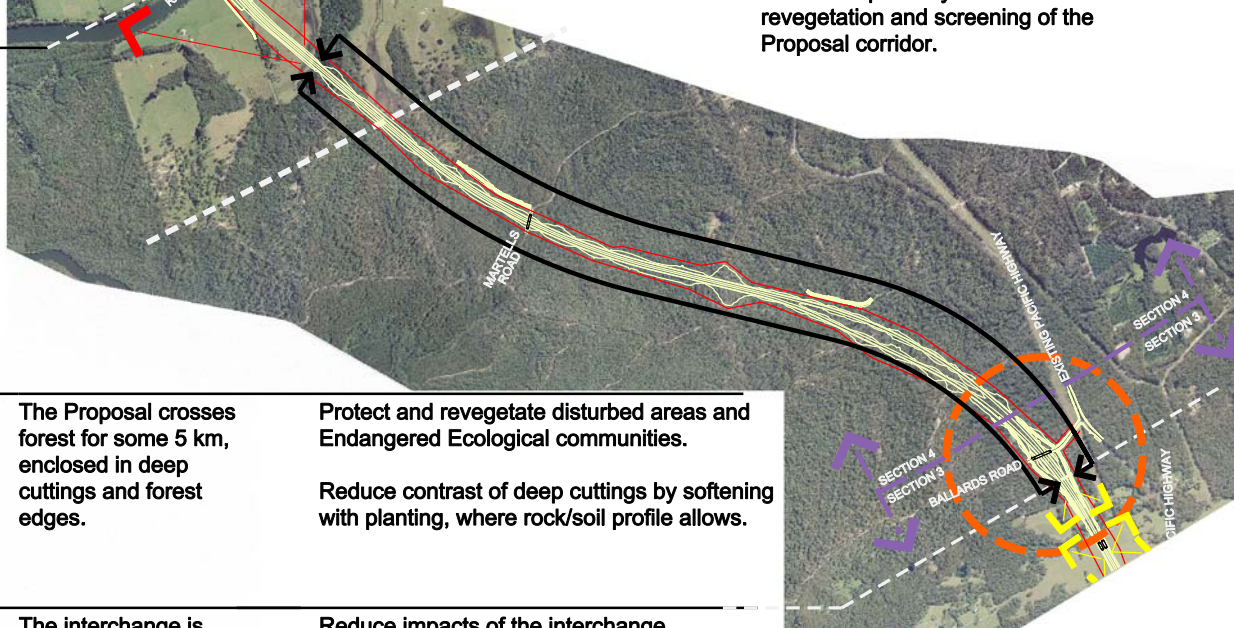
Section 3 Urban Design and Landscape Strategic Concept





LANDMARK	IMPORTANCE	DESIGN RESPONSE/STRATEGY
WATERFALL WAY INTERCHANGE -RALEIGH	The interchange provides access to Bellingen, Raleigh and Urunga	Identify these destinations by expanding the remnant rainforest character of tall, lush canopy trees at the interchange, and protecting the forest communities surrounding.
RESIDENTIAL AREAS ON RIDGEWOOD DRIVE AND SHORT CUT ROAD	The Proposal will be visible from surrounding residences	Provide dense screen planting and mounds to provide visual screening to Ridgewood Drive residences. Provide screen planting for Short Cut Road residences.
	Panoramic and highly scenic views for drivers as the Proposal emerges out of forest on the north and south of the river.	Maintain the views north and south directly to the river from the Proposal, whilst screening residences views from the east and west.
SOUTH (WEST) ARM ROAD SCENIC LANDSCAPE	This area is a highly scenic landscape in this enclosed valley. It is also defined in Bellingen Council's Conservation Areas.	The Proposal will produce a very high impact in this valley. Manage impacts by protecting all existing vegetation beyond the immediate roadworks and extending the existing forested edges to the embankments and cuttings.
KALANG RIVER VALLEY AND BRIDGE CROSSING	The bridge is a significant intervention in this enclosed highly scenic rural landscape.	Recognise the importance and high visibility of the Kalang River crossing and provide a refined and uncluttered bridge design. Reduce impacts by dense revegetation and screening of the Proposal corridor.
NEWRY AND LITTLE NEWRY STATE FOREST	The Proposal crosses forest for some 5 km, enclosed in deep cuttings and forest edges.	Protect and revegetate disturbed areas and Endangered Ecological communities. Reduce contrast of deep cuttings by softening with planting, where rock/soil profile allows.
BALLARDS ROAD INTERCHANGE	The interchange is located within forest and provides a southern exit for Urunga.	Reduce impacts of the interchange by revegetating with forest species.

LEGEND

- Interchanges
- Proposed Road and Boundary
- Proposed noise barrier
- Proposed mound for visual screening
- Long views from Proposal
- Intermittent views from Proposal
- View enclosed by cutting or forest

0 200 400 600 800 1000 m 2000

Section 4
Urban Design and Landscape Strategic Concept

D.2 Urban Design and Landscape Strategy: Sheets 1 to 9

BRIDGE OVER WARRELL CREEK
- TO BE SIMPLIFIED & REFINED
- PROTECT EXISTING ENVIRONMENT DURING CONSTRUCTION & ENSURE THE BRIDGE SITS WITHIN A TREED ENVIRONMENT.
- REVEGETATE WITH TREES & DENSE UNDERSTOREY CONSISTENT WITH THE WARRELL CREEK MOIST SCLEROPHYLL FOREST.

WARRELL CREEK INTERCHANGE
FOR DETAIL REFER TO INTERCHANGE PLAN

PROTECT TREES ADJACENT PROPOSAL
- TO MAINTAIN VISUAL SCREEN FROM RESIDENCE.

NOISE BARRIER
- BETWEEN ALBERT DRIVE TO THE NORTH OF DONNELLYVILLE.
- IF SUFFICIENT FILL IS AVAILABLE PROVIDE A MOUND AS THE NOISE BARRIER.
- PROTECT EXISTING TREES ADJACENT TO DONNELLYVILLE & ADJUST MOUND TO RETAIN TREES WHERE NECESSARY

- RETAIN TREES ALONG DRIVEWAY TO ADJACENT PROPERTY WHERE POSSIBLE TO MAINTAIN EXISTING ENTRANCE DRIVE & VISUAL SCREEN (CHECK PROPERTY BOUNDARY AND TREES)

ENSURE DISTURBANCE TO EEC AROUND WARRELL CREEK IS MINIMISED
- REVEGETATE USING LOCAL PROVENANCE SEED

LANDSCAPE TREATMENT
- TO INCLUDE CLUSTERED TREES & DENSE SHRUBS AS VISUAL SCREEN PLANTING TO REFLECT & REINFORCE THE EXISTING LANDSCAPE PATTERNS

PROTECT TREES ADJACENT PROPOSAL
- ON ALBERT DRIVE ON RIDGE.

PLANTED MOUND
- TO 3M WITH TREE CLUSTERS & DENSE SHRUBS TO PROVIDE A VISUAL SCREEN WITH SOME ACOUSTIC BENEFITS.
- PROTECT EXISTING TREES DURING INSTALLATION OF MOUND

LOW NOISE PAVEMENT EXTENT

UPPER WARRELL CREEK ROAD
EXISTING PACIFIC HIGHWAY
WARRELL CREEK VILLAGE
ALBERT DRIVE
ODELLS ROAD
ROSEWOOD ROAD
DONNELLYVILLE
QUARRY
SCOTTS HE

JOIN LINE REFER SECTION 1, SHEET 2

JOIN LINE REFER SECTION 1, SHEET 2

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

SCALE 1:15000 @ A3

ISSUE C

0 100 200 300 400 500 m 1000 m

SECTION 1 / SHEET 1 : URBAN DESIGN AND LANDSCAPE STRATEGY

SECTION 1 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 1

JOIN LINE REFER SECTION 2, SHEET 3

SCREEN PLANTING FOR RESIDENCES ON WEDGEWOOD DRIVE

- LANDSCAPE TREATMENT TO INCLUDE TREES & DENSE UNDERSTOREY TO EXTEND THE GROUPS OF EXISTING VEGETATION PATTERNS IN THE NAMBUCCA RIVER VALLEY

BALD HILL ROAD INTERCHANGE
FOR DETAIL REFER TO INTERCHANGE PLAN

SCREEN PLANTING OF TREES AT BASE OF HIGH EMBANKMENTS ON BRIDGE APPROACHES

- BOTH SIDES OF THE RIVER.

VIEWS FOR RESIDENTS & LOCAL TRAFFIC TO THE BRIDGE OVER THE EXISTING PACIFIC HIGHWAY TO BE ENHANCED BY FEATURE TREES FLANKING BRIDGE ABUTMENTS

QUARRY ACCESS PROVIDED BY UNDERPASS

PROTECT EXISTING TREES TO MAINTAIN VISUAL SCREEN

MACKSVILLE

DONNELLY WELSH PLAYING FIELDS

RIVER STREET

BELLVUE ROAD

PACIFIC HIGHWAY

WEDGEWOOD DRIVE

LOW NOISE PAVEMENT EXTENT

NAMBUCCA RIVER

SCOTTS HEAD ROAD

KERR DRIVE

BALD HILL ROAD

WARRELL CREEK

QUARRY

NURSERY ROAD

EXISTING PACIFIC HIGHWAY

GUMMA ROAD

TP5162.771

TP7725.095

TP7713.081

TP7067.881

TP8707.077

TP9245.339

TP10800.883

TP11080.638

106.147

5500 6000 6500 7000 7500 8000 8500 9000 9500 10500 11000

REDUCE VISUAL IMPACT OF THE CUTTINGS

- PLANT SCREEN TREES THE TOP OF CUTTINGS

LOWER WARRELL CREEK BRIDGE & APPROACHES

- SCREEN PLANTING ON APPROACHES TO REINFORCE THE EXISTING HIGH QUALITY SETTING OF WARRELL CREEK.
- EMBANKMENTS PLANTED WITH DENSE SHRUBS CONSISTENT WITH WARRELL CREEK

NOISE BARRIER & SCREEN PLANTING FOR RESIDENCES ON KERR DRIVE & BALD HILL ROAD

CLUSTERED TREES & SHRUBS AT THE BASE OF EMBANKMENTS

- ON APPROACHES TO NAMBUCCA RIVER BRIDGE TO VISUALLY SCREEN THE EMBANKMENT
- STABILISE EMBANKMENTS WITH TALL SHRUBS, GRASSES & GROUNDCOVERS.
- VEGETATION IS TO BE SELECTED FROM SPECIES PRESENT ON THE EXISTING FLOOD PLAIN

BRIDGE OVER NAMBUCCA RIVER

- TO BE SIMPLIFIED & REFINED & TO PROVIDE A POSITIVE CONTRIBUTION TO THE JOURNEY
- RETAIN VIEWS OVER THE NAMBUCCA RIVER
- BRIDGE IS TO BE INTEGRATED WITH ITS SETTING BY MAINTAINING AN OPEN VIEW AT ABUTMENTS FOR SURROUNDING RESIDENTS TO THE RIVER
- MAINTAIN VIEWS BETWEEN THE BRIDGE & THE EXISTING BRIDGE AT MACKSVILLE TO REINFORCE MACKSVILLE AS A DESTINATION ALONG THE JOURNEY

PROTECT EXISTING LARGE FICUS sp. ADJACENT TO BRIDGE & EMBANKMENT

SECTION 1 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 1

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper

- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

SCALE 1:15000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 1 / SHEET 2 : URBAN DESIGN AND LANDSCAPE STRATEGY

SECTION 2 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 2

SCREEN PLANTING OF TREES AT BASE OF HIGH EMBANKMENTS ON BRIDGE APPROACHES
- BOTH SIDES OF THE RIVER.

