NSW Roads and Maritime Services

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE

ENVIRONMENTAL IMPACT STATEMENT

MAIN VOLUME 1B

Chapter 11 – Urban design, landscape character and visual impact

Chapter summary

This chapter presents a summary of the landscape character and visual impact assessment that was undertaken to assess the direct and indirect impacts of the project. The project is a rural highway that passes through a landscape that features an interplay of tall eucalyptus forests, farms, townships and farmsteads. The project boundary also features the large Clarence and Richmond rivers and associated floodplains, views towards the mountains and occasional glimpses of ocean. Overall, the project would have a low to moderate impact on landscape character.

A small number of moderate to high landscape character impact locations are located throughout the project. These locations occur at:

- The cutting at Dirty Creek, near Corindi
- The large bridge structures crossing the Coldstream River and floodplain
- The cutting at Bondi Hill at Tyndale
- The major bridge over the Clarence River
- The major bridge over the Richmond River
- The alignment north of the Richmond River, between Wardell and the Blackwall Range.

The visual impact assessment found that the project would have moderate–high and high visual impacts on 28 out of 75 viewpoints across the project, including at residences, at local roads and at other public vantage points from where the project would be seen.

To minimise visual impact and adverse changes to the landscape character from the project, an urban design and landscape strategy has been prepared that aims to retain the Pacific Highway experience of open and closed views, acknowledging coastal towns along the route and protecting the natural and cultural landscapes including river and waterway crossings. The strategy comprises design principles for all road elements including bridges, noise barriers, retaining walls, revegetation and landscaping and rest areas.

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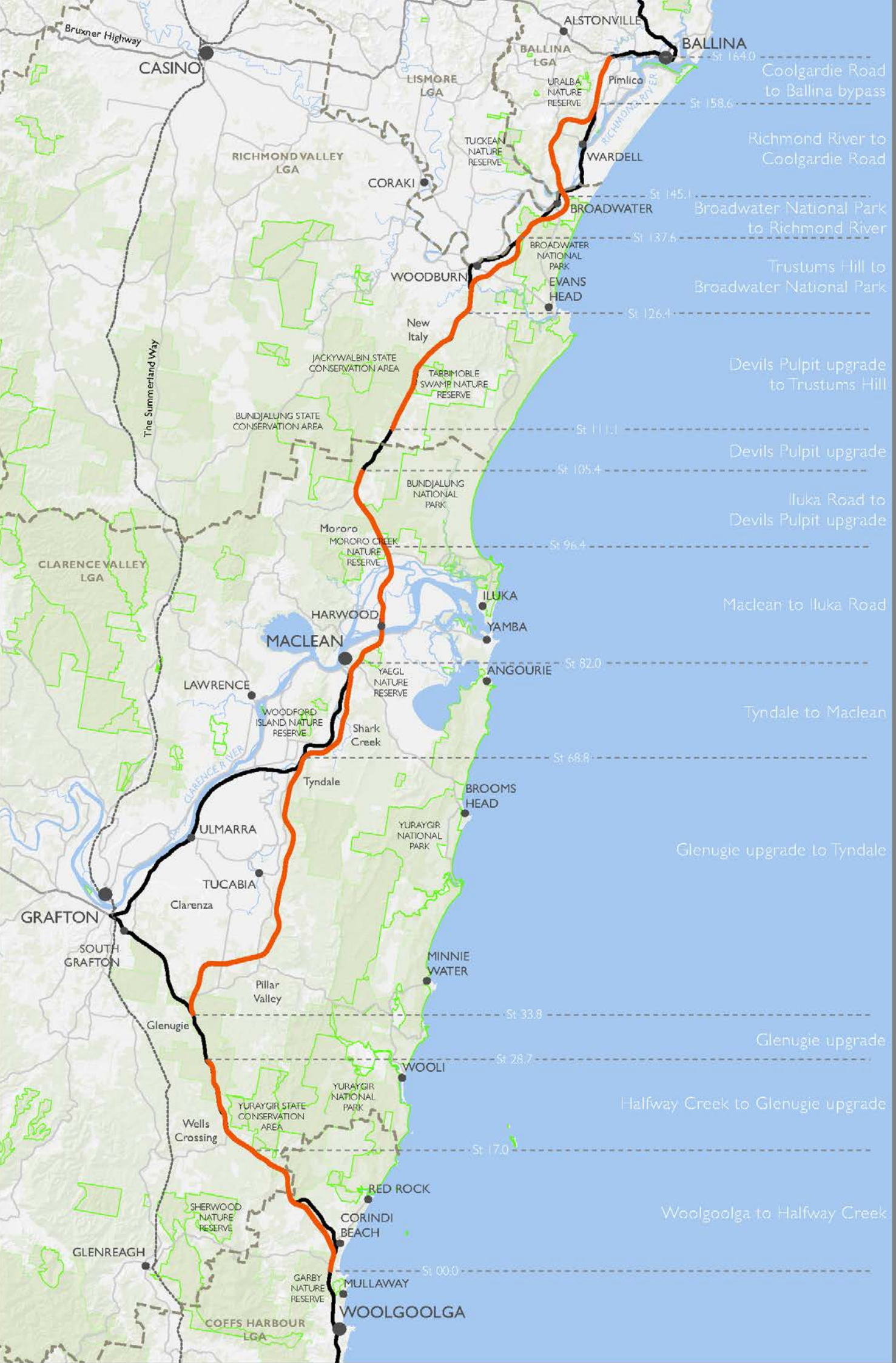
Bruxner Highway
CASINO
ALSTONVILLE
BALLINA
BALLINA LGA
LISMORE LGA
URALBA NATURE RESERVE
Pimlico
RICHMOND RIVER
TUCKEAN NATURE RESERVE
WARDELL
RICHMOND VALLEY LGA
CORAKI
BROADWATER
BROADWATER NATIONAL PARK
WOODBURN
EVANS HEAD
New Italy
JACKYWALBIN STATE CONSERVATION AREA
TABBIMOBLE SWAMP NATURE RESERVE
The Summerland Way
BUNDJALUNG STATE CONSERVATION AREA
BUNDJALUNG NATIONAL PARK
Mororo
MORORO CREEK NATURE RESERVE
CLARENCE VALLEY LGA
ILUKA
HARWOOD
YAMBA
MACLEAN
YAEGL NATURE RESERVE
ANGOURIE
LAWRENCE
WOODFORD ISLAND NATURE RESERVE
Shark Creek
CLARENCE RIVER
Tyndale
BROOMS HEAD
ULMARRA
YURAYGIR NATIONAL PARK
TUCABIA
Clarenza
GRAFTON
SOUTH GRAFTON
MINNIE WATER
Pillar Valley
Glenugie
WOOLI
YURAYGIR NATIONAL PARK
YURAYGIR STATE CONSERVATION AREA
Wells Crossing
RED ROCK
SHERWOOD NATURE RESERVE
CORINDI BEACH
GLENREAGH
GARBY NATURE RESERVE
MULLAWAY
WOOLGOOLGA
COFFS HARBOUR LGA
St 164.0
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St 96.4
St 82.0
St 68.8
St 33.8
St 28.7
St 17.0
St 00.0
Coolgardie Road to Ballina bypass
11
Richmond River to Coolgardie Road
10
Broadwater National Park to Richmond River
9
Trustums Hill to Broadwater National Park
8
Devils Pulpit upgrade to Trustums Hill
7
Devils Pulpit upgrade
Iluka Road to Devils Pulpit upgrade
6
Maclean to Iluka Road
5
Tyndale to Maclean
4
Glenugie upgrade to Tyndale
3
Glenugie upgrade
Halfway Creek to Glenugie upgrade
2
Woolgoolga to Halfway Creek
1

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11 Visual amenity, urban design and landscaping

This chapter presents a summary of the landscape character and visual impact assessment that was undertaken to assess the direct and indirect impacts of the project. The full assessment is provided in the Working paper – Urban design, landscape character and visual impact (Hassell, 2012). The assessment addresses the Director-General's environmental assessment requirements, which are provided below.

Reference	Director-General's requirements	Where addressed
Visual amenity, urban design and landscaping	a description of the visual significance of the affected landscape, particularly where the corridor traverses greenfield areas	Section 11.2
	an assessment of the visual impact of the project on the landscape character of the area, including built form (materials and finishes) and the urban design (height, bulk and scale) of key components including bridge crossings, floodplain embankments, interchanges, and views to and from the project; and	Section 11.3
	details of landscaping treatment and design (including noise barriers, retaining walls and landscaping) consistent with the overall design of the Pacific Highway Upgrade Program and integration with the existing (and desired) character of affected localities;	Section 11.4
	taking into account the Noise Wall Design Guideline (Roads and Traffic Authority, 2006).	Section 11.4

11.1 Assessment methodology

The project assessed includes the built form and size of bridges, interchanges, rest areas and other ancillary features as described in Chapter 5 (Description of the project – operation). Visualisations of key locations (such as at interchanges and major river crossings) are also provided in Chapter 5 to inform the description of the project. These visualisations provide a representation for the built form of the project integrated with the urban design and landscape strategy. The design identifies materials and finishes at a concept design level. During the detailed design stage, the detail of the built form (including consideration of materials and finishes) of structures would be further developed in accordance with the design principles outlined in Working paper - Urban design, landscape character and visual impact and in accordance with Beyond the Pavement (RTA, 2009a) and Pacific Highway Urban Design Framework (RTA, 2005)).

The landscape character and visual impact assessment has been undertaken concurrently with development of the engineering design in an iterative and collaborative process which has allowed coordination of engineering, urban design and landscape aspirations. The purpose of landscape character and visual assessment is to improve design outcomes, identify impacts and propose mitigation strategies.

The assessment process involved:

- An assessment of landscape character
- An assessment of the impacts on landscape character in terms of the sensitivity of affected areas and the magnitude of the project
- An assessment of the visual impact of the project when seen from various viewpoints

The methodology used in these assessments is discussed in the following sections.

11.1.1 Landscape character assessment

A landscape character assessment was carried out in accordance with the RTA Guidance Note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment (RTA, 2009b). Landscape character assessment determines the impact of development of the aggregate of an area's built, natural and cultural character or sense of place. The assessment is a broad-scale regional review of the visual significance of the existing landscape focusing on topography, vegetation, land use and settlement patterns. Landscape character assessment ensures that the important characteristics of each landscape type are well understood and considered so that they can be adequately addressed in the project landscape strategy. Landscape character assessment is based on assessment of a four kilometre wide corridor along the project. It identifies and characterises 10 common landscape types and 54 detailed landscape character precincts as a basis for understanding the visual significance of the affected landscape. These are assessed to determine ability to absorb proposed development changes. The impact on landscape character is determined by a review of the magnitude of the project and the sensitivity of the quality of each of the 54 detailed landscape precincts (refer to Figure 11-2 to Figure 11-10) as follows

- Sensitivity: This is a measure of how sensitive the existing character of the environment is to the proposed change (for example, a greenfield area will be more sensitive to change than an area that is already in proximity to the highway)
- Magnitude: This is a measure of the degree of intrusion or scale of the project including character and distance (for example, a large bridge will have a greater impact on landscape character than a localised road widening).

The impact on landscape character is defined from negligible to high, as per the grading matrix shown in Figure 11-1 (from RTA Guidance Note EIA-N04). The impact was assessed against each of the landscape character precincts (refer to Section 11.3.2).

MAGNITUDE

SENSITIVITY

	High	High to Moderate	Moderate	Moderate to low	Low	Negligible
High	High Impact	High Impact	Moderate - high	Moderate - high	Moderate	Negligible
High to Moderate	High Impact	Moderate - high	Moderate - high	Moderate	Moderate	Negligible
Moderate	Moderate - high	Moderate - high	Moderate	Moderate	Moderate - low	Negligible
Moderate to low	Moderate - high	Moderate	Moderate	Moderate - low	Moderate - low	Negligible
Low	Moderate	Moderate	Moderate - low	Moderate - low	Low impact	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Figure 11-1: Landscape character and visual impact grading matrix

11.1.2 Visual impact assessment

Visual impact assessments help define the day to day visual impacts on people's views. The assessment is based on the review of a selection of viewpoints that are rated according to the magnitude of change proposed by a development and sensitivity to the change and was based on:

- The visual catchment area (the extent of visibility)
- Visual sensitivity (sensitivity of the existing view and ability to absorb change)
- Magnitude (the type of change and where the change would occur).

These concepts are discussed below.

Viewpoint locations

Viewpoints are public or private places from where the project can be viewed. Specifically, viewpoint locations have been chosen that:

- Address views from public vantage points (streets, lookouts, public places)
- Typically represent particular views that might be experienced from residences
- Address a location of high impact and major change (bridges, overpasses)
- Address areas where the project traverses greenfield areas, where new infrastructure is introduced in native forest or traditional agriculture areas
- Address places of interest or high perceived cultural value such as heritage or conservation items, lookouts, schools or community facilities
- Typically represent the entire project alignment and nominated catchment area.

The visual impact assessment addressed 75 viewpoints focused around the areas with the highest anticipated impacts (namely, at major interchanges and bridges, and the most populated and used areas).

Visual catchment

The visual catchment is the extent that the project can be viewed from outside the project. Landform, vegetation, land use, and other landscape features influence the extent of the visual catchment. Visual envelope maps (VEMs) were created to define areas from which the project can be viewed from a 1.5-metre vantage point (this being the typical height of a person at eye level).

The visibility of the project would be mostly determined through vegetation and topography. The undulating nature of the environment that the project passes, as well as mature forest, would result in views to the project being confined to the road corridor. However, through the large floodplains of the Corindi, Clarence and Richmond rivers, the project would be more widely visible. The visibility of the project is shown through the visual envelope maps (refer to Figure 11-2 to Figure 11-10).

Visual sensitivity

Visual sensitivity is based on perceived value judgements about the value, coherence and scenic quality of a landscape and ability to absorb change.