ENSURE EXISTING TREES ALONG OLD COAST ROAD ARE RETAINED & PROTECTED TO MAINTAIN VISUAL SCREEN FOR RESIDENCES ALONG OLD COAST ROAD

VIEWS FOR RESIDENTS & LOCAL TRAFFIC TO THE BRIDGE OVER THE EXISTING PACIFIC HIGHWAY TO BE ENHANCED BY FEATURE TREES FLANKING BRIDGE ABUTMENTS

DENSE SCREEN PLANTING
- FOR ADJACENT RESIDENCES IN THIS AREA
- INSTALL A MOUND AS ADDITIONAL SCREENING IF FILL IS AVAILABLE.

NOISE BARRIER BETWEEN CH 12325 - 12900
- NOISE WALL IS TO BE PROVIDED WITH ADJACENT SCREEN PLANTING FOR RESIDENCES ON MATTICK ROAD.
- INSTALL A PLANTED MOUND IF FILL & SPACE IS AVAILIABLE

REVEGETATE LOCAL ACCESS ROAD & ADJACENT TO PROPOSAL WITH FOREST LANDSCAPE SPECIES - TALL TREES & DENSE UNDERSTOREY FROM NAMBUCCA STATE FOREST.

REVEGETATE ROAD CORRIDOR WITH FOREST LANDSCAPE CHARACTER
- PROVIDE VISUAL SCREENING & TO EXTEND THE NAMBUCCA STATE FOREST CHARACTER.
- SCREEN PLANTING FOR RESIDENCES ALONG LETITIA CLOSE, OLD COAST ROAD & MATTICK DRIVE USING DENSE TREES AND UNDERSTOREY.

PLANTED MOUND TO 2M
WITH DENSE TREES & UNDERSTOREY TO PROVIDE A VISUAL SCREEN & ACOUSTIC REDUCTION FOR RESIDENCES IN LETITIA CLOSE

BRIDGE OVER NAMBUCCA RIVER
- TO BE SIMPLIFIED & REFINED & TO PROVIDE A POSITIVE CONTRIBUTION TO THE JOURNEY
- RETAIN VIEWS OVER THE NAMBUCCA RIVER
- BRIDGE IS TO BE INTEGRATED WITH ITS SETTING BY MAINTAINING AN OPEN VIEW AT ABUTMENTS FOR SURROUNDING RESIDENTS TO THE RIVER
- MAINTAIN VIEWS BETWEEN THE BRIDGE & THE EXISTING BRIDGE AT MACKSVILLE TO REINFORCE MACKSVILLE AS A DESTINATION ALONG THE JOURNEY

SECTION 2 SECTION 2

JOIN LINE REFER SECTION 1, SHEET 2

JOIN LINE REFER SECTION 2, SHEET 4

JOIN LINE REFER SECTION 2, SHEET 4

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

SCALE 1:15000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 2 / SHEET 3 : URBAN DESIGN AND LANDSCAPE STRATEGY

JOIN LINE REFER
SECTION 2, SHEET 3

JOIN LINE REFER
SECTION 3, SHEET 5

RETAIN EXISTING TREE GROUPS & UNDERSTOREY IN MEDIAN FOR GLIDERS FAUNA CROSSING
- PROTECT EXISTING EEC & MARSDENIA LONGLEAF

DEDICATED FAUNA UNDERPASS. REVEGETATE TO GUIDELINES OUTLINED IN FLORA & FAUNA WORKING PAPER

SECTION 2 SECTION 3

NAMBUCCA HEADS INTERCHANGE
FOR DETAIL REFER TO INTERCHANGE PLAN

NORTH COAST RAILWAY

OLD COAST ROAD

EXISTING PACIFIC HIGHWAY

TO NAMBUCCA HEADS

DUPLICATE BRIDGES OVER THE NORTH COAST RAILWAY

PROTECT EEC & MARSDENIA LONGILOBA & REVEGETATE TO GUIDELINES OUTLINED IN FLORA & FAUNA WORKING PAPER

- BRIDGE OVER OLD COAST ROAD TO SIT WITHIN A FOREST ENVIRONMENT.
- REVEGETATE AREAS DISTURBED DURING CONSTRUCTION WITH TREES & DENSE UNDERSTOREY

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

SCALE 1:15000 @ A3

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SECTION 2 / SHEET 4 : URBAN DESIGN AND LANDSCAPE STRATEGY

AREA SUBJECT TO NAMBUCCA SHIRE COUNCILS DRAFT 20 YEAR STRUCTURE PLAN 2006 PROPOSED FUTURE URBAN AREA

SCREEN PLANTING TO COW CREEK RESERVE

SCREEN PLANTING FOR RESIDENTS ON VALLA ROAD

BRIDGE OVER DEEP CREEK
- RETAIN HIGH QUALITY LANDSCAPE
- RETAIN VIEWS FROM BRIDGE OVER DEEP CREEK AS A SCENIC MILESTONE ON THE JOURNEY
- REVEGETATE EMBANKMENTS

- RESIDENCES IN THIS AREA ARE SCATTERED & USUALLY SET IN TREED ENCLOSURES WITH SOME PLANTATIONS
- IT IS IMPORTANT TO RETAIN AND PROTECT THE EXISTING VEGETATION ENCLOSERS & SETTINGS OF THESE RESIDENCES

FAUNA UNDERPASS IN CONJUNCTION WITH COW CREEK BRIDGE: TREAT AS REQUIRED BY THE FLORA & FAUNA WORKING PLAN

COW CREEK RESERVE

JOIN LINE REFER SECTION 2, SHEET 4

JOIN LINE REFER SECTION 3, SHEET 6

SECTION 2 SECTION 3

VALLA ROAD

DEEP CREEK

DEEP CREEK ROAD

BLACK BUTT LANE

AULD CLOSE

EXISTING PACIFIC HIGHWAY

NORTH COAST RAILWAY

NAMBUCCA HEADS INTERCHANGE
FOR DETAIL REFER TO INTERCHANGE PLAN

SCREEN PLANTING FOR RESIDENTS ON AULD CLOSE

REVEGETATE REALIGNED PACIFIC HIGHWAY & THE PROPOSAL WITH DENSE FOREST VEGETATION. TREES & UNDERSTOREY

AREA SUBJECT TO NAMBUCCA SHIRE COUNCILS DRAFT 20 YEAR STRUCTURE PLAN 2006 PROPOSED FUTURE URBAN AREA (RURAL RESIDENTIAL RELEASE AREA)

LOW NOISE PAVE

TO VALLA BEACH

OLD COAST ROAD TO NAMBUCCA HEADS

SECTION 2 SECTION 3

JOIN LINE REFER SECTION 2, SHEET 4

JOIN LINE REFER SECTION 3, SHEET 6

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper

- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

SCALE 1:15000 @ A3

ISSUE B

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SECTION 3 / SHEET 5 : URBAN DESIGN AND LANDSCAPE STRATEGY

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

JOIN LINE REFER SECTION 3, SHEET 5

SECTION 4

SECTION 3

JOIN LINE REFER SECTION 4, SHEET 7

TP32044.740

32000

31500

TP31451.464

BALLARDS ROAD INTERCHANGE
- REDUCE IMPACTS OF CUTTING BY REVEGETATING WITH DENSE SHRUBS TO REDUCE THE COLOUR CONTRAST

BALLARDS ROAD

31000

EXISTING PACIFIC HIGHWAY

LITTLE NEWRY STATE FOREST

30500

TP30216.352

30000

EXISTING PACIFIC HIGHWAY

29500

TP29362.768

TP29227.998

29000

TP28644.960

28500

TP28437.511

TP28280.201

28000

TP27987.712

27500

TP27278.886

27000

- SCREEN PLANTING FOR RESIDENCES AT EAST WEST ROAD
- EAST WEST ROAD BRIDGES OVER THE PROPOSAL. REVEGETATE ALL OF BRIDGE SURROUNDINGS WITH DENSE TREES

BURKE LANE

EAST WEST ROAD

EXISTING PACIFIC HIGHWAY

EXISTING PACIFIC HIGHWAY

NORTH COAST RAILWAY

TO VALLA BEACH

25500

26000

TP25907.801

26500

TP26675.504

LOW NOISE PAVEMENT EXTENT

VALLA

JOIN LINE REFER SECTION 3, SHEET 5

REPLANT AREAS ADJACENT TO PACIFIC HIGHWAY INTERSECTION WITH FOREST SPECIES & RETAIN OPEN TRANSMISSION LINE EASEMENT

JOIN LINE REFER SECTION 4, SHEET 7

SECTION 4

SECTION 3

PROTECT EEC & MARSDENIA REVEGETATE TO GUIDELINES OUTLINED IN FLORA & FAUNA WORKING PAPER

OYSTER CREEK SUBDIVISION & EXISTING RESIDENCES
- PROTECT EXISTING TREES BETWEEN THE PROPOSAL & THE EXISTING PACIFIC HIGHWAY TO AVOID IMPACTS OF 4 PARRALLEL CARRIAGEWAYS
- SET LOCAL ACCESS ROAD ON WESTERN SIDE WITHIN A FORESTED CORRIDOR

ISSUE B

SCALE 1:15000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 3 / SHEET 6 : URBAN DESIGN AND LANDSCAPE STRATEGY

JOIN LINE REFER SECTION 4, SHEET 8

JOIN LINE REFER SECTION 4, SHEET 8

DEDICATED FAUNA CROSSING

DEDICATED FAUNA CROSSING

NEWRY STATE FOREST

RETAIN FOREST BY REVEGETATION OF ALL DISTURBED AREAS WITH INDIGENOUS TREES & DENSE UNDERSTOREY OF NEWRY STATE FOREST

REVEGETATE CUTTING WHERE POSSIBLE (DEPENDENT ON ROCK / SOIL PROFILE) WITH GRASSES & GROUNDCOVERS TO REDUCE COLOUR CONTRAST OF THE CUTTING WITH THE FOREST.

DALHOUSE CREEK COMBINED FAUNA UNDERPASS & DRAINAGE STRUCTURE

- PROTECT EXISTING MARSDENIA LONGILOBA IN MEDIAN & ADJACENT PROPOSAL
- RETAIN ALL EXISTING VEGETATION IN WIDE MEDIAN

BALLARDS ROAD INTERCHANGE & OVER BRIDGE

- REVEGETATE FOREST LANDSCAPE

SECTION 4

SECTION 3

JOIN LINE REFER SECTION 3, SHEET 6

JOIN LINE REFER SECTION 3, SHEET 6

SECTION 4

SECTION 3

MARTELLS ROAD

BALLARDS ROAD

EXISTING PACIFIC HIGHWAY

EXISTING PACIFIC HIGHWAY

34500

TP34431.883

34000

33500

33000

TP32953.586

32500

TP32418.072

32000

TP32044.740

31500

TP31451.464

31000

30500

30000

TP30218.862

29500

TP29352.768

29227.996

29000

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

SCALE 1:15000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 4 / SHEET 7 : URBAN DESIGN AND LANDSCAPE STRATEGY

SECTION 4 / SHEET 8 : URBAN DESIGN AND LANDSCAPE STRATEGY

0 100 200 300 400 500 m 1000 m

ISSUE B

SCALE 1:15000 @ A3

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

SOUTH WEST ARM ROAD SCENIC LANDSCAPE
PROTECT ALL EXISTING VEGETATION BEYOND IMMEDIATE ROADWORKS (AS DEFINED IN BELLINGEN SHIRE COUNCIL'S CONSERVATION AREA)

EXTEND EXISTING FORESTED EDGES TO THE PROPOSAL ON THE SIDESLOPES OF THE KALANG RIVER VALLEY TO PROVIDE SCREENING FOR RESIDENCES ON SOUTH ARM ROAD

KALANG RIVER BRIDGE
- SIMPLIFIED & REFINED BRIDGE DESIGN TO REDUCE VISUAL IMPACTS
- OPEN BRIDGE ABUTMENTS
- ABUTMENT ON NORTH SIDE TO MAINTAIN ALIGNMENT OF EXISTING SOUTH ARM ROAD ALONG RIVERBANK

- DENSE TREE CLUSTERS AT BASE OF EMBANKMENT ALONG KALANG RIVER VALLEY TO PROVIDE SCREENING TO THE PROPOSAL & TO LINK WITH THE EXISTING PATTERNS OF VEGETATION IN THE VALLEY
- EMBANKMENT PLANTED WITH DENSE TALL SHRUBS & GROUNDCOVERS

OFFER TUBESTOCK PLANTS TO RESIDENTS FOR PLANTING ADJACENT TO THEIR RESIDENCES FOR ADDITIONAL SCREENING

SOUTH ARM ROAD

KALANG RIVER

MARTELLS ROAD

TP36792.985

TP37445.082

TP35330.923

TP34431.883

37500

37000

36500

36000

35500

35000

34500

34000

JOIN LINE REFER SECTION 4, SHEET 9

JOIN LINE REFER SECTION 4, SHEET 7

JOIN LINE REFER SECTION 4, SHEET 7

SECTION 4 / SHEET 9 : URBAN DESIGN AND LANDSCAPE STRATEGY

0 100 200 300 400 500 m 1000 m

ISSUE B

SCALE 1:15000 @ A3

JOIN LINE REFER SECTION 4, SHEET 8

- PROTECT EEC & MARSDENIA LONGILOBA
- REVEGETATE TO GUIDELINES OUTLINED IN FLORA & FAUNA WORKING PAPER REQUIREMENTS

FAUNA UNDERPASS & BRIDGE

MOUND TO 4M OF DENSE PLANTING TO PROVIDE VISUAL SCREENING TO RESIDENCES IN RIDGEWOOD DRIVE. MOUND WILL HAVE SOME ACOUSTIC BENEFITS

PROTECT EEC TO FLORA & FAUNA WORKING PAPER REQUIREMENTS

ADDITIONAL SCREEN PLANTING TO INTERCHANGES ALONG AREAS AFFECTED BY MODIFIED RAMPS

CLUSTERED TREES TO BASE OF ROAD CORRIDOR

CHARACTER OF WATERFALL WAY INTERCHANGE
PLANT ADDITIONAL TREES TO REINFORCE REMNANT RAINFOREST VEGETATION & TO INTRODUCE CHARACTER OF BELLINGER VALLEY

SCREENING FOR RESIDENCES ALONG OLD PACIFIC HIGHWAY ALIGNMENT

REVEGETATE & PLANT TREES ON ORIGINAL ALIGNMENT OF SHORT CUT ROAD WHERE IT HAS BEEN REALIGNED NORTH TO PROVIDE ADDITIONAL SCREENING FOR RESIDENTS ON SOUTH ARM ROAD

SCREEN PLANTING FOR RESIDENCES ALONG SHORT CUT ROAD & SOUTH ARM ROAD MOUND IF FILL AND SPACE IS AVAILIABLE

LOW NOISE PAVEMENT EXTENT

RALEIGH INDUSTRIAL AREA

RIDGEWOOD DRIVE

SOUTH ARM ROAD

SHORT CUT ROAD

EXISTING PACIFIC HIGHWAY

OLD PACIFIC HIGHWAY

WATERFALL WAY

JOIN LINE REFER SECTION 4, SHEET 8

LEGEND

- MEDIAN PLANTING
- REVEGETATION OF EMBANKMENTS (FILL)
- REVEGETATION OF CUTTING (CUT)
- PROPOSED PLANTED MOUND AS A VISUAL SCREEN
- REVEGETATION ALONG ROAD CORRIDOR (for planting types refer to Urban Design & Landscape Concept)
- SEDIMENT BASINS WITH SURROUNDING REVEGETATION
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- INTERCHANGE
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

Appendix E

E.1 Urban Design and Landscape Concept: Sheets 1 to 12

dem

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREES
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

UPPER WARRELL CREEK ROAD
EXISTING PACIFIC HIGHWAY
WARRELL CREEK VILLAGE
ROSEWOOD ROAD
JOIN LINE REFER SECTION 1, SHEET 2
JOIN LINE REFER SECTION 1, SHEET 2
TP0.000
TP334.697
500
TP482.469
TP639.972
1000
TP1203.625
1500
2000
TP2326.474
2500
TP2520.331
TP2735.592
3000
3500
TP3549.395
TP3766.260

SCALE 1:10000 @ A3

0 100 200 300 400 500 m 1000 m

ISSUE C

SECTION 1 / SHEET 1: URBAN DESIGN AND LANDSCAPE CONCEPT

dem

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREES
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

JOIN LINE REFER SECTION 1, SHEET 1

JOIN LINE REFER SECTION 1, SHEET 3

ALBERT DRIVE

ODELLS ROAD

DONNELLYVILLE

SCOTTS HEAD ROAD

KERR DRIVE

BALGOWNIE HILL ROAD

QUARRY

WARRELL CREEK

XS02

3500 TP3546.395

4000 TP3766.260

4500 TP4736.935

5000 TP4859.276

5000 TP5162.771

5500

6000

6500 TP6545.562

7000 TP7067.881

7500 TP7267.038

TP7776.081

ISSUE B

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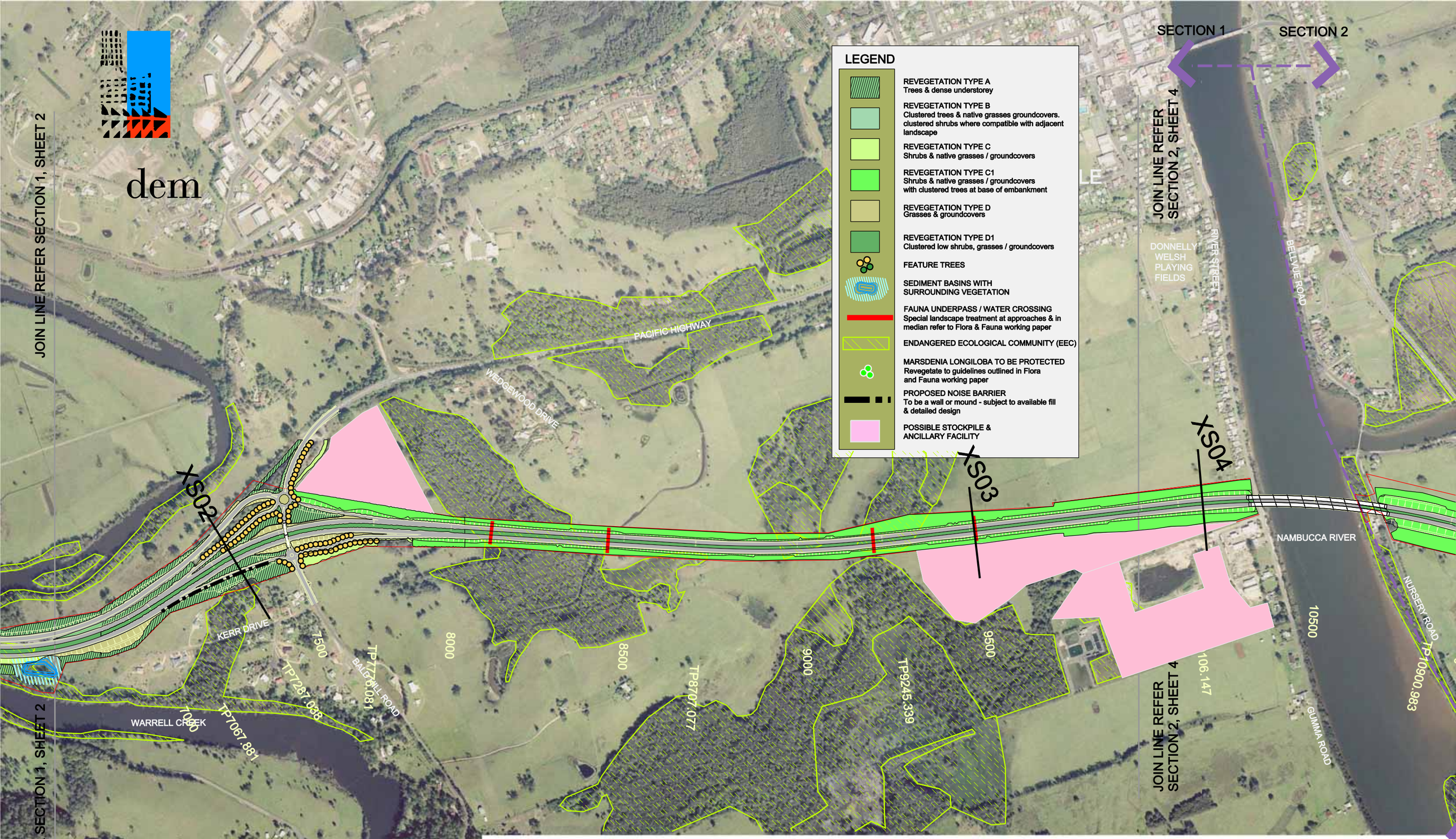
SCALE 1:10000 @ A3