Magnitude

Magnitude refers to the nature of the project and its proximity to the viewer. It represents the contrast between the height, bulk, scale, form and character of the project and the context into which it would be placed. Images showing the height, bulk and scale of the project from viewpoints are shown in Section 11.3.3.

11.2 Existing environment

11.2.1 Landscape and visual environment

The study area is defined largely by the interplay of tall eucalypt forests divided by crop and pasture land, townships and interspersed farms and homesteads, the presence of mountains, the occasional glimpse of the ocean, and the great rivers that meander across the coastal plains.

There are also a number of the key natural landmarks of the region and the Pacific Highway. The Clarence and Richmond rivers, prominent topographical formations, and townships along the route, are important milestones along the journey. Water is a major landscape feature, rivers, their tributaries, and other creeks and wetlands; all of which have shaped the landscape.

Vegetation is also a defining feature in the existing landscape. In broad terms, the vegetation characters include woodland and grazing and woodland hills and sugarcane country.

In addition to these natural features, the urban settlements along the highway add to a continuous and repeating pattern that occurs within the landscape. Within the urban landscape a number of heritage items of state and local significance are identified along the alignment of the project. The items identified comprise state and local listed items, notably including:

- New Italy Settlement Sites and Vineyard Haven (state significance)
- High Conservation Value Old Growth Forest (state significance)
- Harwood Heritage Conservation Area (local significance).

The landscape features along the project include:

- Waterways: Rivers (including the Clarence and Richmond rivers), their tributaries, and other creeks and wetlands, all of which have shaped the landscape
- Woodland: Tall eucalypt forests grow within a number of national parks and reserves
- Farmland: Farmland is used for crops and pasture, with sugarcane a dominant crop
- Mountains: These are largely in the backdrop
- Urban settlements: Townships along the highway add to a continuous and repeating pattern within the landscape.

Environments that would be crossed by the project are listed in Table 11-1. The landscape character assessment identified 10 landscape character types (refer to section 11.2.2) and 54 landscape character precincts (refer to section 11.2.3).

Photo 1: View south across Coldstream Basin showing Somervale Ranges and Tyndale-Tucabia Road

Photo 2: View north to Richmond River towards Wardell Heath and Blackwall Ranges

Table 11-1: Landscapes across the project

Project section	Environments
1	In Section 1, the project would traverse a highly modified landscape with small rural and agricultural holdings. The landscape character is a mosaic of agricultural land and woodland, which has a high capacity to absorb a new road. The project would be located to the west of Corindi Beach township, limiting the impact on the town. There are limited residences along the route, which follows the eastern edge of blueberry farms.
2	In Section 2, the landscape contains woodland with cleared pockets. The existing highway would be widened with some deviations. There are limited dwellings within this area. Views into the road corridor are limited due to the dense vegetation.
3	In Section 3, the project would traverse woodland of the foothills of the Pine Brush State Forest, which would enclose the road and limit views from the west. The woodland has good ability to absorb the project's visual impacts. The project would pass close to the Tyndale township precinct in the north of the section. The project would be located to the east, with a new interchange requiring significant cuttings through Bondi Hill. Section 3 features areas of unique scenic quality including the Pillar Valley, Somerville Flat, Coldstream River valley, and the Clarence River.
4	In Section 4, the project would mostly traverse areas of sugarcane and cleared land through floodplains and the foothills north and south of Green Hill. The seasonal nature of the sugarcane would create a changeable amount of screening for the road.
5	In Section 5, the project would widen the existing highway corridor, which is located along the edges of different adjoining landscape types. The project would have limited impact on the Yaegl Nature Reserve. There is a mixture of woodland, grassland and cropland.
6	In Section 6, the project would traverse a variety of landscape units. A mixture of woodland and grassland along undulating landform enables screening from surrounding areas.
7	In Section 7, the landscape would have a large capacity to absorb the project, which would be in the existing road corridor. The landform is generally flat with some undulations. The vegetation is varied, containing some areas of cleared grazing land within woodland. There are limited residences within this section.
8	In Section 8, the project would follow a new alignment through varied and highly modified landscapes. North of the Tuckombil Canal, it would pass through agriculture. This section of road has limited vegetation and the road would be on an embankment.
9	In Section 9, the landscape features Broadwater National Park. The project would be adjacent to the existing highway, minimising impacts. The landscape contains areas of woodland capable of absorbing the new infrastructure. The project would be largely hidden from the Broadwater township. There would be a new interchange at Broadwater – Evans Head Road within an area of woodland with some cleared grazing areas. There are few residential dwellings close to the project. The roadside sugarcane is a mosaic of paddocks at differing stages of cultivation. Views from the existing highway, township and dwellings would change constantly.
10	In Section 10, the project would be within woodland, pasture and cropland. The road would interrupt the pattern of cropping in areas, but would generally follow the boundaries between cleared and forested areas. A number of rural residential properties would be located close to the project, near the Wardell Road overpass.
11	In Section 11, the project would widen the existing corridor. There are not many residences within this section, which is dominated by sugarcane plantations and pockets of roadside vegetation.

11.2.2 Landscape character types

There are 10 landscape character types across the project boundary (refer to Table 11-2). These are based on overall topography, vegetation and land use patterns within the existing landscape.

Table 11-2: Landscape character types across project

Landscape type	Description
Floodplain	The floodplain is characterised by flat lands adjacent to streams or rivers subject to occasional or periodic flooding. It is generally used for pasture and crop production. The Clarence and Richmond river floodplains comprise a large part of the project. These extensive river floodplains are a dominant and constantly changing landscape type.
Cleared land (pasture)	Cleared land is characterised by pasture grasses. In the project, it occurs as large, continuous areas of pasture or pockets of pasture within open woodland and forest. On floodplains, cleared pastures are interspersed with cultivated lands.
Cultivated land (crops)	Cultivated land largely comprises sugarcane plantations, particularly on alluvial floodplains. It is subject to cycles of harvesting and crop rotation, creating alternating cycles of open and closed views within the project.
Valley land – foothills	Valley land and foothills are transitional landscapes between floodplains and coastal ranges. This landscape is characterised by rolling hills of gentle gradients (6–15%) that are cleared, partially cleared or forested.
Open woodland	Open woodland comprises cleared or partially cleared forested areas, with tree cover ranging from scattered clumps/clusters to continuous open woodland. The woodland provides opportunities to reveal and hide views, offering a sense of both enclosure and exposure. Open woodland is also a transitional zone between dense forest and floodplain, giving a waypoint to travellers of changing landscape.
Forest	Forest is a relatively undisturbed landscape, with dense vegetation creating a strong sense of enclosure. It occurs in national parks, State forests, conservation areas and nature reserves, all strong features in the project. It reinforces the presence of mountains through view lines, occasional glimpses of the ocean, small settlements and interspersed farmsteads.
Littoral scrub	Littoral scrub is a distinctive landscape adjacent to water. It is dominated by dense coastal Banksia scrub, pockets of wetland forest, and dense dry heath. It is found near Broadwater, particularly within Broadwater National Park.
Ranges and hilltops	Ranges and hilltops are mainly to the east of the project, south of the Clarence River and to the west of the project north of the Clarence River. Ranges have steep gradients (15% or greater) and relatively high elevation. The steep topography has seen the natural vegetation largely retained. Major features are Mount Elaine (316 m), Pillar Rock (200 m), McCraes Knob (260 m), Mount Double Duke (220 m) and Devils Pulpit (220 m).
Waterways	Waterways provide major natural landmarks along the Pacific Highway, with the two most notable waterways being the Clarence and Richmond rivers.
Urban settlement	Loosely divided into three typical characters: rural and semi rural; rural residential; and townships. Main townships include Corindi Beach, Tucabia, Tyndale, Gulmarrad, Maclean, Townsend, Harwood, Woodburn, Broadwater and Wardell. Rural residential settlements include Arrawarra, Dirty Creek, Halfway Creek, Wells Crossing, Glenugie, Sandy Crossing, Pillar Valley, Chatsworth, James Creek, Jacky Bulbin Flat, Tabbimoble, Trustums Hill and Coolgardie.

11.2.3 Landscape character precincts

The project has been divided into 54 landscape character precincts. Landscape character precincts reflect the variation in the character of the highway, generally displaying repeating sequences of coastal hinterland, forest and floodplain. There are also a number of different heritage landscape items which form part of the landscape. These include the High Conservation Value Old Growth Forest, Harwood Heritage Conservation Area and the New Italy Settlement Sites. These heritage landscape elements are addressed in further detail in the visual impact assessment (refer to section 11.3.3).

Table 11-3 identifies the features and the landscape character types within the 54 landscape character precincts within each project section. Some character precincts have more than one landscape type. Figure 11-2 to Figure 11-10 show the landscape character precincts.

KEY TERM – Landscape character precinct

Precincts with similar landscape properties or strongly defined spatial qualities.

Photo 3: View east towards Mororo Bridge along Clarence River North Arm

Table 11-3: Features of each project section and the landscape character precincts present

Project section	Features of section	Landscape precinct	Landscape type
1	• Corindi beach coastal plain • Eucalypt woodland and forest • Wetlands • Corindi River floodplain and pastureland • Corindi (adjacent to highway) • Dirty Creek Range • Blueberry farm complex	01 Arrawarra Headland and Corindi Beach	Urban settlement, forest
		02 Wedding Bells State Forest and Garby Nature Reserve	Forest
		03 Blackadder Gully	Valley land – foothills, cleared land (pasture)
		04 Dirty Creek Forest	Forest
		05 Dirty Creek blueberry farms	Valley land – foothills, cultivated land (crops)
		06 Halfway Creek Forest	Forest
2	• Partial cleared pastureland • Forest • Undulating landscape from ridges to floodplain • Glenugie State Forest	07 Halfway Creek	Open woodland (pasture and crops), forest
		08 Glenugie State Forest	Forest
3	• Glenugie State Forest • Partially cleared pastureland • Grafton Airport • Wetland and open woodland • Coldstream River and ephemeral swampland • Pillar Valley and Pillar Range foothills • Tucabia • Pine Brush State Forest and foothills of nearby ranges • Clarence River South Arm floodplain and sugarcane farms • Tyndale village • Bondi Hill	08 Glenugie State Forest	Forest
		09 Glenugie pasture	Forest, open woodland (pasture)
		10 Grafton Airport / Pheasant Creek	Floodplain (pasture)
		11 Coldstream River / Sandy Crossing	Forest, open woodland (pasture), floodplain (pasture)
		12 Pillar Valley	Floodplain, valley land – foothills, open woodland (pasture), forest, ranges and hilltops
		13 Coldstream River swampland	Floodplain (pasture)
		14 Tucabia township	Urban settlement (pasture)
		15 Upper Coldstream	Floodplain (pasture and crops), valley land – foothills
		16 Pine Brush State Forest	Valley land – foothills (pasture), forest, ranges and hilltops
		17 South Arm floodplain	Floodplain (pasture and crops), open woodland (pasture)
		18 Tyndale township	Urban settlement, open woodland
		19 Bondi Hill	Forest, ranges and hilltops

Project section	Features of section	Landscape precinct	Landscape type
4	• Clarence River South Arm floodplain • Tyndale • Clarence River • Bondi Hill • Woodford Island • Shark Creek valley and floodplain • Gulmarrad rural residential area • Cleared pastureland • Green Hill • Maclean and Townsend • Maclean Pinnacle	17 South Arm floodplain	Floodplain (pasture and crops), open woodland
		20 Woodford Island	Forest, ranges and hilltops
		21 Shark Creek	Floodplain (pasture and crops)
		22 Green Hill	Forest, ranges and hilltops
		23 Gulmarrad township	Urban settlement, open woodland (pasture)
		24 Maclean and Townsend townships	Urban settlement, open woodland (pasture)
		25 Maclean Pinnacle	Ranges and hilltops
5	• Maclean Pinnacle • Yaegl Nature Reserve and wetlands • Clarence River floodplain and sugarcane farms • Mountain range to the west • Clarence River Bridge • Harwood (including the Harwood Heritage Conservation Area) • Mororo Creek Nature Reserve • Cleared agricultural land • Open woodland valley	25 Maclean Pinnacle	Ranges and hilltops
		26 Yaegl Nature Reserve	Forest, open woodland (pasture and crops)
		27 Clarence River floodplain	Floodplain (crops)
		28 Ashby	Ranges and hilltops
		29 Harwood township	Urban settlement, floodplain (crops)
		30 Chatsworth Hill	Ranges and hilltops
		31 Mororo Creek Valley	Forest, valley land – foothills (pasture and crops)
6	• Agricultural fields in open woodland • Bundjalung National Park (gently undulating with creeks and minor ridges) • Dense forest • Distant views (some filtered) to mountain range • Pastureland	31 Mororo Creek Valley	Forest, valley land – foothills (pasture and crops)
		32 Bundjalung National Park	Forest, ranges and hilltops
		33 Jacky Bulbin Flat	Forest, valley land – foothills, open woodland (pasture and crops)
7	• Bundjalung National Park (gently undulating with creeks and minor ridges) • Agricultural and pastureland in forest • Tabbimoble floodways provide waymarking opportunity • Tabbimoble State Forest • Settlement of New Italy (heritage listed)	32 Bundjalung National Park	Forest, ranges and hilltops
		33 Jacky Bulbin Flat	Forest, valley land – foothills, open woodland (pasture and crops)
		34 Tabbimoble floodways	Forest, valley land – foothills (pasture and crops)
		35 Tabbimoble State Forest	Forest
		36 Tabbimoble Swamp Nature Reserve	Forest

Project section	Features of section	Landscape precinct	Landscape type
		37 New Italy	Forest, open woodland (pasture), ranges and hilltops
		38 Rocky Mouth Creek and floodplain	Floodplain (pasture and crops)
		39 Trustums Hill	Forest, open woodland (pasture), ranges and hilltops
8	• Flat rural land • Tuckombil Canal • Agricultural land uses (cattle and sugarcane) • Woodburn • Broadwater National Park (banksia scrub, wetland & eucalypt forest) • Richmond River (obscured in areas by mangroves)	40 Tuckombil Canal	Floodplain (pasture and crops), forest
		41 East Woodburn	Floodplain (pasture and crops), forest
		42 Woodburn township	Urban settlement, floodplain (crops)
		43 Broadwater National Park and surrounds	Littoral scrub, floodplain (pasture)
		44 South Richmond River and floodplain	Floodplain (crops)
9	• Cooks Hill • Forested hilltops rising steeply out of the floodplain • Broadwater • Richmond River and dense mangroves • Views towards Blackwall Mountain Range and Alleys Hill	45 East Broadwater	Littoral scrub, floodplain (crops)
		46 Broadwater township	Urban settlement, floodplain (crops)
		47 Tuckean Broadwater	Floodplain (crops)
10	• Views towards Blackwall Mountain Range and Alleys Hill • Richmond River partially obscured by mangroves and sugarcane • Blackwall Mountain Range foothills • Agricultural floodplains • Bingal Creek woodland (dense forest and banksia heath) • Wardell	47 Tuckean Broadwater	Floodplain (crops)
		48 Cabbage Tree Island and floodplain	Floodplain (crops)
		49 Baggotville floodplain	Floodplain (crops)
		50 Bingal Creek	Forest
		51 Wardell township	Urban settlement
		52 Blackwall Range	Forest, valley land – foothills, ranges and hilltops
11	• Blackwall Mountain Range to west • Agricultural floodplains east of the Richmond River • Emigrant Creek	52 Blackwall Range	Forest, valley land – foothills, ranges and hilltops
		53 Pimlico	Floodplain (crops)
		54 Emigrant Creek	Floodplain (crops)

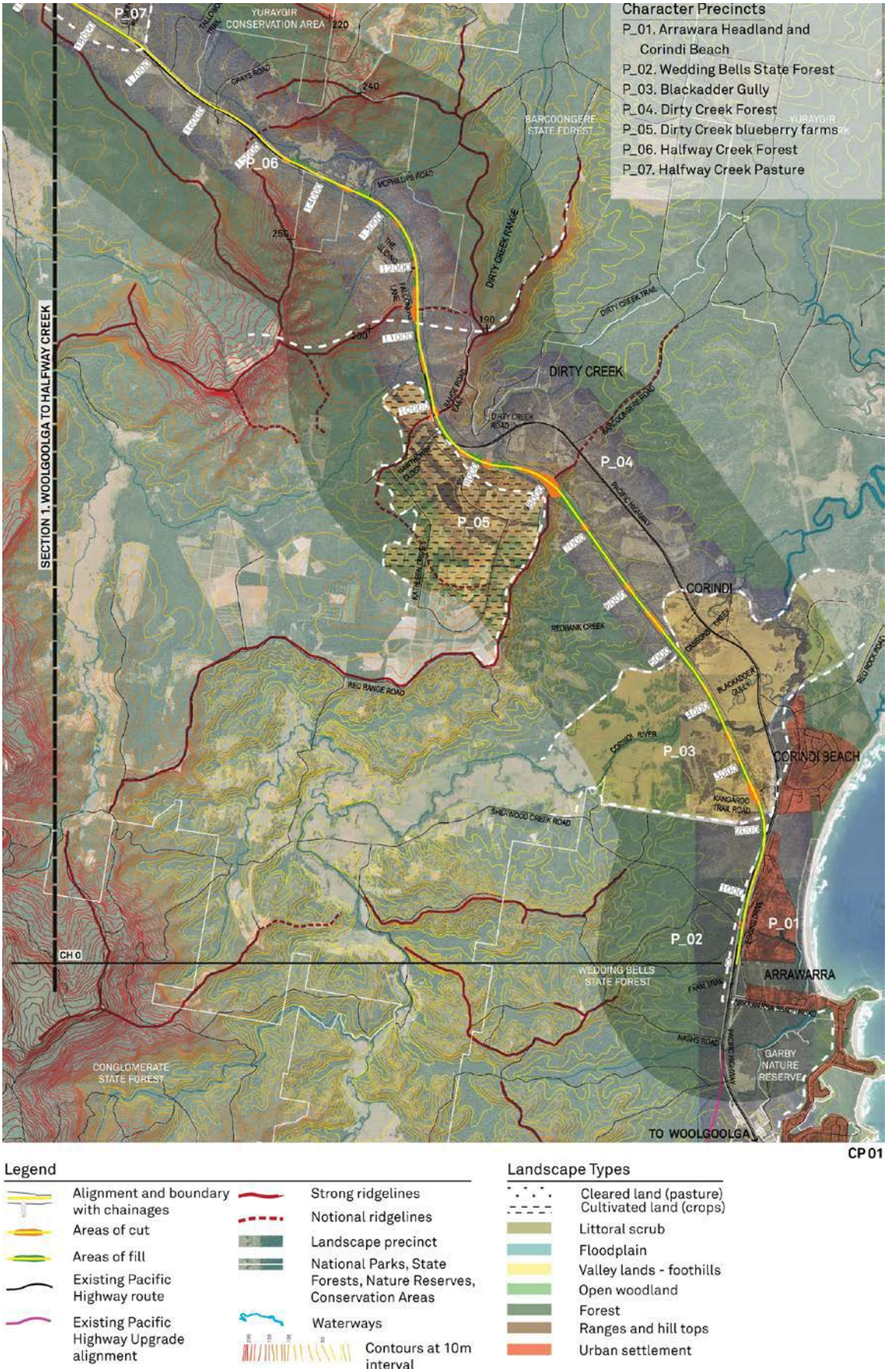
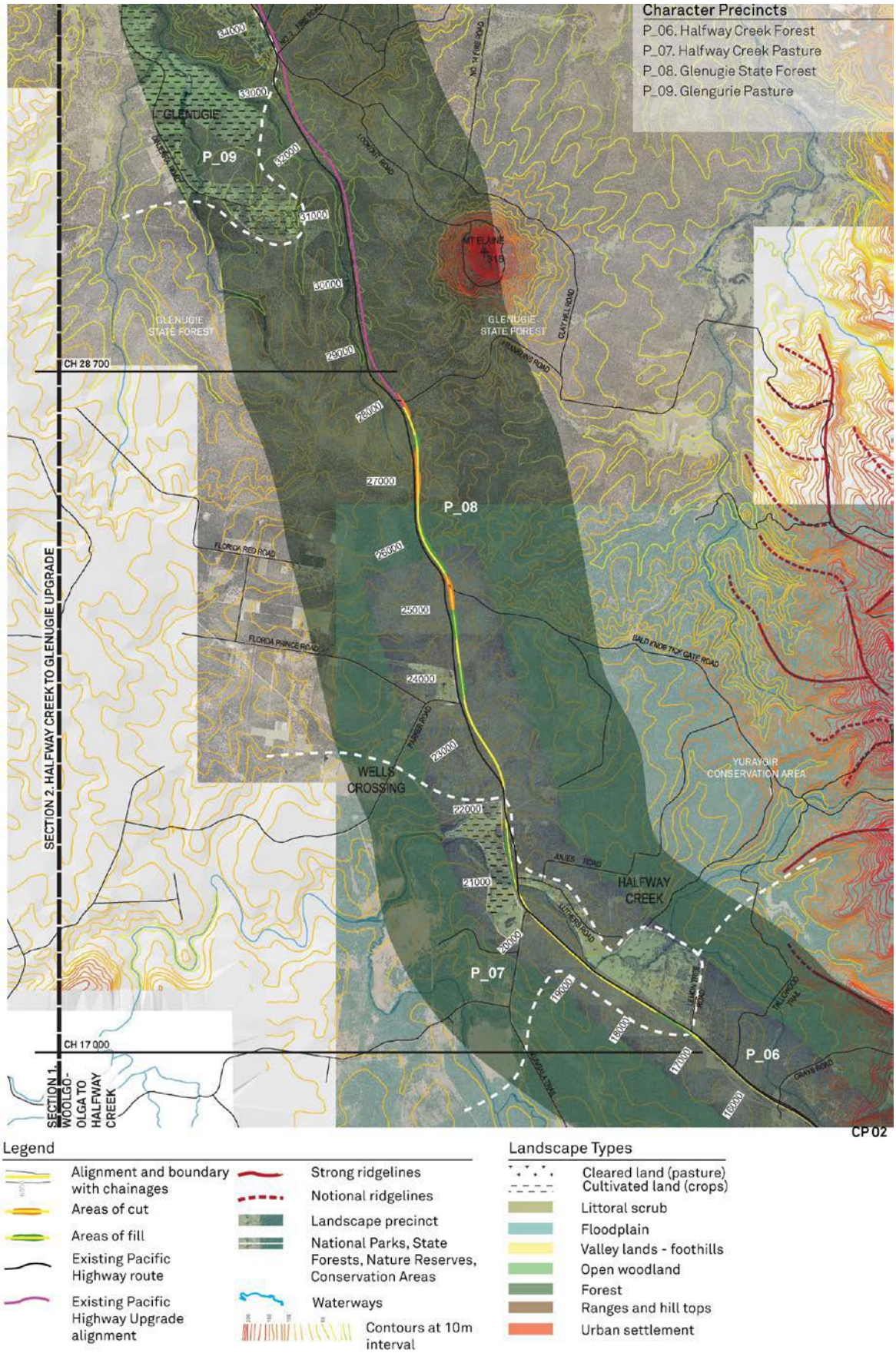


Figure 11-2: Landscape character precincts



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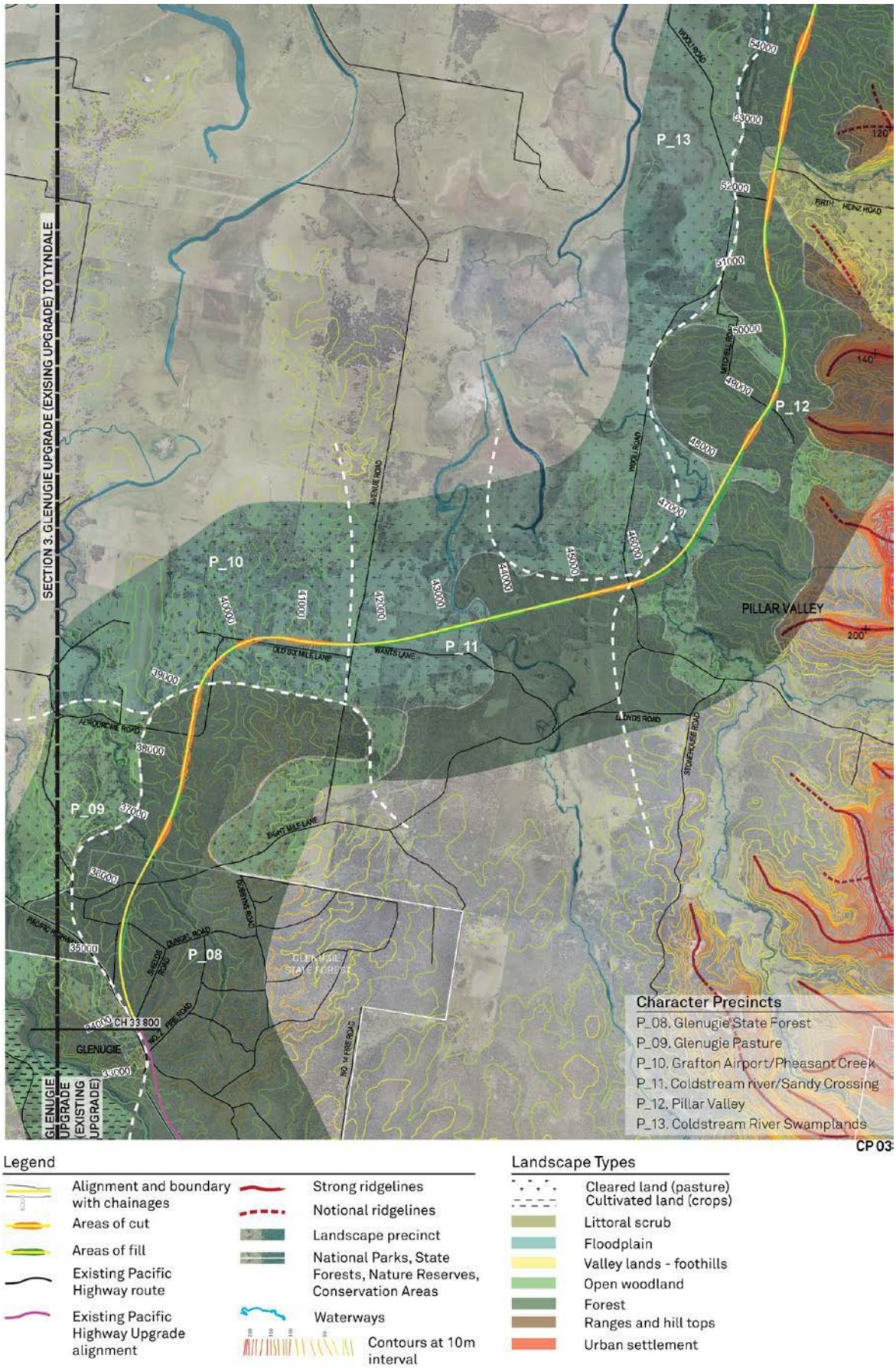