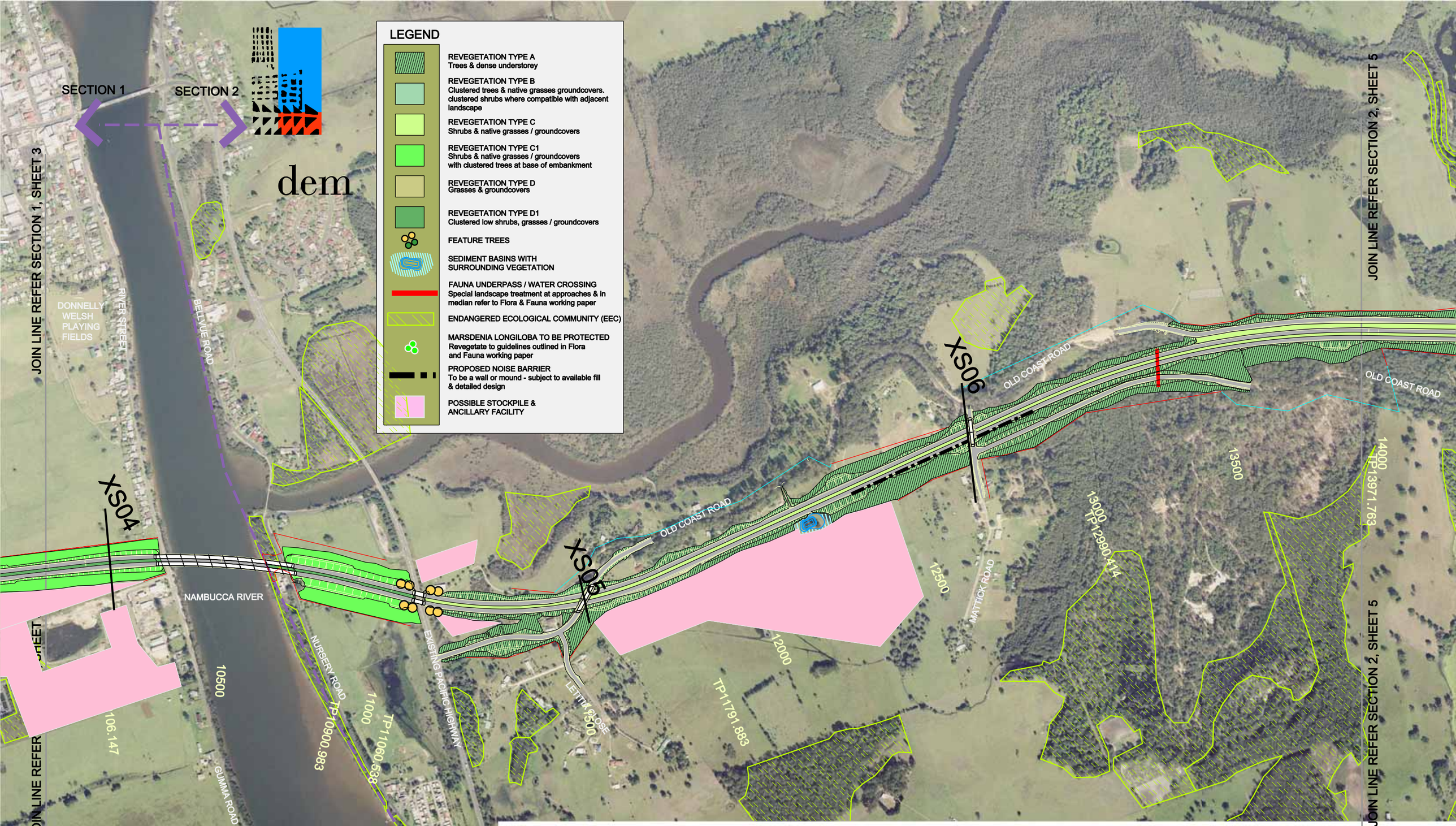
SECTION 1 / SHEET 2 : URBAN DESIGN & LANDSCAPE CONCEPT



ISSUE B

SCALE 1:10000 @ A3

SECTION 1 / SHEET 3 : URBAN DESIGN AND LANDSCAPE CONCEPT



ISSUE B

SCALE 1:10000 @ A3

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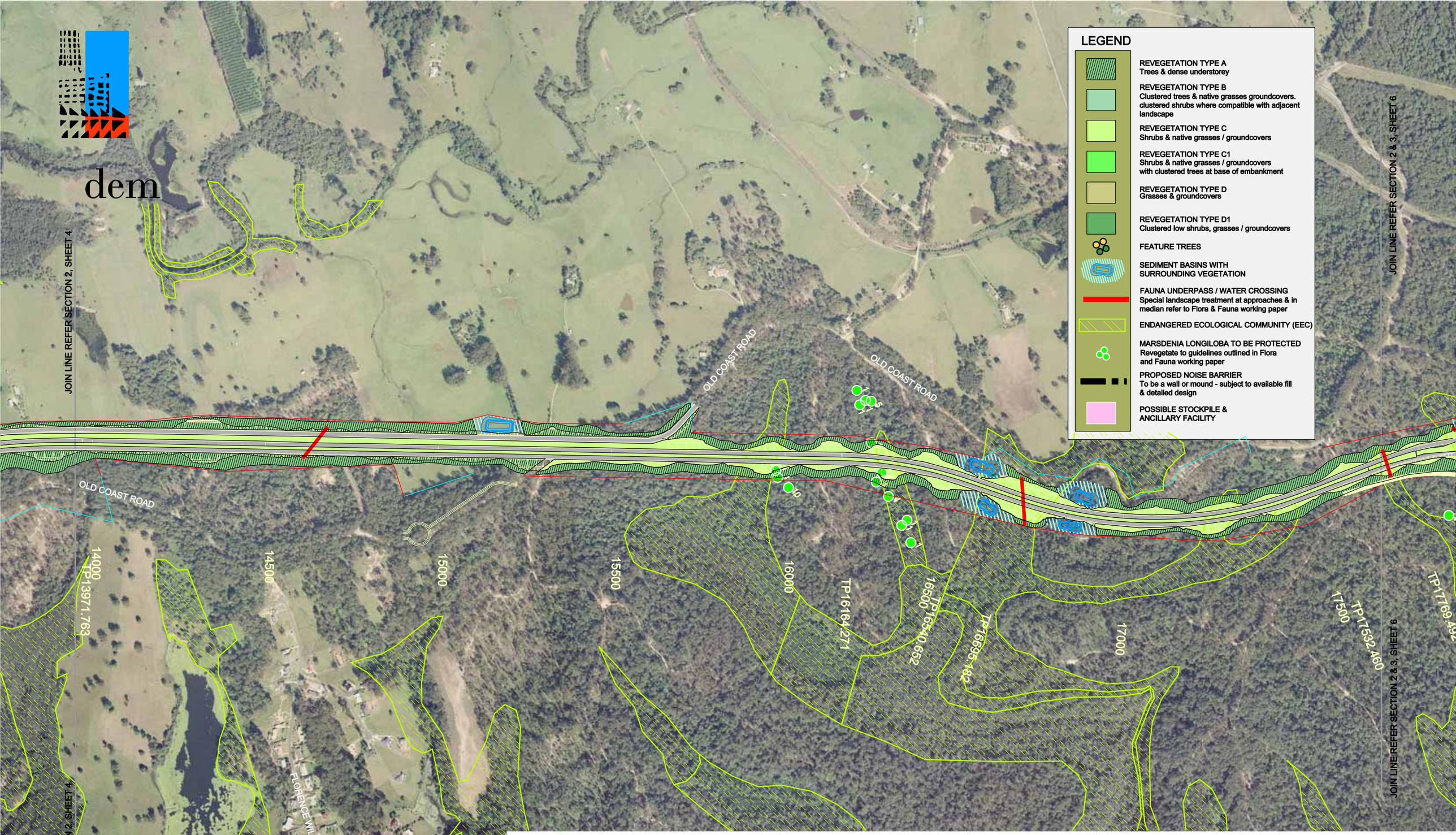
SECTION 2 / SHEET 4 : URBAN DESIGN AND LANDSCAPE CONCEPT



ISSUE B

SCALE 1:10000 @ A3

SECTION 2 / SHEET 5 : URBAN DESIGN AND LANDSCAPE CONCEPT

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREES
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

SECTION 2
SECTION 3
JOIN LINE REFER SECTION 2, SHEET 5
JOIN LINE REFER SECTION 3, SHEET 7
NORTH COAST RAILWAY
EXISTING PACIFIC HIGHWAY
OLD COAST ROAD
TO NAMBUCCA HEADS
21500
TP21441.453
21000
TP20952.717
20500
TP20539.869
20000
TP20033.542
19500
TP19791.231
19000
18810.916
18500
TP18520.383
18000
TP17769.492
17500
TP17532.460

ISSUE B

0 100 200 300 400 500 m 1000 m

SCALE 1:10000 @ A3

SECTION 2 & 3 / SHEET 6 : URBAN DESIGN AND LANDSCAPE CONCEPT

dem

JOIN LINE REFER SECTION 2 & 3, SHEET 6

JOIN LINE REFER SECTION 3, SHEET 8

XS07

VALLA ROAD

AULD CLOSE

DEEP CREEK

DEEP CREEK ROAD

BLACKBUTT LANE

EXISTING PACIFIC HIGHWAY

NORTH COAST RAILWAY

TO VALLA BEACH

22000

22500

23000

23500

24000

24500

25000

TP21858.084

TP22678.931

TP23385.690

TP24144.624

TP24334.201

TP24994.262

TP25412.956

21500

TP21441.453

JOIN LINE REFER SECTION 2 & 3, SHEET 6

JOIN LINE REFER SECTION 3, SHEET 8

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
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  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
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- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
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- SEDIMENT BASINS WITH SURROUNDING VEGETATION
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  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

0 100 200 300 400 500 m 1000 m

SCALE 1:10000 @ A3

SECTION 3 / SHEET 7 : URBAN DESIGN AND LANDSCAPE CONCEPT

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREES
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
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- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
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  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

dem

JOIN LINE REFER SECTION 3, SHEET 7

JOIN LINE REFER SECTION 3 & 4, SHEET 9

JOIN LINE REFER SECTION 3 & 4, SHEET 9

JOIN LINE REFER SECTION 3, SHEET 7

EAST WEST ROAD

BURKE LANE

XS08

XS09

EXISTING PACIFIC HIGHWAY

NORTH COAST RAILWAY

TO VALLA BEACH

ST RAILWAY

EXISTIN

TP2544.950

TP28437.511

TP28280.381

TP27967.712

TP27278.886

TP29227.998

TP2907

TP2667

25500

26000

26500

27000

27500

28000

28500

29000

ISSUE B

SCALE 1:10000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 3 / SHEET 8 : URBAN DESIGN AND LANDSCAPE CONCEPT

dem

JOIN LINE REFER SECTION 4, SHEET 10

JOIN LINE REFER SECTION 4, SHEET 10

JOIN LINE REFER SECTION 3, SHEET 8

JOIN LINE REFER SECTION 3, SHEET 8

TP32418.072

TP32044.740

32000

31500

TP31451.464

31000

30500

30000

TP30216.862

29500

TP29352.768

TP29227.998

29000

TP28644.950

BALLARDS ROAD

EXISTING PACIFIC HIGHWAY

EXISTING PACIFIC HIGHWAY

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
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  Grasses & groundcovers
- REVEGETATION TYPE D1
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- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE B

SCALE 1:10000 @ A3

0 100 200 300 400 500 m 1000 m

SECTION 3 & 4 / SHEET 9 : URBAN DESIGN AND LANDSCAPE CONCEPT

SECTION 4 / SHEET 10 : URBAN DESIGN AND LANDSCAPE CONCEPT

0 100 200 300 400 500 m 1000 m

SCALE 1:10000 @ A3

ISSUE B

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
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  Grasses & groundcovers
- REVEGETATION TYPE D1
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  Revegetate to guidelines outlined in Flora and Fauna working paper
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  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