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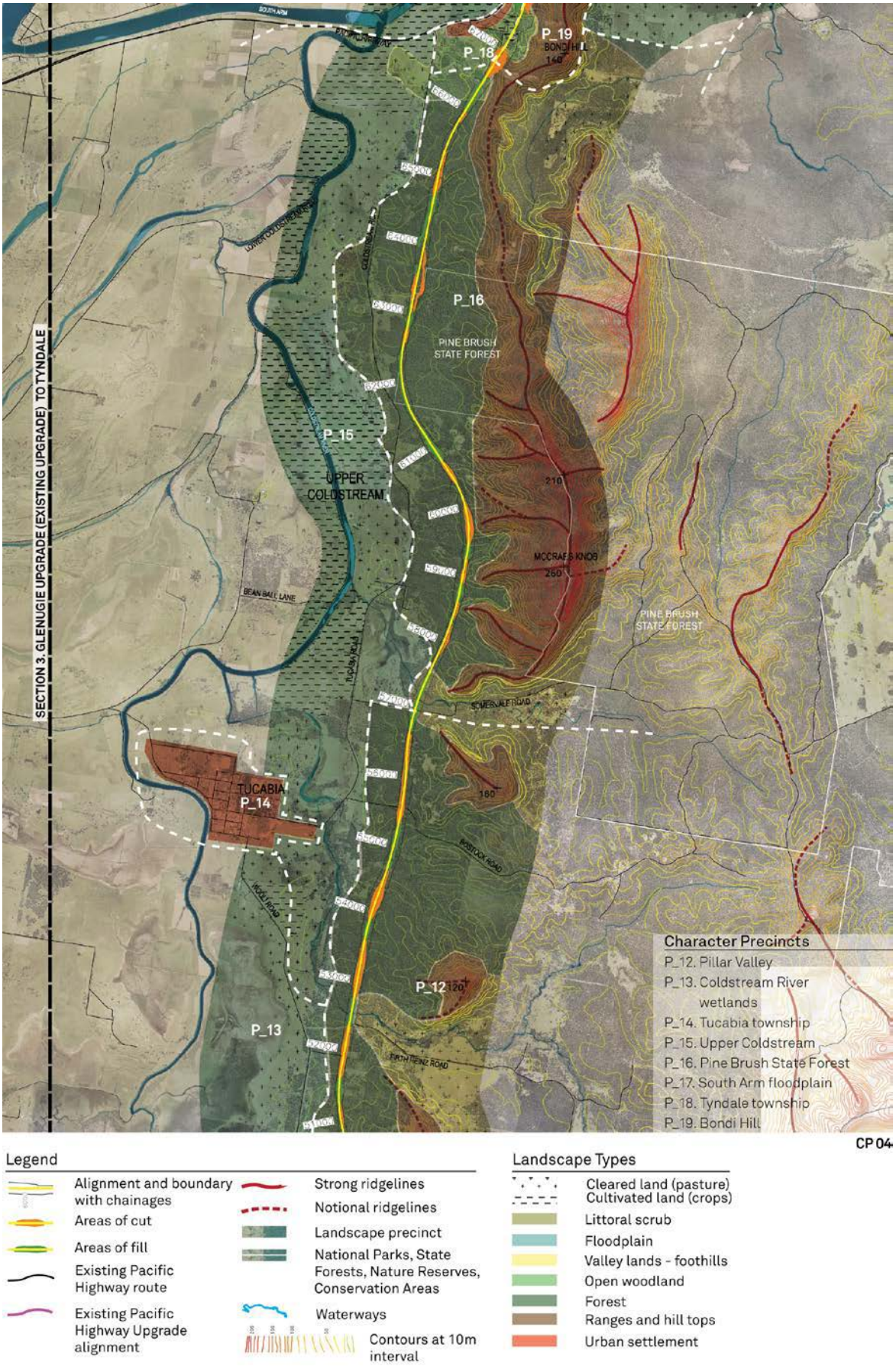


Figure 11-5: Landscape character precincts

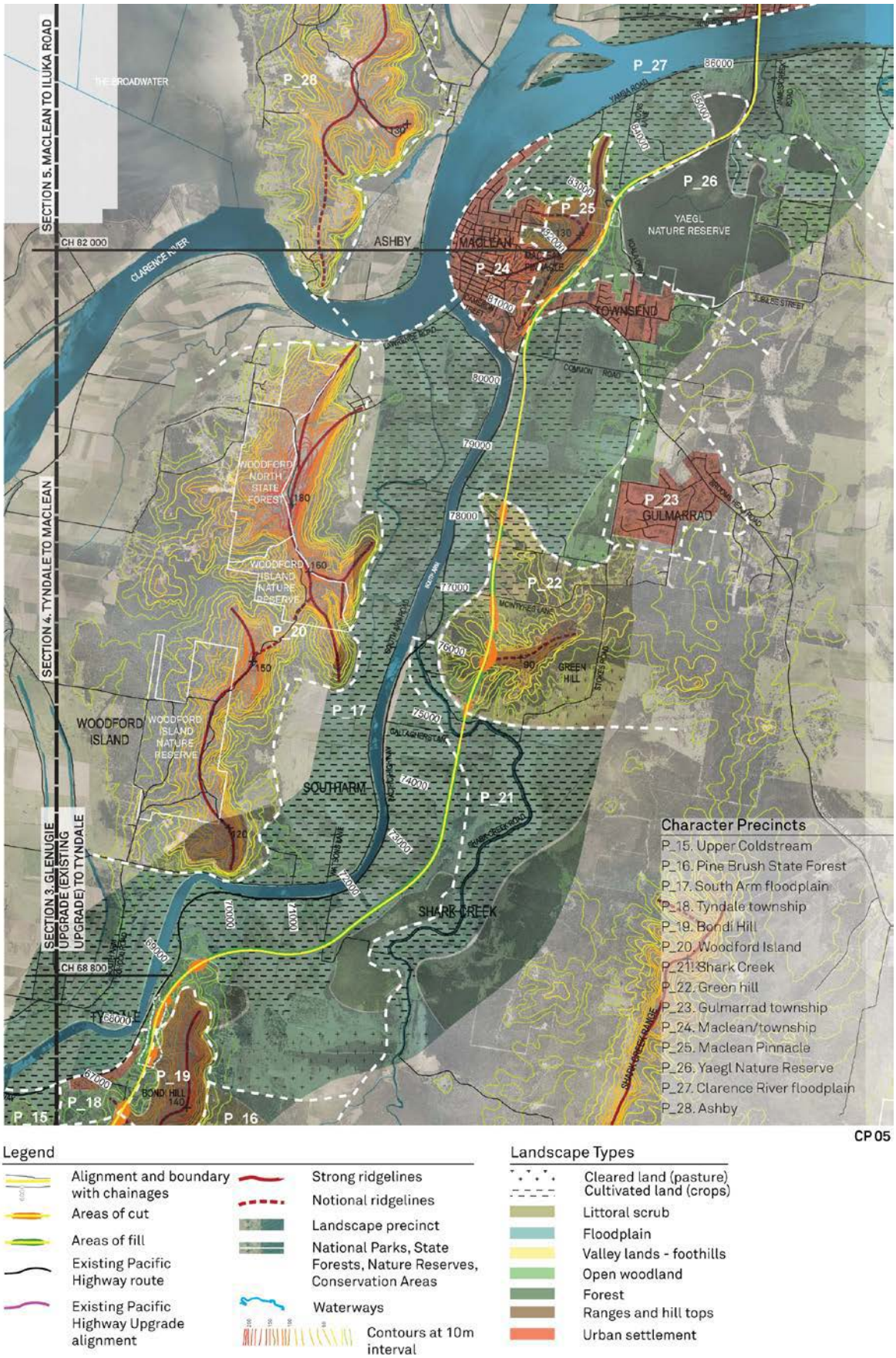


Figure 11-6: Landscape character precincts

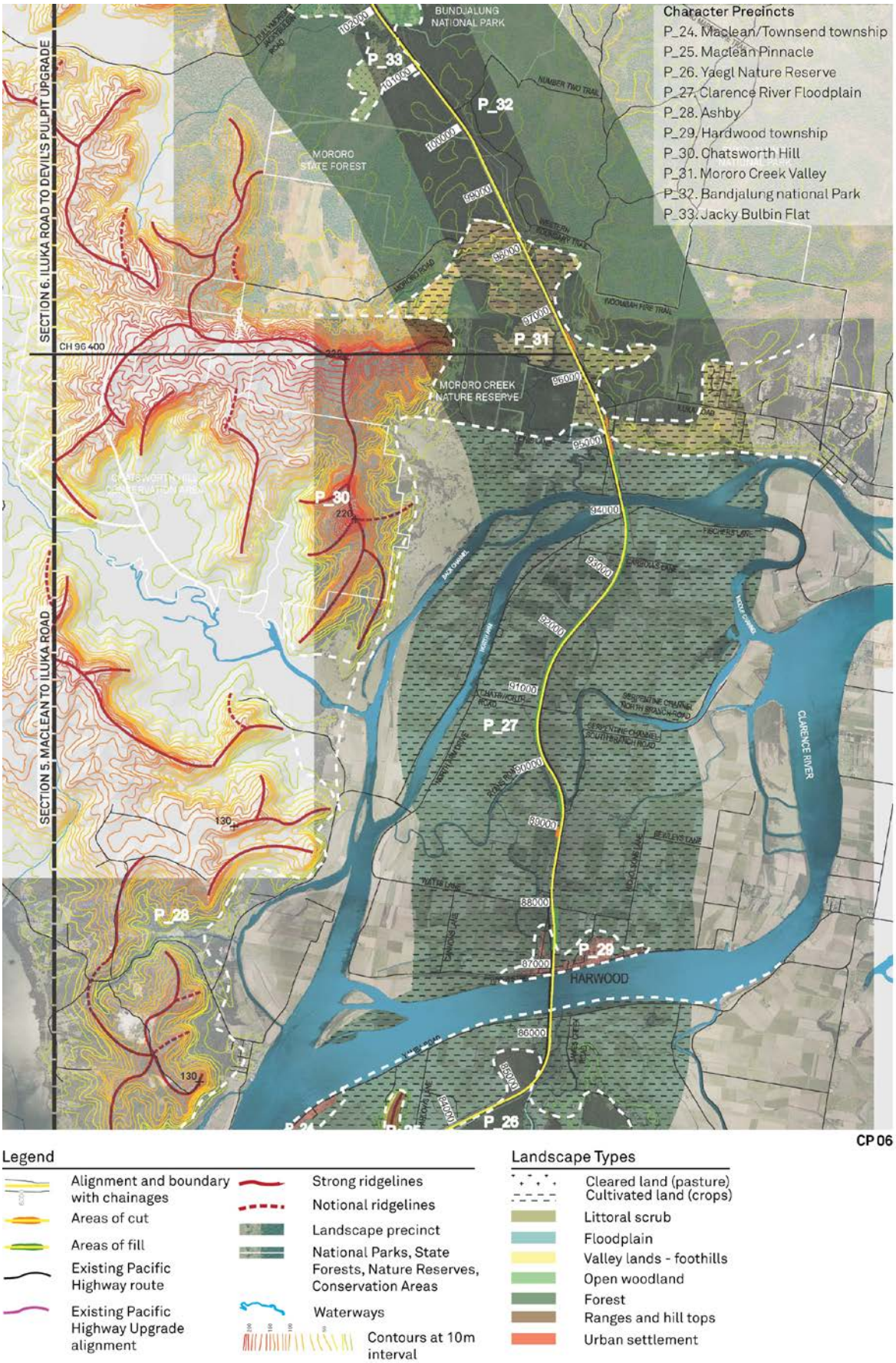


Figure 11-7: Landscape character precincts

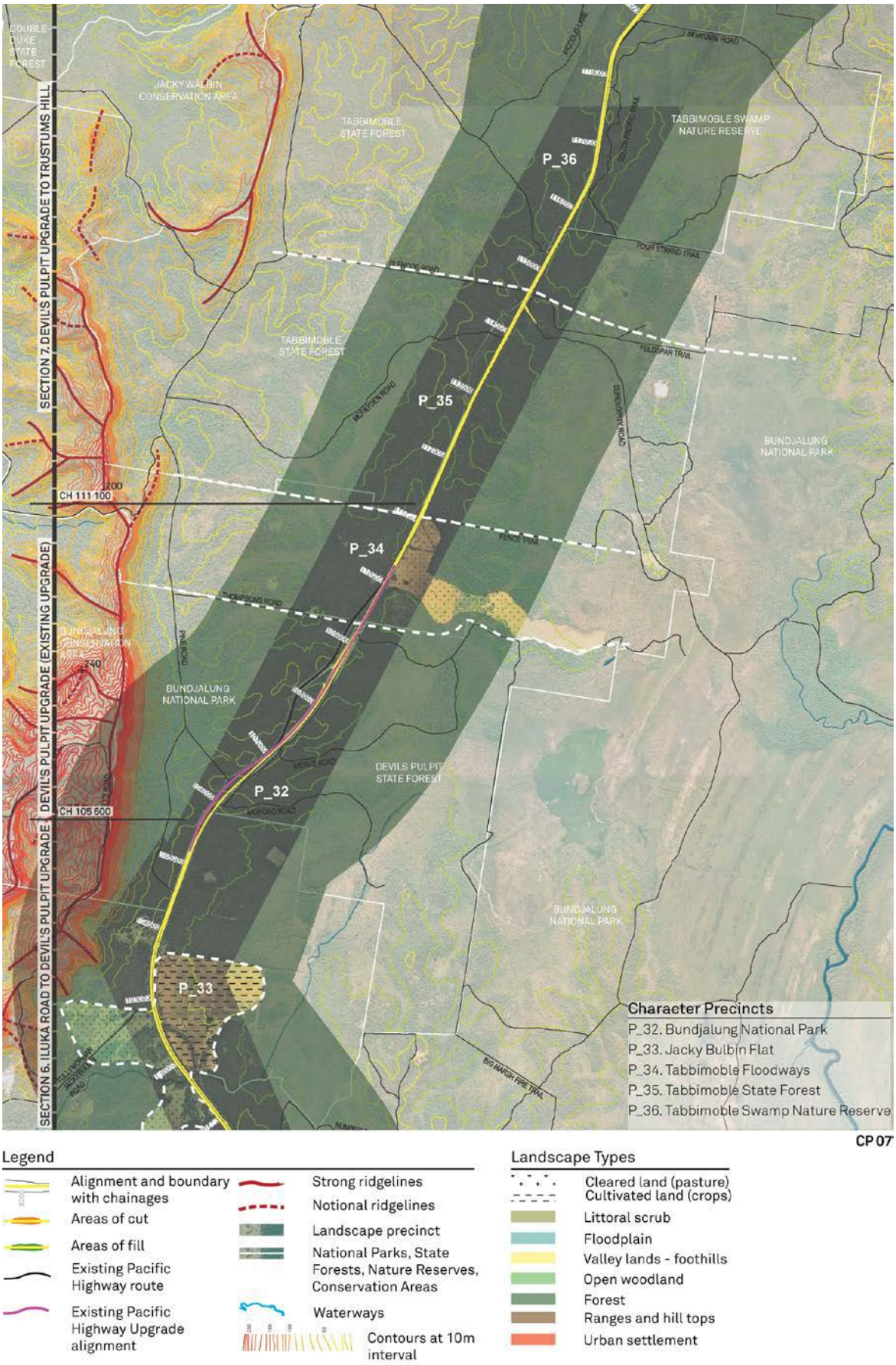
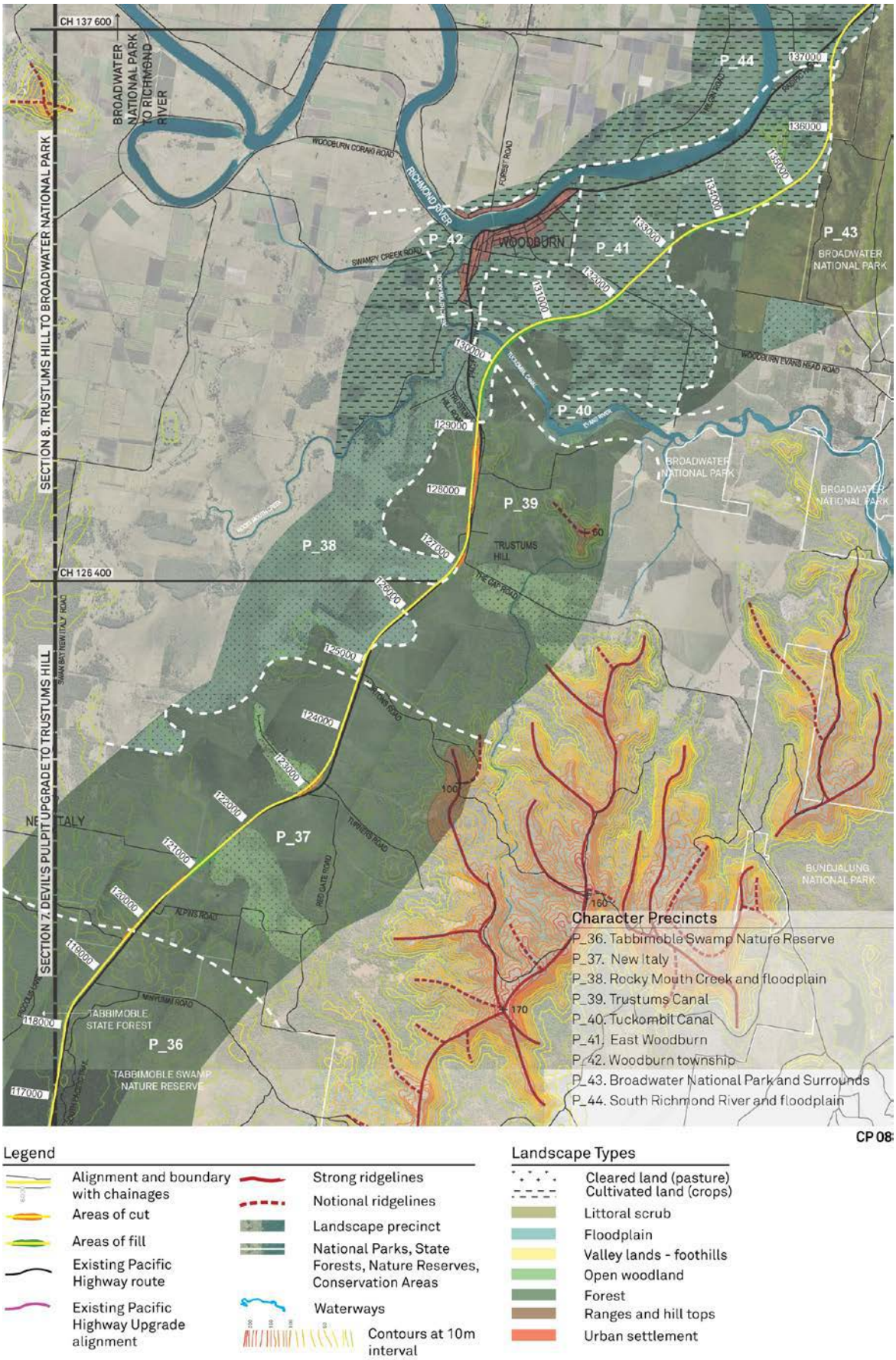


Figure 11-8: Landscape character precincts



Legend

- Alignment and boundary with chainages
- Areas of cut
- Areas of fill
- Existing Pacific Highway route
- Existing Pacific Highway Upgrade alignment
- Strong ridgelines
- Notional ridgelines
- Landscape precinct
- National Parks, State Forests, Nature Reserves, Conservation Areas
- Waterways
- Contours at 10m interval

Landscape Types

- Cleared land (pasture) Cultivated land (crops)
- Littoral scrub
- Floodplain
- Valley lands - foothills
- Open woodland
- Forest
- Ranges and hill tops
- Urban settlement

Figure 11-9: Landscape character precincts

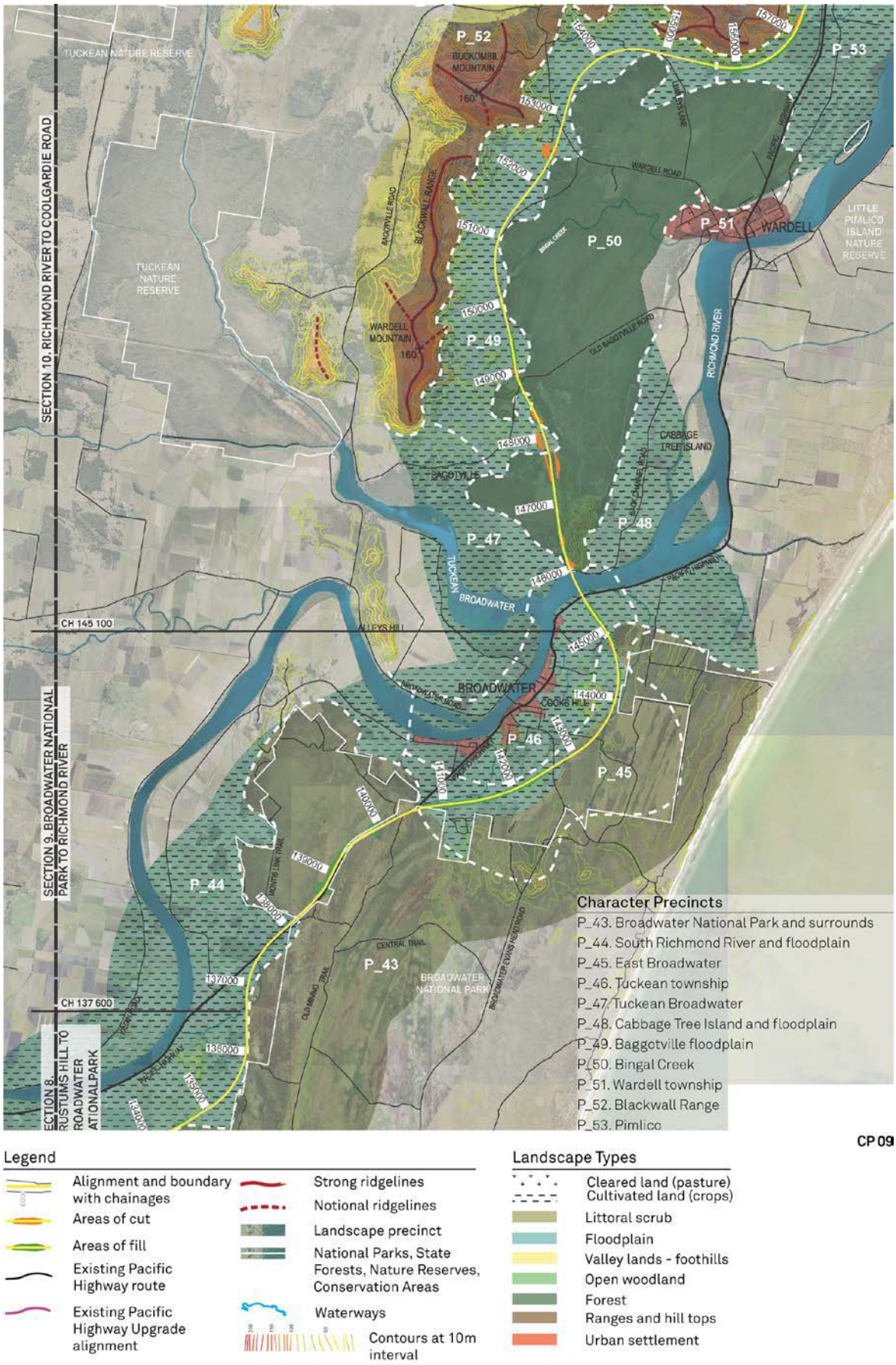


Figure 11-10: Landscape character precincts

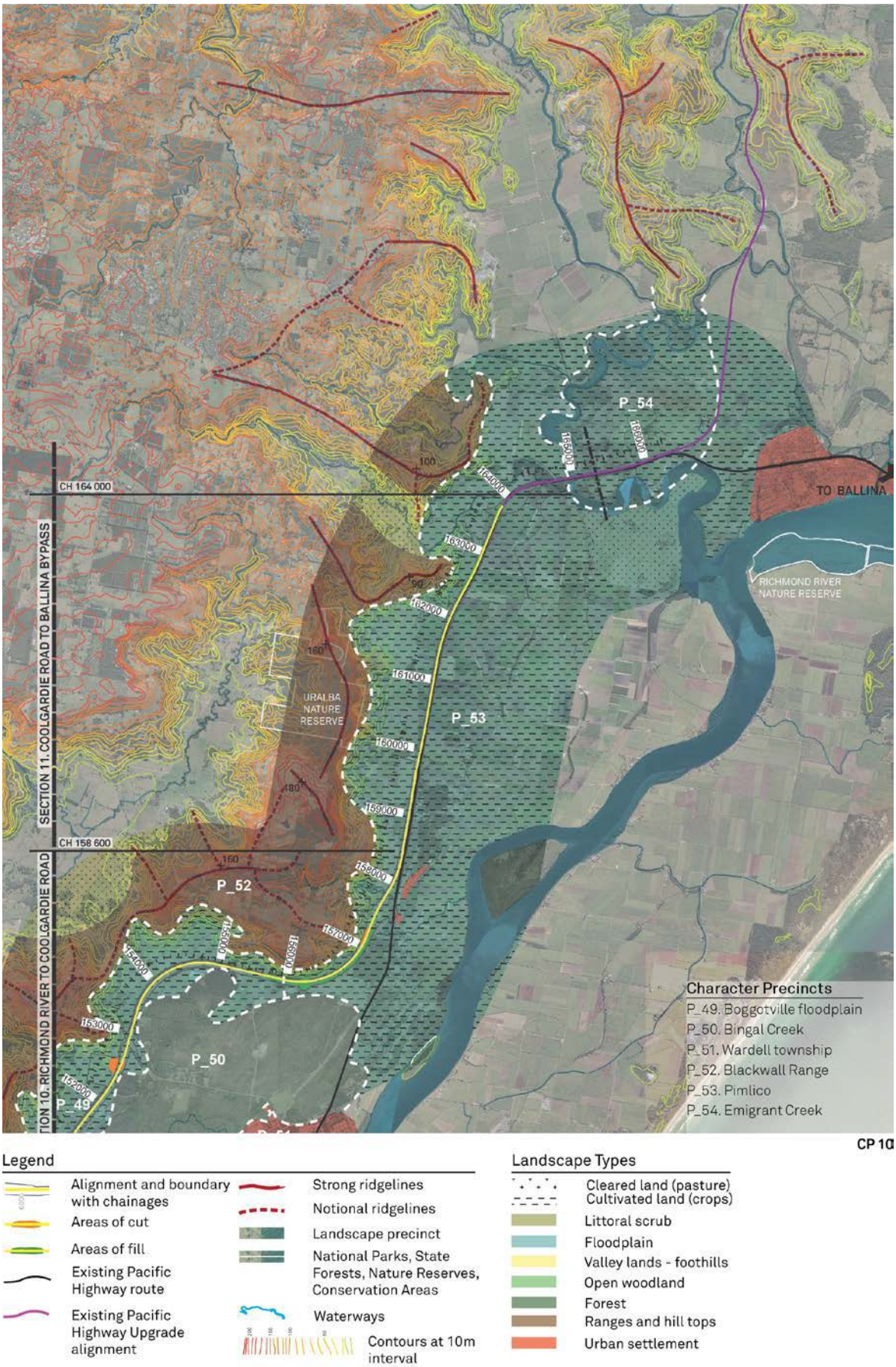


Figure 11-11: Landscape character precincts

11.3 Impact assessment

The impact assessment addresses long-term impacts of the completed project on landscape character and visual amenity; and temporary impacts during construction. These impacts are assessed below.

11.3.1 Construction impacts

Potential visual impacts during construction would be temporary impacts mainly around the construction sites and ancillary facilities adjoining sensitive viewpoints.