35500
TP35330.923
35000
JOIN LINE REFER SECTION 4, SHEET 11
JOIN LINE REFER SECTION 4, SHEET 11
34500
TP34431.893
MARTELLS ROAD
34000
33500
33000
TP32953.586
32500
TP32418.072
JOIN LINE REFER SECTION 3 & 4, SHEET 9
JOIN LINE REFER SECTION 3 & 4, SHEET 9

dem

SECTION 4 / SHEET 11 : URBAN DESIGN AND LANDSCAPE CONCEPT

0 100 200 300 400 500 m 1000 m

SCALE 1:10000 @ A3

ISSUE B

dem

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / groundcovers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREES
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  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
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  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

XS0A

SOUTH ARM ROAD

KALANG RIVER

35500

TP35330.923

35000

34500

TP34431.893

36000

36500

TP36792.985

37000

37500

TP37445.082

JOIN LINE REFER SECTION 4, SHEET 12

JOIN LINE REFER SECTION 4, SHEET 10

JOIN LINE REFER SECTION 4, SHEET 10

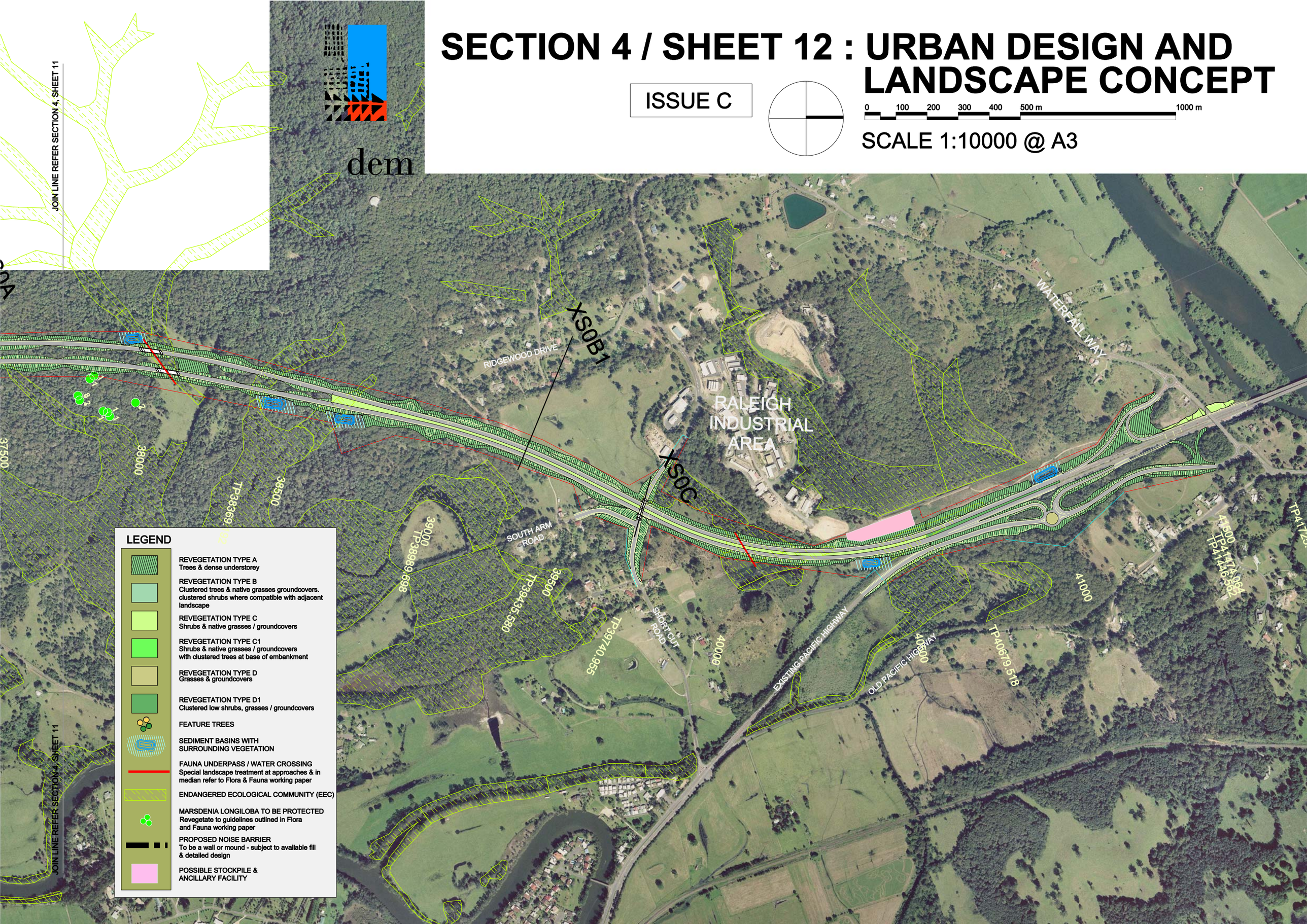
JOIN LINE REFER SECTION 4, SHEET 12

SECTION 4 / SHEET 12 : URBAN DESIGN AND LANDSCAPE CONCEPT

ISSUE C

0 100 200 300 400 500 m 1000 m

SCALE 1:10000 @ A3



E.2 Urban Design and Landscape Concept: Interchanges

- EMBANKMENT ON BRIDGE APPROACHES TO BE REVEGETATED WITH DENSE SHRUBS & GROUND COVERS - TYPE C, TO STABILISE & PROVIDE VISUAL SCREENING
- BASE OF EMBANKMENTS REVEGETATED WITH DENSE TREES & UNDERSTOREY - TYPE A

SCREEN PLANTING ON FILL EMBANKMENTS & TOP OF CUTS TO ADJACENT RESIDENCES & PROPERTIES. PLANT WITH LANDSCAPE TYPE C1.

- WARRELL CREEK BRIDGE & INTERCHANGE MARK THE BEGINNING OF THE PROPOSAL THE BRIDGE SPANS WARRELL CREEK, THE SOUTHBOUND INTERCHANGE ROAD, THE RAILWAY & THE FORESTED EDGES OF WARRELL CREEK.
- AS A LONG BRIDGE IT SHOULD SIT WITHIN A TREED ENVIRONMENT & BE SIMPLE & REFINED IN DETAILING
- THE INTERCHANGE IS TO BE CLEAR & LEGIBLE BY UTILISING BOLD ELEMENTS OF LANDSCAPE TYPES & TREATMENT.
- BRIDGE ABUTMENTS TO BE LOCAL STONE

PROTECT EXISTING FOREST TREES & REINFORCE WITH TYPE A LANDSCAPE

- PROTECT EXISTING EEC - SUBTROPICAL FLOODPLAIN FOREST AROUND WARRELL CREEK.
- ENSURE DISTURBANCE IS MINIMISED DURING BRIDGE WORKS & ROAD CONSTRUCTION REVEGETATE DISTURBED AREAS USING LOCAL PROVENANCE SEED.

REVEGETATE AROUND BRIDGE & APPROACHES WITH TALL TREES CAPABLE OF REACHING THE HEIGHT OF THE BRIDGE - EUCALYPTUS GRANDIS. THE TALL WHITE TRUNKS WILL COMPLEMENT THE CONCRETE PIERS, & INTRODUCE THE WARRELL CREEK INTERCHANGE THEME OF SUBTROPICAL FLOODPLAIN FOREST.

PROTECT EXISTING FOREST TREES & REINFORCE WITH TYPE A LANDSCAPE

SCREEN TREES - TYPE A - FOR ADJACENT PROPERTIES & RESIDENCES TO BRIDGE OVER RAILWAY & WARRELL CREEK.

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / ground covers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREE PLANTINGS
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

ISSUE A

0 25 50 75 100 125 m 250 m

SCALE 1:2500 @ A3

WARRELL CREEK INTERCHANGE
URBAN DESIGN & LANDSCAPE CONCEPT

dem

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
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  Shrubs & native grasses / ground covers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
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- SEDIMENT BASINS WITH SURROUNDING VEGETATION
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REVEGETATE AREAS ADJACENT TO EXISTING TREES WITH DENSE TREES & UNDERSTOREY

REVEGETATE EXISTING BALL HILL ROAD WITH TYPE C PLANTING

REVEGETATE MEDIAN WITH TYPE D1

ADJACENT RESIDENCE TO BE ACQUIRED

REVEGETATE EXISTING ALIGNMENT OF PACIFIC HIGHWAY TYPE A

SCREEN PLANTING - TYPE C - FOR RESIDENCES ON BALD HILL ROAD & KERR DRIVE

FEATURE TREES AT THE INTERCHANGE TO MARK THE APPROACH TO MACKSVILLE & SCOTTS HEAD - LOCATE ON OFF RAMPS & AROUND ROUNDABOUTS

PROTECT EXISTING TREES

NOISE WALL & SCREEN PLANTING - TYPE A - FOR RESIDENCES ON KERR DRIVE

KERR DRIVE

BALD HILL ROAD

ISSUE A

0 25 50 75 100 125 m 250 m

SCALE 1:2500 @ A3

dem

BALD HILL ROAD INTERCHANGE
URBAN DESIGN & LANDSCAPE CONCEPT

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
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  Shrubs & native grasses / ground covers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREE PLANTINGS
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
- FAUNA UNDERPASS / WATER CROSSING
  Special landscape treatment at approaches & in median refer to Flora & Fauna working paper
- ENDANGERED ECOLOGICAL COMMUNITY (EEC)
- MARSDENIA LONGILOBA TO BE PROTECTED
  Revegetate to guidelines outlined in Flora and Fauna working paper
- PROPOSED NOISE BARRIER
  To be a wall or mound - subject to available fill & detailed design
- POSSIBLE STOCKPILE & ANCILLARY FACILITY

BOGGY CREEK BRIDGES
- RETAIN & PROTECT EEC AROUND CREEK & BRIDGE CROSSINGS.
- REINFORCE SUBTROPICAL COASTAL FLOODPLAIN FOREST BY REVEGETATING WITH TYPE A LANDSCAPE USING LOCAL PROVENANCE SEED.
- FAUNA CROSSING PROVIDED UNDER BRIDGE TO FLORA AND FAUNA WORKING PAPER REQUIREMENTS

- REVEGETATE ROAD CORRIDOR WITH A FORESTED CHARACTER - TYPE A - LEADING TO DEEP CREEK.
- RETAIN & REINFORCE THE EXISTING EXISTING VEGETATION ENCLOSURES BETWEEN EXISTING RESIDENCES & THE ROAD

MEDIAN PLANTING TO REDUCE HEADLIGHT GLARE

RESIDENCE TO BE ACQUIRED

OPEN VIEWS FROM ROAD FOR SURVEILLANCE

FEATURE TREES AT ROUNDABOUT

PROPOSED REST AREA

REST AREA SITE:
- * PROTECT & RETAIN EXISTING VEGETATION & EEC
- * MAINTAIN VIEWS FROM SLIP ROAD TO REST AREA FOR SECURITY & SURVEILLANCE
- * PLANT CLEAN STEMMED TREES ADJACENT AREAS OF CUT & FILL
- * REST AREA SHOULD EXPAND ON THE EXISTING HIGH QUALITY FOREST TREES & LOCATE PICNIC SHELTERS WITHIN A SHADY ENVIRONMENT