These impacts would include views of large earthmoving and construction equipment, construction site activities, materials storage and stockpiles, vegetation clearing, excavation of cuttings and construction of embankments, and construction of structures such as waterway bridges and fauna land bridges.

The construction of the bridge over the Clarence River would have the highest impact due to the proximity of a number of residences and the wide views to the project. As well as the actual construction site, the adjoining bridge compound sites would also be highly visible, impacting on views from residences, local roads and marine traffic. Other areas of large visual impact would include construction of the new highway alignment (such as east of Tucabia).

In addition, construction, particularly out-of-hours works (as identified in Chapter 6 (Description of the project – construction)), would require lighting at work activity locations, and where necessary at relevant ancillary facilities. These locations could result in light spill impacts into any adjoining properties. This would result in a visual impact at night particularly where near public areas and residences. Examples would include works on Clarence River bridge where lighting for out-of-hours works and safety purposes would be visible through Harwood, or at the Maclean interchange, where an overpass would be constructed across the existing Pacific Highway.

Mitigation measures have been identified for ancillary facilities during and on completion of construction to manage visual impacts. Most of the construction visual impacts would occur during the initial upgrade. Lesser visual impacts are expected for those sections separately upgraded to motorway standard due to the limited scope of works compared to the initial upgrade.

11.3.2 Landscape character impacts

Overview

The project would have varying impacts on landscape character. Generally, where the project deviates from the existing highway and traverses rural or agricultural land, the impacts would be greater than where the project duplicates the existing highway, due to the visual significance of the area. The main factors that would determine impact include:

- The introduction of new infrastructure forms (such as bridges)
- The extent of vegetation cover
- Topography.

The impact on landscape character precincts would be low where the project generally follows the existing highway corridor or traverses an existing modified landscape setting. The impact on landscape character precincts would be moderate where the project is built in a new road corridor and traverses undeveloped natural landscapes of floodplains and forest.

However, at a small number of landscape character precincts, the impact on landscape character would be moderate to high and high. These impacts would be a result of:

- The cutting at Dirty Creek, near Corindi
- The large bridge structures crossing the Coldstream River and floodplain
- The cutting at Bondi Hill at Tyndale
- The major bridge over the Clarence River
- The major bridge over the Richmond River

- The alignment north of the Richmond River, between Wardell and the Blackwall Range.

The project would also result in some shadowing in areas where bridges or overpasses or interchanges are proposed. Further assessment of shadowing would be undertaken during detailed design.

Overall, the project would have a low to moderate impact on landscape character, primarily due to the extent of the project within or adjacent to the existing road corridor or passes through an existing modified landscape setting with a lower character impact. Five project sections (2, 6, 7, 9, 11) are rated as low impact, four are rated as moderate (project sections 1, 4, 5, 8) and two are rated as having a moderate–high impact. Moderate-high impact are where the project will create a new road corridor and travel through undeveloped natural landscapes of floodplains and forested sections (project sections 3 and 10).

The impacts on landscape character and visual significance of each project section are outlined in the following sections.

Photo 4: View of Harwood bridge crossing over Clarence River with Harwood in foreground

Woolgoolga to Halfway Creek (Section 1)

In Section 1, the project would involve upgrading the highway for most of its length within the existing corridor before deviating along a new corridor. Features of the project in Section 1 include:

- Twin bridges over Corindi Creek (90 metres long)
- A bridge over the Corindi floodplain (280 metres long)
- High embankments (while most embankments would be less than five metres high, some would be about 14 metres high)
- A large cutting through Dirty Creek Range (42 metres deep).

The aggregate impact on the landscape character of project Section 1 would be moderate. Where it deviates from the existing alignment, the project would create a new element in the landscape. The cutting through the Dirty Creek Range would also be visually prominent. It would be primarily viewed by motorists, and from a small number of rural residences. The potential impacts on landscape character precincts in Section 1 are presented in Table 11-4.

Table 11-4: Potential impacts on landscape character precincts in Section 1

Landscape character precinct	Project elements and adjacent landscape	Impact
01 Arrawarra Headland and Corindi Beach	The project would be within low cutting in the existing road corridor. Limited views from Arrawarra or Corindi.	Low
02 Wedding Bells State Forest and Garby Nature Reserve	The project would be within low cutting in the existing road corridor. Limited views into or out of the corridor.	Low
03 Blackadder Gully	There would be bridges and embankments over Corindi Creek and floodplain. Modified landscape with small rural and agricultural holdings. New road corridor.	Moderate
04 Dirty Creek Forest	The project would involve a large cutting through Dirty Creek Range (up to 42 m). New road corridor in bushland with residential views.	Moderate–high
05 Dirty Creek blueberry farms	The project would be within the existing road corridor. Low embankments. Topography and roadside vegetation screens road corridor from blueberry farms.	Low
06 Halfway Creek Forest	Existing road corridor through bushland and pastureland with low embankments. Limited residential views.	Low

Halfway Creek to Glenugie upgrade (Section 2)

In Section 2, the project would involve upgrading the highway within the existing corridor. Features of this section include:

- Small twin bridges over Halfway Creek and Wells Crossing
- An overpass at Bald Knob Tick Gate Road
- A high embankment (around seven metres) north of the bridge over Halfway Creek
- Cuttings, with the largest cutting (five metres deep) to the north of the section where it connects with the Glenugie upgrade
- A heavy vehicle inspection station.

The aggregate impact to the landscape character of project Section 2 is low. The potential impacts on landscape character precincts in Section 2 are presented in Table 11-5.

Table 11-5: Potential impacts on landscape character precincts in Section 2

Landscape character precinct	Project elements and adjacent landscape	Impact
07 Halfway Creek	The project would involve low embankments and cuttings and small bridges within the existing road corridor. Partially cleared pastureland and enclosed forest.	Low
08 Glenugie State Forest	Low embankments and cuttings within existing road corridor. Limited residences within undulating enclosed forest.	Low

Photo 5: View of existing Pacific Highway near Glenugie State Forest

Glenugie upgrade to Tyndale (Section 3)

In Section 3, the project would follow a new alignment between Eight Mile Lane and Tyndale. In this section, there are several areas considered to be of unique scenic quality, including rivers that would be subject to extensive embankments. This would result in an aggregate impact on the landscape character of the project section of moderate- high. Features of the project in Section 3 include:

- Bridge over the Coldstream River (combined 690 metres long)
- Bridges over the Pillar Valley Creek (combined 400 metres long)
- Embankments of around near Tyndale (10 to 11 metres high)
- Cuttings just east of Tyndale (up to 40 metres deep).

The potential impacts on the individual landscape character precincts in Section 3 are presented in Table 11-6.

Table 11-6: Potential impacts on landscape character precincts in Section 3

Landscape character precinct	Project elements and adjacent landscape	Impact
08 Glenugie State Forest	The project would be in a new corridor in foothills of State forest with low embankment and cuttings. Limited views from residences.	Low
09 Glenugie pasture	The precinct is outside the road corridor and views are limited by vegetation and landform.	Negligible
10 Grafton Airport / Pheasant Creek	The project would be in a new corridor with few residences within the area.	Moderate- low
11 Coldstream River / Sandy Crossing	The project would involve large bridge structures across Coldstream River and Pillar Valley. High landscape quality area with extensive views north and south. Limited views from residences.	Moderate–high
12 Pillar Valley	The project would involve moderate embankments and cuttings within a new corridor. Area of high landscape quality within the wooded foothills.	Moderate
13 Coldstream River swampland	Coldstream River swampland is outside the road corridor but there are some views out from the corridor.	Negligible
14 Tucabia township	Tucabia township is outside the road corridor and project would not be visible from Tucabia.	Negligible
15 Upper Coldstream	Upper Coldstream is outside the road corridor but there are some views to the Coldstream River Valley.	Negligible
16 Pine Brush State Forest	The project would involve cuttings and embankments in woodland foothills.	Moderate
17 South Arm floodplain	South Arm floodplain is outside the road corridor.	Negligible
18 Tyndale township	The project would involve large cuttings up to 22 m deep that would be visible from Tyndale.	High
19 Bondi Hill	The project would involve large cuttings up to 22 m deep that would be visible from Tyndale.	High

Tyndale to Maclean (Section 4)

In Section 4, the project would introduce new infrastructure in the landscape, but views would be seasonally obstructed by sugarcane plantations. The impacts would be greatest where the road is in cutting through Green Hill near McIntyres Lane as the cutting would be visible from the floodplain and scattered residences. This would result in an aggregate impact on the landscape character of the project section of moderate. Features of the project in Section 4 include:

- An bridge over Shark Creek (800 metres long)
- Embankments (up to six metres high)
- Interchange at Maclean
- A cutting at Green Hill (24 metres deep).

The potential impacts on individual landscape character precincts in Section 3 are presented in Table 11-7.

Table 11-7: Potential impacts on landscape character precincts in Section 4

Landscape character precinct	Project elements and adjacent landscape	Impact
17 South Arm floodplain	The project would involve embankments across floodplains, interrupting the pattern of sugarcane plantations.	Moderate
20 Woodford Island	Woodford Island is outside the road corridor, but elevated with views over the road corridor.	Negligible
21 Shark Creek	The project would involve a large bridge across Shark Creek with large approach embankments. Generally cleared with sugarcane up to the creekline.	Moderate- low
22 Green Hill	The project would involve a large cutting through Green Hill, in the flat floodplain, visible from a distance from a few residences.	Moderate
23 Gulmarrad township	Gulmarrad is outside the road corridor and disconnected from the road works through vegetation, distance and topography.	Low
24 Maclean / Townsend township	The project would involve a new interchange at Maclean, but it would be situated near the existing corridor.	Moderate
25 Maclean Pinnacle	The project would involve small embankments within the existing road corridor.	Low

Maclean to Iluka Road, Mororo (Section 5)

In Section 5, the project would involve duplicating the highway parallel to the existing alignment mostly through cultivated land on the Clarence River floodplain. Features of the project in Section 5 include:

- A bridge across the Clarence River (1.3 kilometres long and 30 metres high to the deck level)
- A bridge spanning the North Arm (200 metres long)
- New overpasses at Watts Lane, Chatsworth Road, Carols Lane and Iluka Road.

The largest impact would be associated with embankments approaching and between the bridges over the Clarence River and the North Arm. These embankments would be up to three metres high and within or parallel to the existing road corridor. The aggregate landscape character impact on the project section is moderate. The potential impacts on landscape character precincts in Section 5 are presented in Table 11-8.

Table 11-8: Potential impacts on landscape character precincts in Section 5

Landscape character precinct	Project elements and adjacent landscape	Impact
25 Maclean Pinnacle	The project would involve small embankments within the existing road corridor.	Low
26 Yaegl Nature Reserve	The project would involve low embankments within the existing road corridor between Yaegl Nature Reserve and sugarcane plantation.	Moderate- low
27 Clarence River floodplain	The project would involve low embankments within the existing road corridor on the floodplain with extensive sugarcane plantations.	Moderate–high
28 Ashby	Ashby is outside the road corridor. There are views across the floodplain.	Negligible
29 Harwood township	The project would involve a bridge over Clarence River with associated embankments. Within the existing road corridor through Harwood and residential area.	High
30 Chatsworth Hill	Chatsworth Hill is outside the road corridor. There are views across the floodplain.	Negligible
31 Mororo Creek Valley	The project would involve low embankments in the existing road corridor.	Moderate- low

The assessment of the bridge across the Clarence River is a Super-T structure (refer to Figure 11-12). However, other urban design responses to the form of the bridge could include a balanced cantilever or a cable stay bridge (refer to Section 5.3.5 of this EIS and Figure 11-13. These built forms would be further investigated at detailed design stage.

Figure 11-12: Visualisation of the proposed bridge over the Clarence River (view upstream)

Balanced cantilever option

Cable stay option

Figure 11-13: Other potential urban design responses to the bridge over the Clarence River

Iluka Road, Mororo to Devils Pulpit upgrade (Section 6)

In Section 6, the project would pass forests (Bundjalung National Park) with pockets of cleared and cultivated land in open woodland and foothills. Features of the project in Section 6 include:

- A new bridge over Tabbimoble Creek (about 140 metres long)
- A new overpass bridge over Tabbimoble Trail (about 70 metres long)
- Embankments (up to 3.5 metres high).

The project would be located adjacent to the existing highway, with a mosaic of woodland, pasture and cleared land giving the landscape good absorption capacity. This results in an aggregate impact on the landscape character of the project section of low. The potential impacts on landscape character precincts in Section 6 are presented in Table 11-9.

Table 11-9: Potential impacts on landscape character precincts in Section 6

Landscape character precinct	Project elements and adjacent landscape	Impact
31 Mororo Creek Valley	The project would involve low embankments in the existing road corridor in an agricultural area.	Low
32 Bundjalung National Park	The project would involve low embankments in the existing road corridor in a landscape with good capacity to absorb visual changes.	Low
33 Jacky Bulbin Flat	The project would involve an upgrade in the existing road corridor with small cuttings and embankments in a variety of landscape types.	Low

Photo 6: View of existing Pacific Highway at intersection with Iluka Road

Devils Pulpit upgrade to Trustums Hill (Section 7)

In Section 7, the project would traverse mostly forested areas with pockets of cultivated land in open woodland to the east and through the Richmond River floodplain to the west. This area is capable of absorbing visual impacts, resulting in an aggregate impact on the landscape character of the project section of low. Features of the project in Section 7 include:

- Bridge duplications over the Tabbimoble floodways
- Embankments (up to 3.5 metres high)
- Cuttings (up to 8.5 metres deep)
- A widened median.

The potential impacts on the individual landscape character precincts in Section 7 are presented in Table 11-10.

Table 11-10: Potential impacts on landscape character precincts in Section 7

Landscape character precinct	Project elements and adjacent landscape	Impact
32 Bundjalung National Park	The project would involve low embankments in the existing road corridor in a variety of landscape types.	Low
34 Tabbimoble floodways	The project would involve low embankments and bridges over Tabbimoble floodways. Upgrade in the existing vegetated road corridor.	Moderate-low
35 Tabbimoble State Forest	The project would involve low embankments up to 3 m in the existing vegetated road corridor.	Low
36 Tabbimoble Swamp Nature Reserve	The project would involve low embankments up to 3 m in the existing vegetated road corridor.	Low
37 New Italy	The project would involve low embankments up to 3 m in the existing vegetated road corridor.	Low
38 Rocky Mouth Creek and floodplain	The project would involve upgrading the existing road corridor in a variety of landscape types.	Low
39 Trustums Hill	The project would involve some deep cuttings (up to 8.5 m deep) in a variety of landscape types with good capacity to absorb visual changes.	Moderate- low

Note: The landscape character assessment provides an aggregate assessment of built, natural and cultural aspects in the landscape. This broad assessment does not specifically address single cultural heritage (ie New Italy) or other items. Heritage items listed above are considered in further detail in the visual impact assessment (section 11.3.3).

Trustums Hill to Broadwater National Park (Section 8)

In Section 8, the project would mostly traverse cultivated and cleared land, but would also pass through pockets of littoral scrub at the northern end. The project would bypass Woodburn, minimising visual impacts to the township. The pockets of remnant vegetation within low-lying areas would provide screen the project. Overall, the impact to the landscape character of the project section would be low. Features of the project in Section 8 include:

- A bridge spanning Tuckombil Canal (350 metres long)
- A bridge spanning Woodburn drain (200 metres long)
- Small bridge across McDonalds Creek
- A large cutting at Lang Hill (25 metres deep).

Photo 7: View west towards Woodburn and Richmond River floodplain

The potential impacts on individual landscape character precincts in Section 8 are presented in Table 11-11.

Table 11-11: Potential impacts on landscape character precincts in Section 8

Landscape character precinct	Project elements and adjacent landscape	Impact
39 Trustums Hill	The project would involve some deep cuttings (up to 8.5 m deep) in a variety of landscape types with good capacity to absorb visual changes.	Moderate – low
40 Tuckombil Canal	The project would involve a new road alignment and bridge over Tuckombil Canal in agricultural land and floodplain.	Moderate
41 East Woodburn	The project would involve a low embankment and large cutting at Lang Hill on a new alignment within the floodplain, cultivated and wooded lands. This precinct has good capacity to absorb visual changes.	Moderate
42 Woodburn township	The project is outside the existing road corridor, and away from Woodburn.	Negligible
43 Broadwater National Park	The project would be within the existing road corridor in Broadwater National Park.	Moderate – low
44 South Richmond River and floodplain	The project would involve low embankments on new and existing alignment within the floodplain, cultivated and wooded lands. This has good capacity to absorb visual changes.	Low

Broadwater National Park to Richmond River (Section 9)

In Section 9, the project would mostly traverse cultivated land in floodplain and areas of littoral scrub through the Broadwater National Park. The project would involve duplicating the existing alignment. This would minimise the footprint and therefore visual impact. The alignment would also bypass Broadwater, so there would be limited visual impacts on people in the township. The aggregate impact on the landscape character of the project section would be low. Features of the project in Section 9 include:

- Embankments (up to three metres high)
- Small areas of cut (up to four metres deep).

The potential impacts on landscape character precincts in Section 9 are presented in Table 11-12.

Table 11-12: Potential impacts on landscape character precincts in Section 9

Landscape character precinct	Project elements and adjacent landscape	Impact
43 Broadwater National Park and surrounds	The project would be within the existing corridor in woodland, wetland and pasture landscapes.	Moderate – low
44 South Richmond River and floodplain	The project would involve small embankments within the existing corridor and areas of new alignment. In agricultural land, floodplain and some woodland.	Low
45 East Broadwater	The project would involve small embankments on new alignment across the floodplain.	Moderate

Photo 8: View north to Richmond River – Cooks Hill and sand quarries in foreground

Richmond River to Coolgardie Road (Section 10)

In Section 10, the project would mostly traverse cultivated land on floodplains, smaller areas of forest and disturbed areas in Bagotville. This would minimise vegetation removal and reduce visual impacts. Features of the project in Section 10 include:

- A bridge spanning Richmond River (780 metres long)
- A number of road overpasses
- Small embankments (up to three metres high)
- Cuttings (up to eight metres deep).

While the project would pass through a variety of landscape types, it would introduce new infrastructure in an undisturbed rural landscape. In particular, the extent of excavation at Lumleys Hill would be reviewed. There would also be visual impacts on adjacent properties. Overall, the project would have a moderate- high impact on the landscape character of the project section. The potential impacts on the individual landscape character precincts in Section 10 are presented in Table 11-13.

Table 11-13: Potential impacts on landscape character precincts in Section 10

Landscape character precinct	Project elements and adjacent landscape	Impact
46 Broadwater township	The project would involve a new bridge across Richmond river. There would be few residential viewers.	High
47 Tuckean Broadwater	Tuckean Broadwater is outside of road corridor.	Negligible
48 Cabbage Tree Island and floodplain	Cabbage Tree Island and floodplain are outside the road corridor.	Negligible
49 Baggotville floodplain	The project would involve 1–3 m embankments through open agricultural land following edges between floodplain and forest. There would be a high number of residential viewers.	Moderate
50 Bingal Creek (Wardell heath)	The project would involve a new road corridor with 1–3 m embankments. The project would be situated in mixed woodland, forest and agricultural land and generally follow the edges between landscape character types.	Moderate–high
51 Wardell township	Wardell township is outside the road corridor.	Negligible
52 Blackwall Range	Blackwall Range is outside of road corridor but would be visible from the project.	Negligible

Coolgardie Road to Ballina upgrade (Section 11)

In Section 11, the project would traverse cultivated land and sugarcane plantations on the Richmond River floodplain. The project would be adjacent to the existing highway to minimise its footprint and would have an aggregate impact of low on the landscape character of the project section. Sugarcane plantations adjacent to the project would provide a variable backdrop of crops in a rotational cycle, and would have good capacity to absorb the landscape character impact of the highway. Features of the project in Section 11 include:

- Whytes Lane overpass (about 55 metres long)
- Bridge over Emigrant Creek (about 220 metres long)
- Embankments (generally one to 2.5 metres high).

The potential impacts on the individual landscape character precincts in Section 11 are presented in Table 11-14.

Table 11-14: Potential impacts on landscape character precincts in Section 11

Landscape character precinct	Project elements and adjacent landscape	Impact
52 Blackwall Range	Blackwall Range is outside the road corridor but would be visible from the project.	Negligible
53 Pimlico	The project would involve a 1–2.5 m embankment within the existing road corridor and a bridge over Duck Creek. There are few residences in the sugarcane plantations.	Moderate
54 Emigrant Creek	Emigrant Creek is a highly modified environment. The Ballina bypass is currently being constructed in this area.	Low

Photo 9: View of Thurgates Lane and Wardell Heath with Lumley's hill to the left

11.3.3 Visual impacts

Overview

The visual impact assessment is a separate assessment to the landscape character assessment (as discussed in the previous section 11.3.2). This assessment identifies the impact of the project on select viewpoints, rather than on the whole landscape character precinct. However, the visual impact assessment takes into consideration the rankings from the landscape character assessment. The results of the visual impact assessment is discussed below.

The visual impacts of the project were assessed from 75 viewpoints across the project length. The project would have a:

- High visual impact on seven viewpoints: These viewpoints are located where the project follows a new alignment, such as at Dirty Creek Range, Glenugie and Tyndale (Bondi Hill). Other areas where the project would have high visual impact are at the Harwood Bridge, New Italy, and at major interchanges (interchange at Tyndale and interchange at Iluka Road, Woombah)
- Moderate–high impact on 21 viewpoints: These viewpoints are located in areas where the project would remove forest vegetation such as through Glenugie State Forest or near Pine Brush State Forest or near new interchanges (such as the interchange at Corindi and interchange at Glenugie) or where the project follows a new alignment through scenic landscapes (such as near Wardell)
- Moderate impact on 29 viewpoints: These viewpoints would have moderate visual impacts where a variety of specific site conditions result in the magnitude or sensitivity rating being high.
- Moderate-low impact on 14 viewpoints: These viewpoints would have low–moderate visual impacts, being located in less sensitive agricultural areas where no elevated interchanges are proposed or where views of the project are distant
- Low impact on four viewpoints: These viewpoints are located in less visually sensitive agricultural areas and where views of the project are distant.

Viewpoints where the project would have a moderate–high or high visual impact are identified in Table 11-15 to Table 11-41. Viewpoints where the project would have a low or low–moderate visual impact are identified in the Working paper – Urban design, landscape character and visual impact.

The visual impact of the project is considered to be appropriate for the scale of the project and the landscapes through which it passes. Mitigation measures have been identified for these viewpoints (refer to section11.4.2) and would be implemented as part of the urban design and landscape strategy.

KEY TERM – Viewpoint

A vantage point where the project would be visible, either from a residences or public vantage point such as a local road.

Table 11-15: Visual impacts of the project from viewpoint 02B (Section 1)

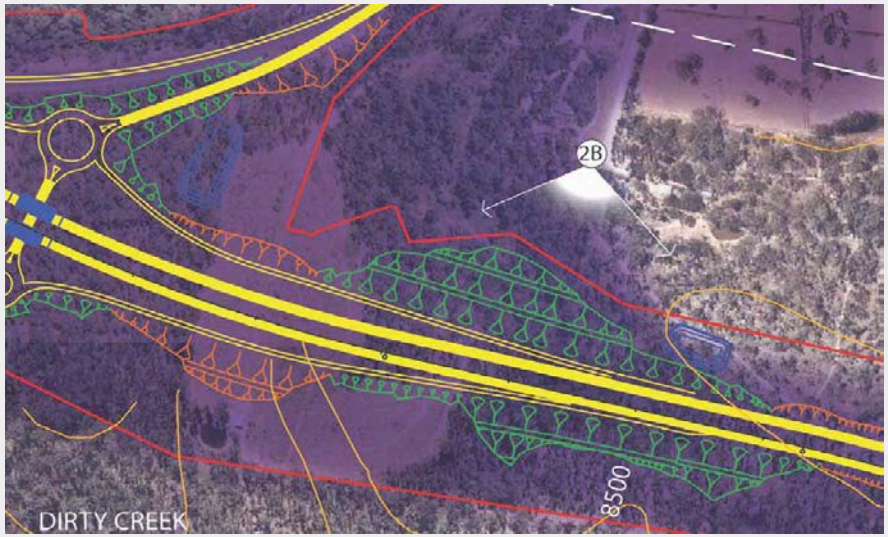
02B_Flinty Road, Dirty Creek Range (Foreground view)		
Magnitude	High. Infrastructure would be in woodland, requiring major earthworks and vegetation removal.	
Sensitivity	Moderate. Adjacent residents would experience repeated and long-duration views of the project.	
Impact	Moderate–high	

Table 11-16: Visual impacts of the project from viewpoint 9 (Section 3)

9_ Old Six Mile Road, near Wants Lane (Foreground view)	
Magnitude	High New infrastructure would be on fill embankment in an agricultural setting, requiring vegetation removal.
Sensitivity	Moderate–low A small number of residents would experience direct and repeated changed foreground views of the project.
Impact	Moderate–high

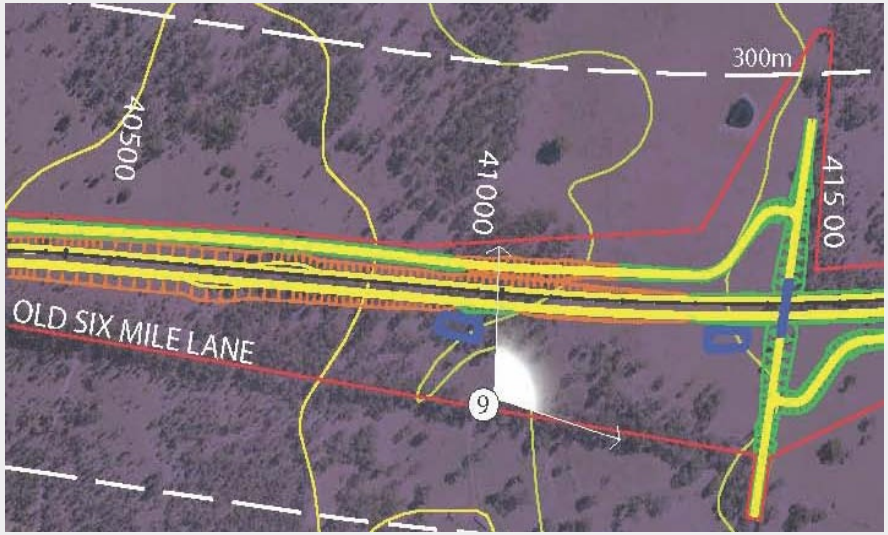


Table 11-17: Visual impacts of the project from viewpoint 10 (Section 3)

10_Avenue Road – crossing at Wants Lane (Middle ground view)		
Magnitude	Moderate–high New infrastructure would be on fill embankment in an existing agricultural setting, requiring vegetation removal.	
Sensitivity	Moderate A small number of residents and users of local roads would experience long-duration and/or repeated views of the project.	
Impact	Moderate–high	

Table 11-18: Visual impacts of the project from viewpoint 17 (Section 3)

17_Pine Brush Forest (Foreground view)	
Magnitude	Moderate–high New infrastructure would be in a natural setting, requiring major tree removal and earthworks. The cutting would reduce visibility.
Sensitivity	High Few vehicles would use the property access. The project would remove a highly sensitive area of High Conservation Value Old Growth Forest is listed on State Heritage Register.
Impact	High