RETAIN & PROTECT EXISTING VEGETATION

EXISTING PACIFIC HIGHWAY

PROTECT EEC

FEATURE TREES AT BRIDGE ABUTMENT

ISSUE A

0 25 50 75 100 125 m 250 m

SCALE 1:2500 @ A3

dem

NAMBUCCA HEADS INTERCHANGE
URBAN DESIGN & LANDSCAPE CONCEPT

LEGEND

- REVEGETATION TYPE A
  Trees & dense understorey
- REVEGETATION TYPE B
  Clustered trees & native grasses groundcovers. clustered shrubs where compatible with adjacent landscape
- REVEGETATION TYPE C
  Shrubs & native grasses / ground covers
- REVEGETATION TYPE C1
  Shrubs & native grasses / groundcovers with clustered trees at base of embankment
- REVEGETATION TYPE D
  Grasses & groundcovers
- REVEGETATION TYPE D1
  Clustered low shrubs, grasses / groundcovers
- FEATURE TREE PLANTINGS
- SEDIMENT BASINS WITH SURROUNDING VEGETATION
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WATERFALL WAY INTERCHANGE
- PLANT TREES & FOREST SPECIES TO REINFORCE RAINFOREST CHARACTER VEGETATION & INTRODUCE CHARACTER OF BELLINGER VALLEY
- MINIMISE EXTENT OF CONSTRUCTION DISTURBANCE
- REINFORCE EXISTING MEDIAN PLANTING

- EEC SWAMP SCLEROPHYLL & SWAMP OAK FLOODPLAIN FOREST NO WORKS ARE PROPOSED NEAR THIS SECTION OF EEC.

REVEGETATE PREVIOUS ON & OFF RAMPS WITH BLACKBUTT FOREST TYPE A.

PACIFIC HIGHWAY

PROVIDE DENSE SCREEN PLANTING ADJACENT ON & OFF RAMPS - TYPE A - TO SCREEN FOR PROPERTIES ON OLD PACIFIC HIGHWAY.

PROTECT EXISTING FLOODED GUM FOREST & BLACKBUTT FOREST

REVEGETATE ALL CONSTRUCTION AFFECTED AREAS WITH TYPE A - DENSE TREE/ SCREEN PLANTING TO INTEGRATE WITH EXISTING FOREST CHARACTER

SCALE 1:2500 @ A3

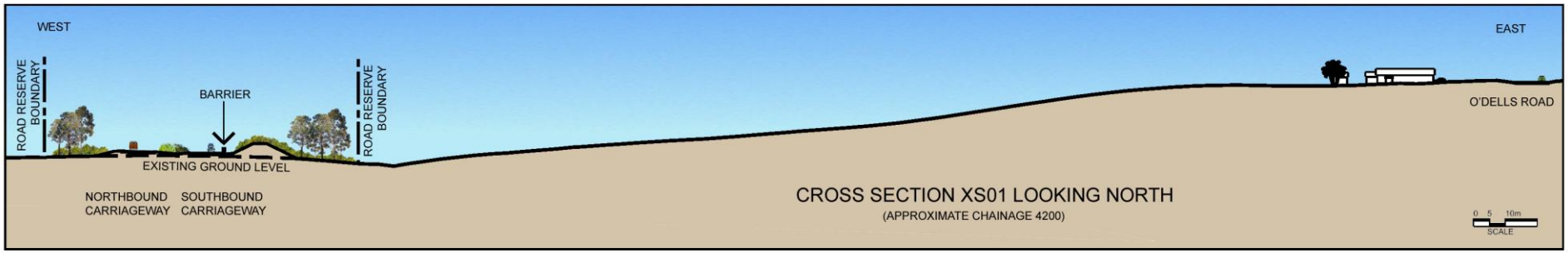
0 25 50 75 100 125 m 250 m

ISSUE A

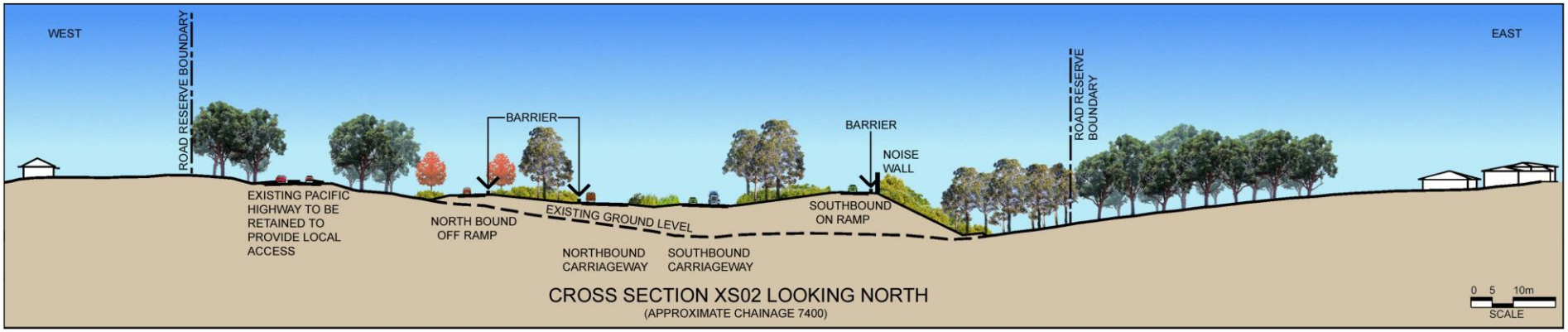
URBAN DESIGN & LANDSCAPE CONCEPT
WATERFALL WAY INTERCHANGE - RALEIGH

dem

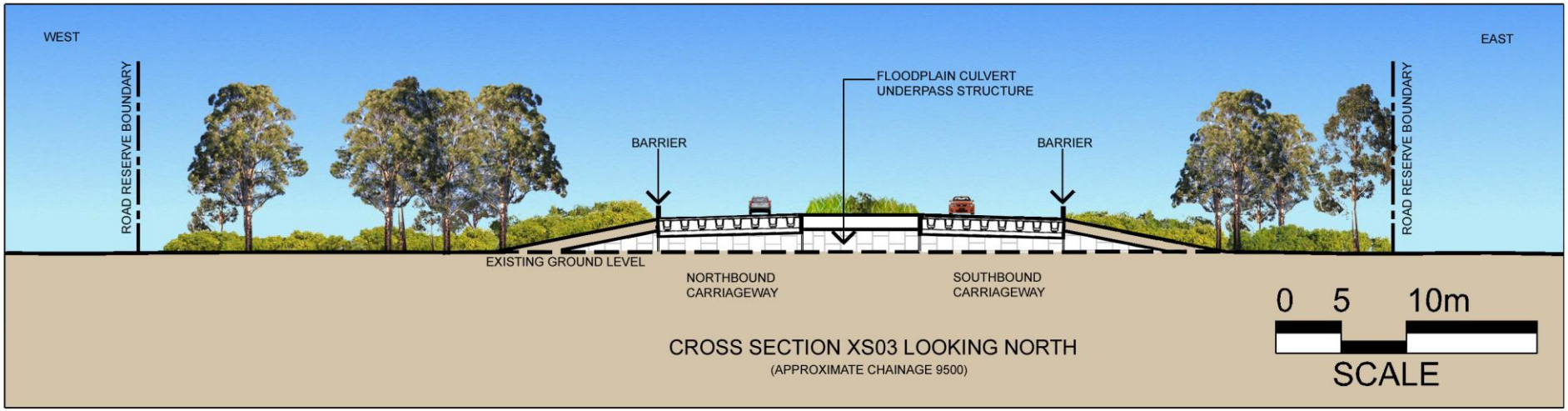
E.3 Typical Cross Sections of the Proposal



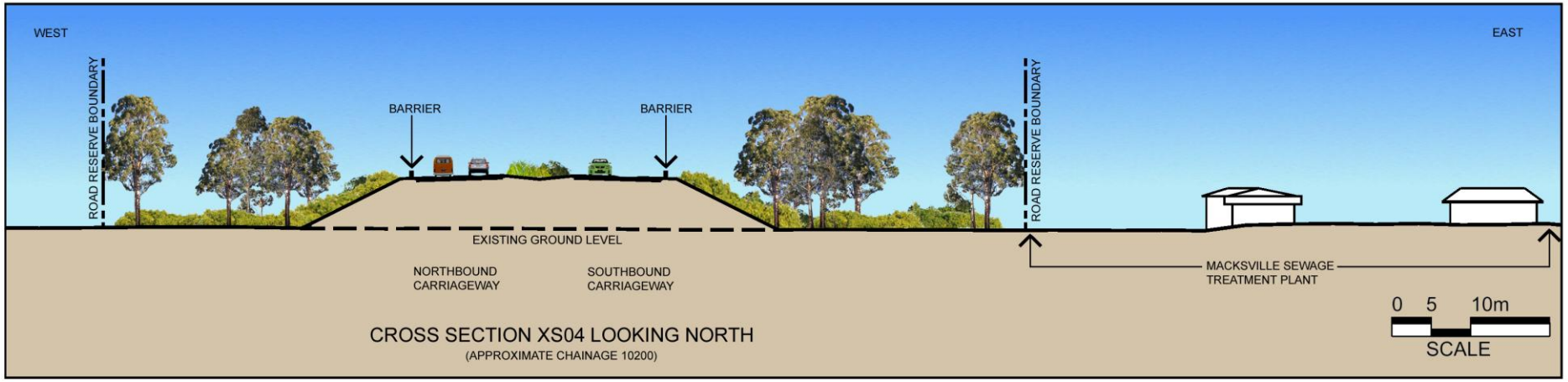
Typical Cross Section at Warrell Creek through O'Dells Road looking North (Approximate Chainage 4200)



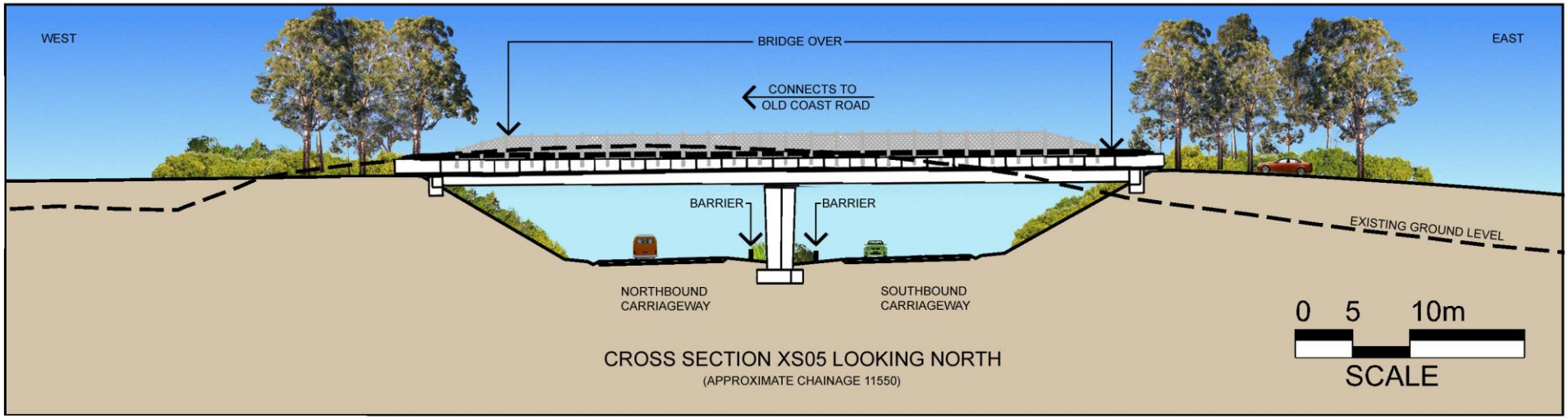
Typical Cross Section at Bald Hill Road Interchange looking North (Approximate Chainage 7400)



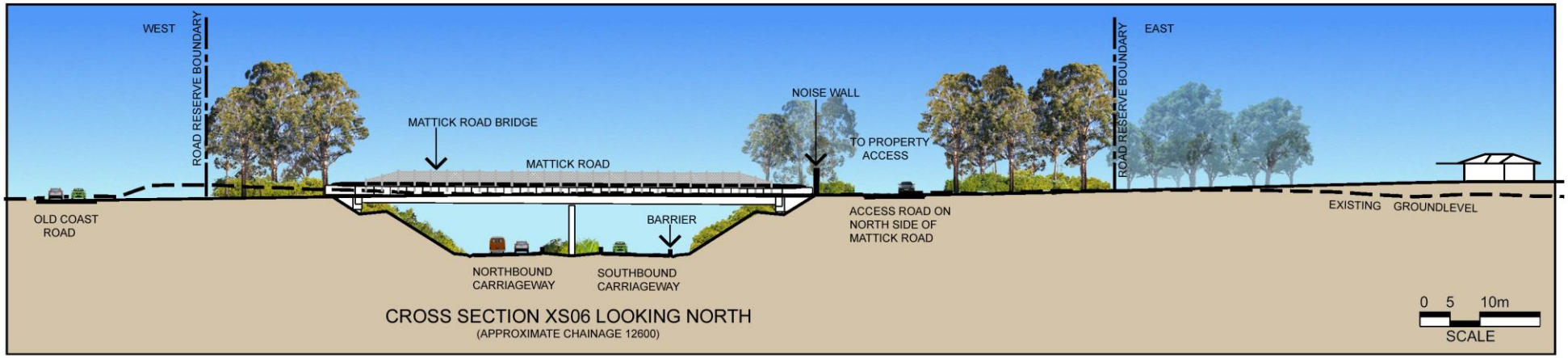
Typical Cross Section East of Macksville looking North (Approximate Chainage 9500)



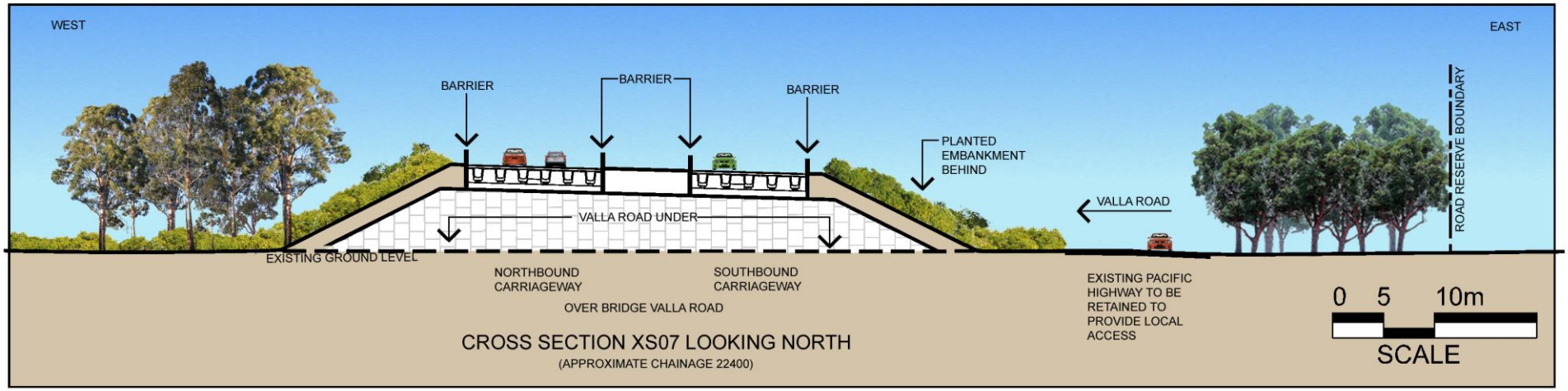
Typical Cross Section South of Nambucca River looking North (Approximate Chainage 10200)



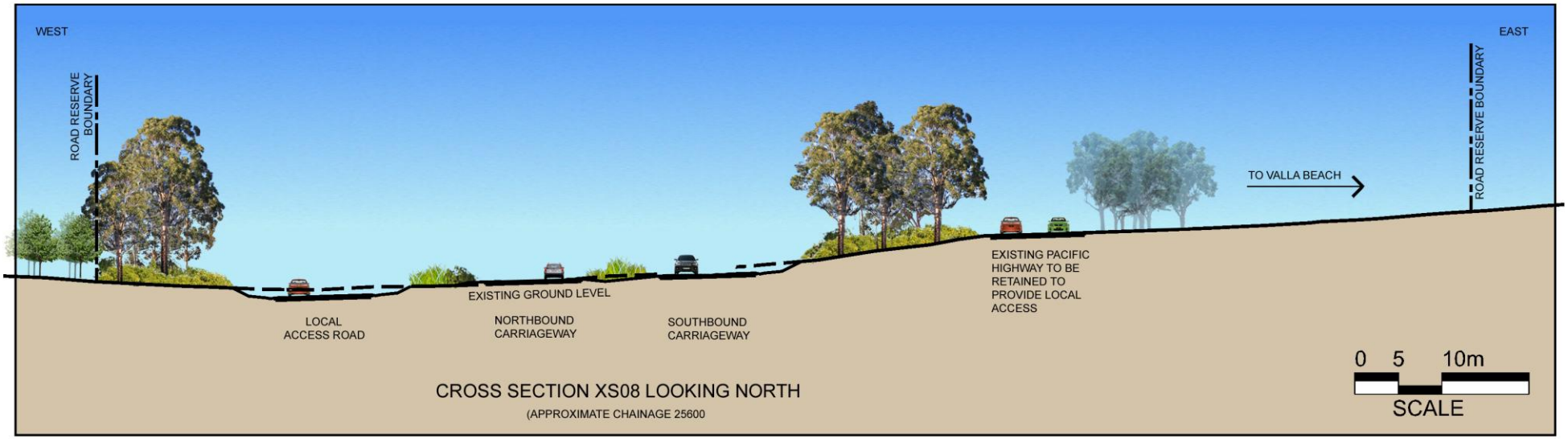
Typical Cross Section at Old Coast Road near Letitia Close looking North (Approximate Chainage 11550)



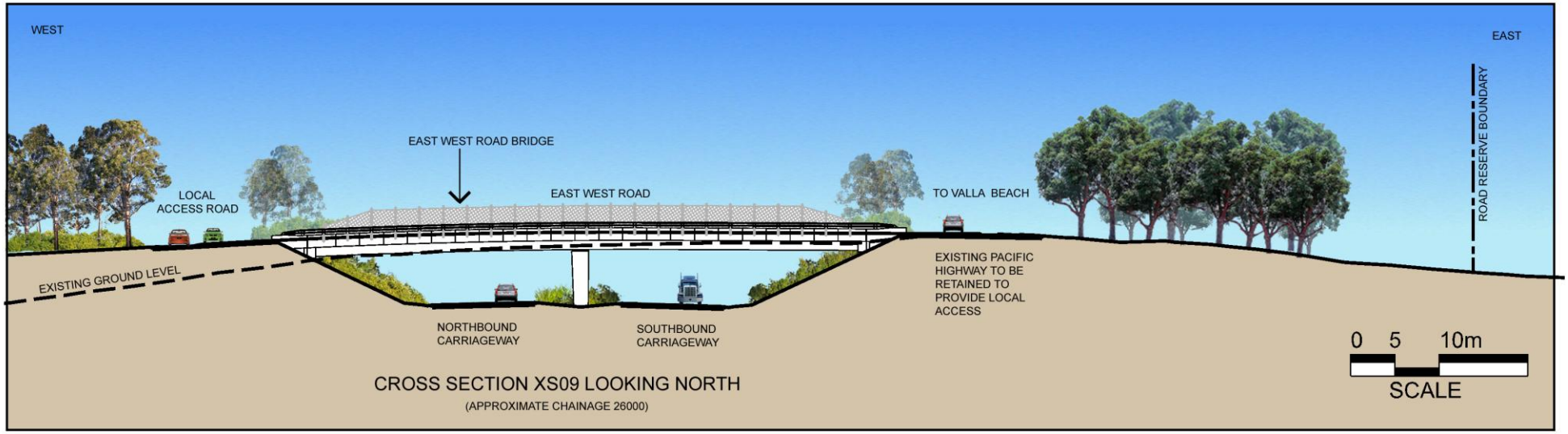
Typical Cross Section at Mattick Road looking North (Approximate Chainage 12600)



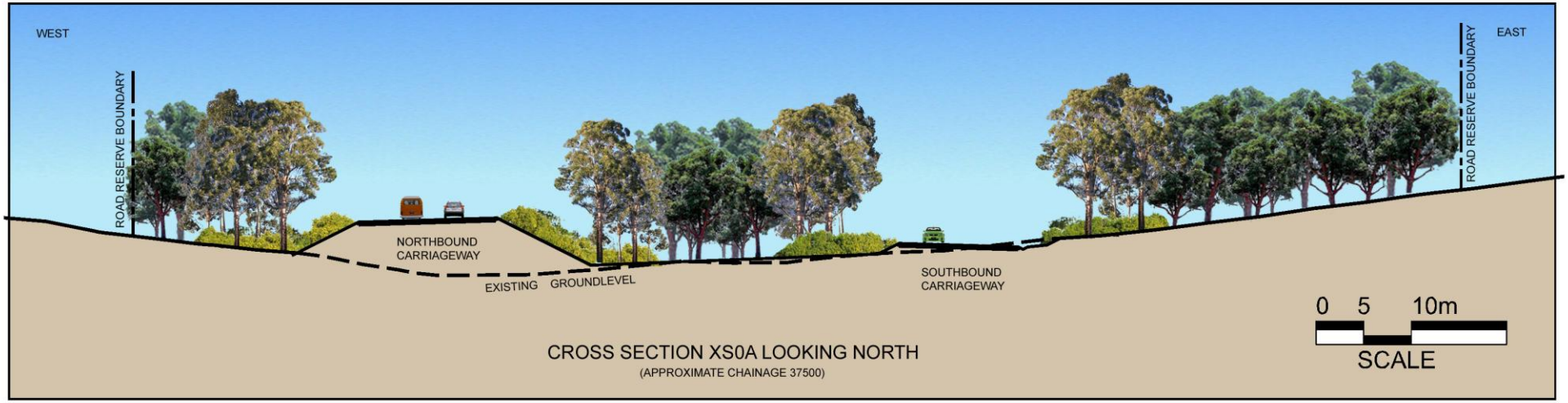
Typical Cross Section at Valla Road Road looking North (Approximate Chainage 22400)



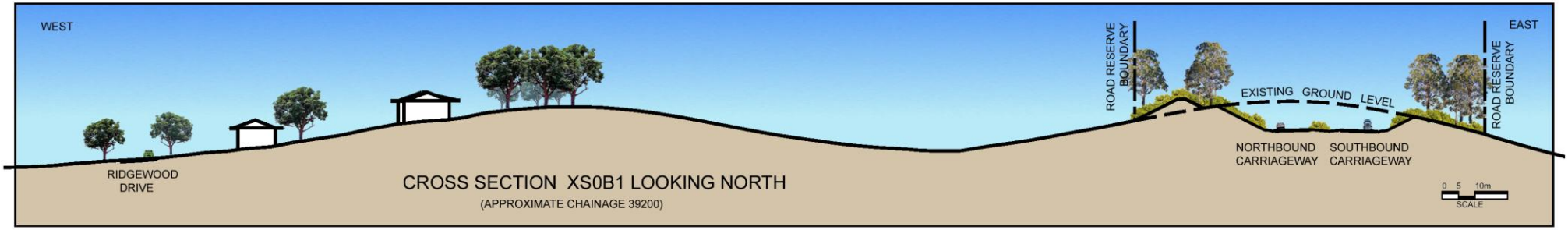
Typical Cross Section near Valla looking North (Approximate Chainage 25600)



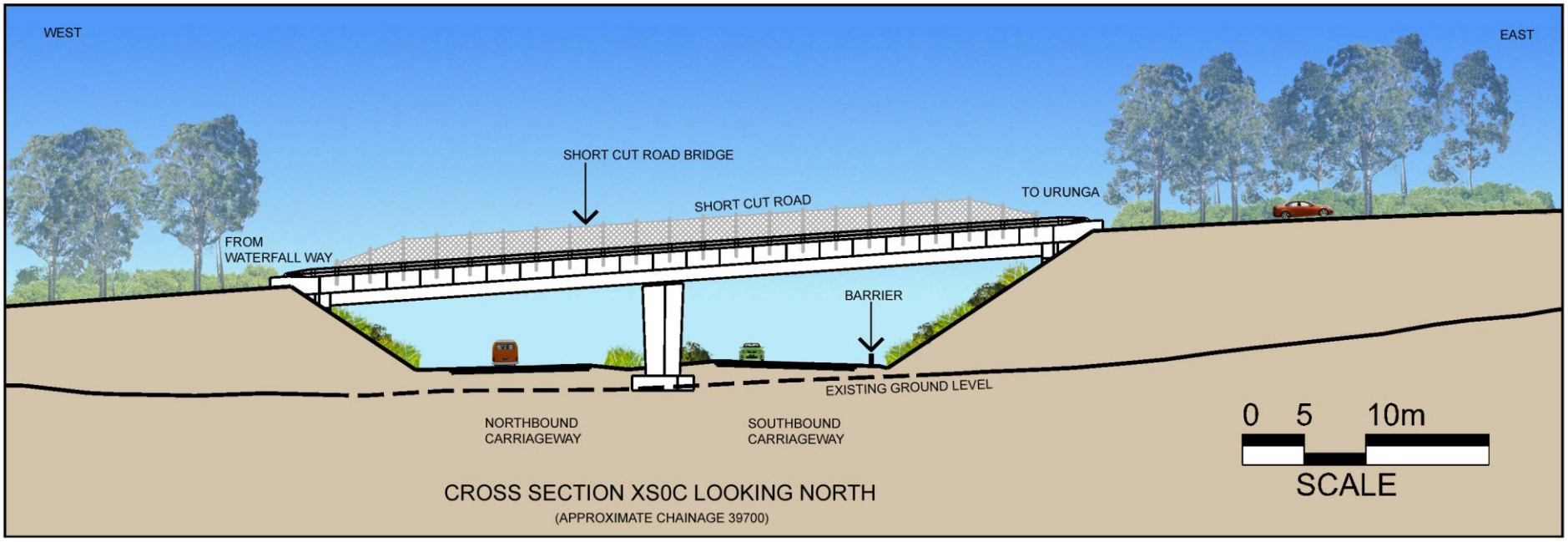
Typical Cross Section at East West Road looking North (Approximate Chainage 26000)



Typical Cross Section through forest north of Kalang River looking North (Approximate Chainage 37500)



Typical Cross Section near Ridgewood Drive looking North (Approximate Chainage 39200)



Typical Cross Section at Short Cut Road looking North (Approximate Chainage 39700)

Appendix F

F.1 Simulated aerial views from selected viewpoints

Artist’s impression of Proposal east of Warrell Creek Village looking north towards Donnellyville and bridge over Warrell Creek

Artist’s impression of bridge over Nambucca River looking north

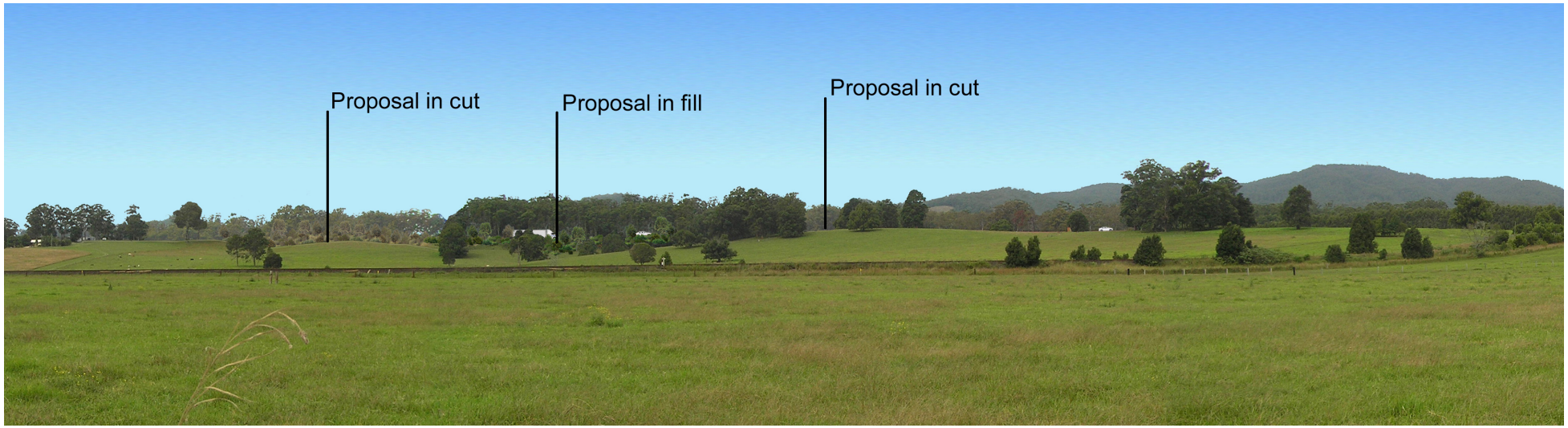
Artist’s impression of Proposal east of Macksville looking west

Artist’s impression of Proposal north of Kalang River Bridge looking south

Artist’s impression of Proposal east of Ridgewood Drive looking north

F.2 Simulated views from selected viewpoints

Existing view from the Pacific Highway south of Warrell Creek Village looking east



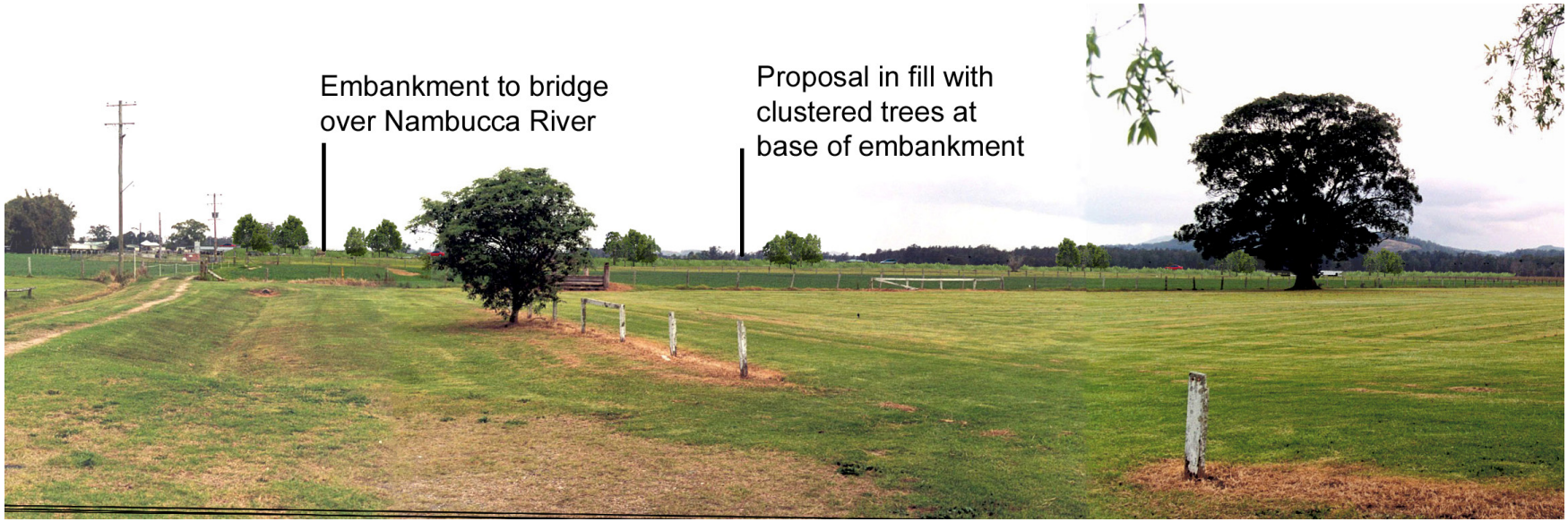
Artist's impression of potential view from the Pacific Highway south of Warrell Creek Village looking east

Existing view from O'Dells Road looking west

Artist's impression of potential view from O'Dells Road looking west at completion.

Artist's impression of potential view from O'Dells Road looking west

Existing view from Donnelly Welsh Playing Fields, East Macksville, looking east



Artist's impression of potential view from Donnelly Welsh Playing Fields, East Macksville, looking east

Existing view from Macksville traffic bridge looking east

Artist's impression of potential view from Macksville traffic bridge looking east towards proposed bridge over Nambucca River

Existing view from Letitia Close looking north west

Artist's impression of potential view from Letitia Close looking north west

Existing view from East West Road, Valla, looking east

Artist's impression of potential view from East West Road, Valla, looking east