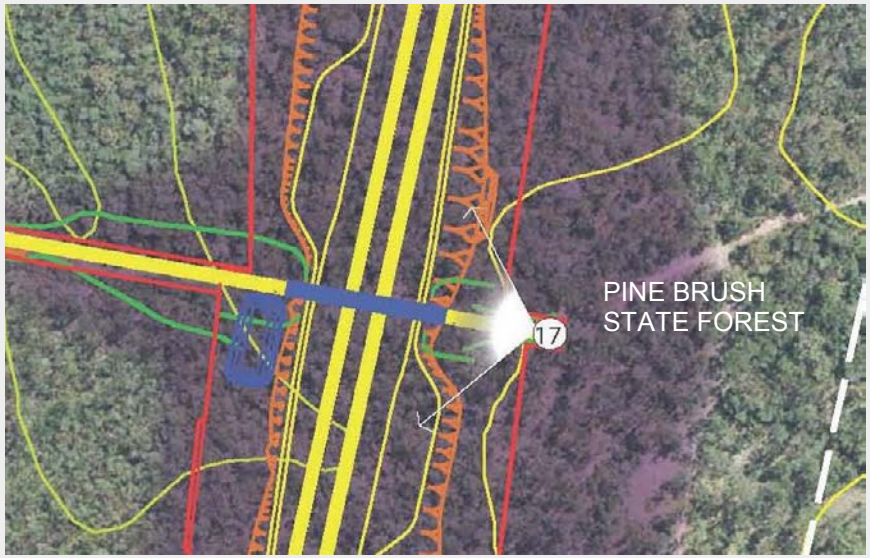


Table 11-19: Visual impacts of the project from viewpoint 18 (Section 3)

18_Pacific Highway, Tyndale (Foreground view)	
Magnitude	High New infrastructure would be in a natural setting, requiring tree removal and earthworks, and a large cutting into Bondi Hill.
Sensitivity	High A large number of residents and users of local roads would experience long-duration and/or repeated views of a changed foreground. The project would be visible to a high number of existing highway motorists.
Impact	High

Table 11-20: Visual impacts of the project from viewpoint 20B (Section 4)

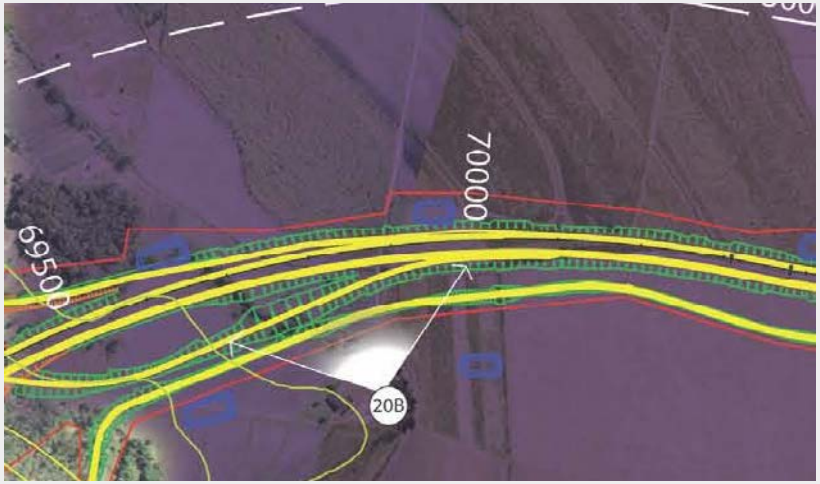
20B_Cane fields, Tyndale (north) (Foreground view)		
Magnitude	High Significant new infrastructure would be in an agricultural setting, with minor filling and disturbance to vegetation.	
Sensitivity	Moderate Adjacent residents would experience repeated and long-duration views of the project.	
Impact	Moderate–high	

Table 11-21: Visual impacts of the project from viewpoint 20C (Section 4)

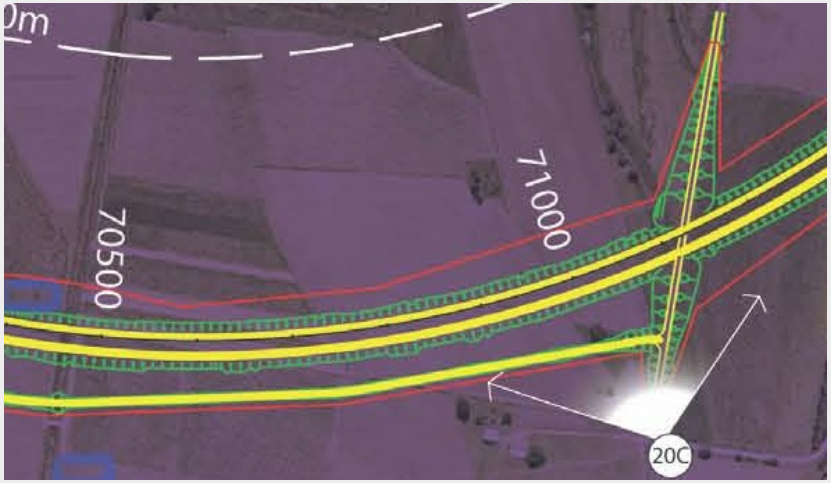
20C_Byrons Lane, Tyndale (north) (Foreground view)		
Magnitude	High Significant new infrastructure would be in an agricultural setting, with minor filling and disturbance to vegetation.	
Sensitivity	Moderate Adjacent residents would experience repeated and long-duration views of the project.	
Impact	Moderate–high	

Table 11-22: Visual impacts of the project from viewpoint 24A (Section 4)

24A_Ferry Park, Maclean (Foreground view)	
Magnitude	High Major new infrastructure would be in an agricultural landscape. Infrastructure is typical of existing highway infrastructure.
Sensitivity	Moderate A high number of motorists on local roads would experience repeated views of the project.
Impact	Moderate–high

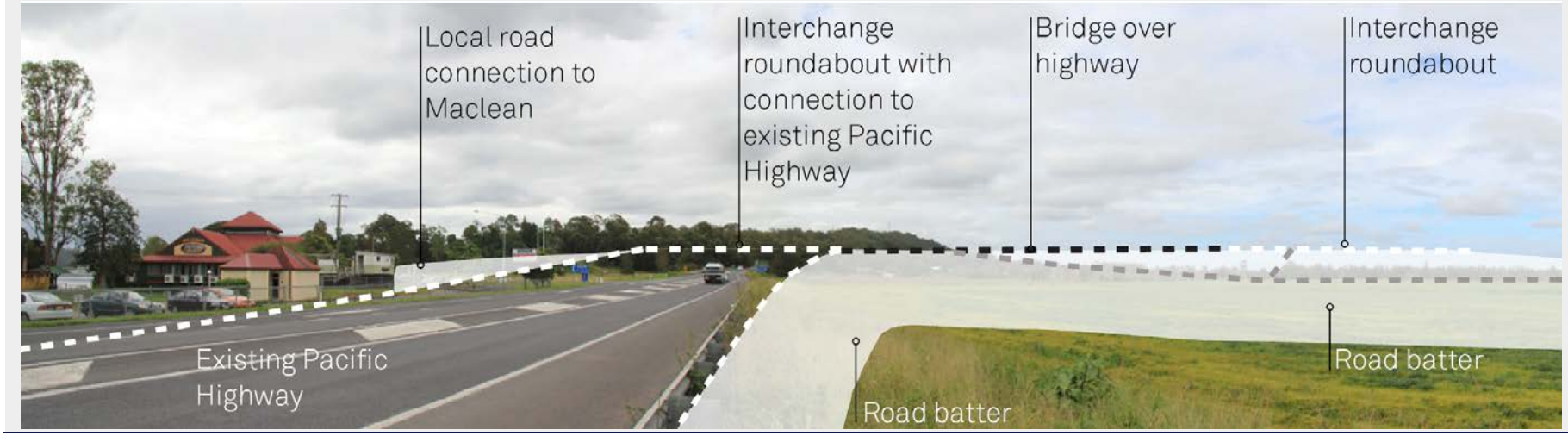


Table 11-23: Visual impacts of the project from viewpoint 24B (Section 4)

24B_Schwonberg Street, Townsend (Foreground view)	
Magnitude	Moderate New infrastructure is typical of existing infrastructure.
Sensitivity	Moderate Low number of residences on Schwonberg and Jubilee streets with long duration and/ or repeated views to changed foreground.
Impact	Moderate–high

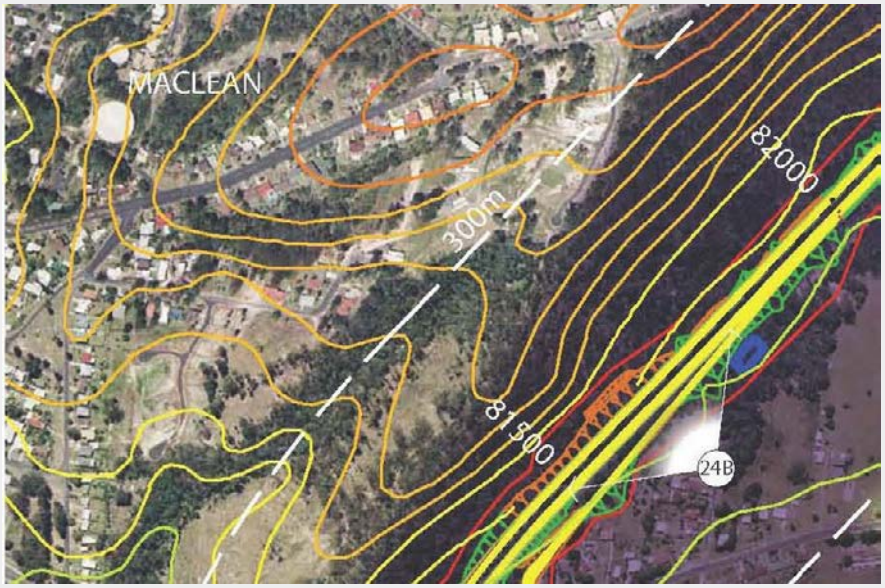


Table 11-24: Visual impacts of the project from viewpoint 26B (Section 5)

26B_Yamba Road, South Harwood (Middle ground view)	
Magnitude	High The Clarence River bridge and embankments would dominate the foreground to middle ground view.
Sensitivity	Moderate There would be considerable sensitivity for few residents with long duration views, and lower sensitivity for local people with repeated short-term views.
Impact	Moderate – high

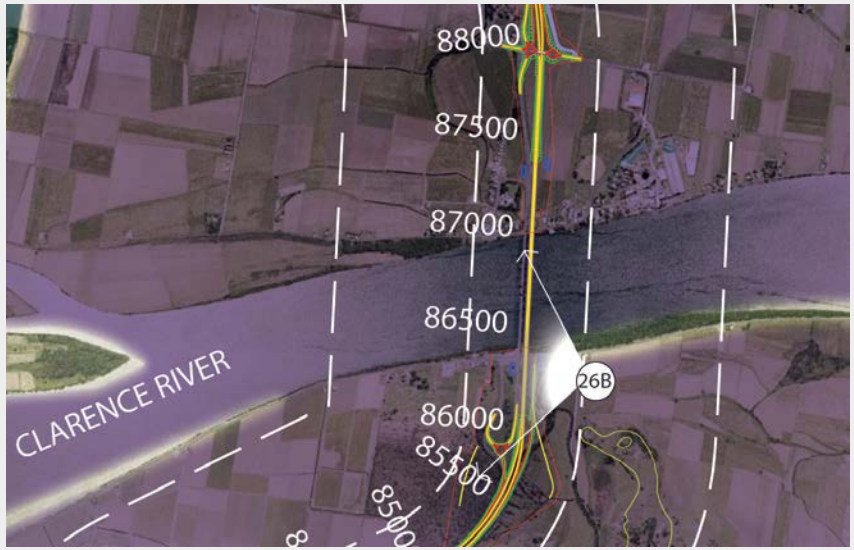


Table 11-25: Visual impacts of the project from viewpoint 28 (Section 5)

28_Public Jetty, Clarence River, Harwood (Foreground view)	
Magnitude	High The Clarence River bridge would be built at the existing crossing.
Sensitivity	High Considerable sensitivity around the local heritage listed existing Harwood bridge. Many local residents would have repeated, changed views in a highly scenic setting.
Impact	High

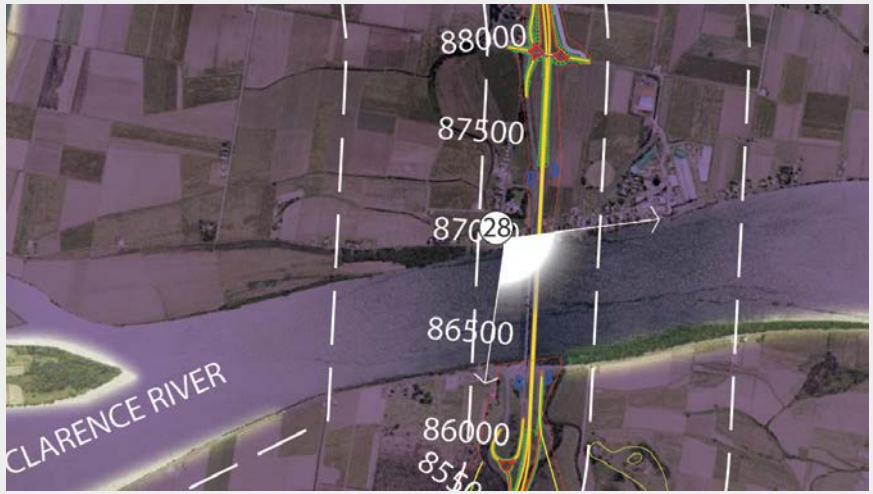


Table 11-26: Visual impacts of the project from viewpoint 29 (Section 5)

29_ End Harwood Road, Harwood (Middle ground view)	
Magnitude	High The Clarence River bridge would be built at the existing crossing.
Sensitivity	High Considerable sensitivity around the local heritage listed existing Harwood bridge. Many local residents would have repeated, changed views in a highly scenic setting.
Impact	High

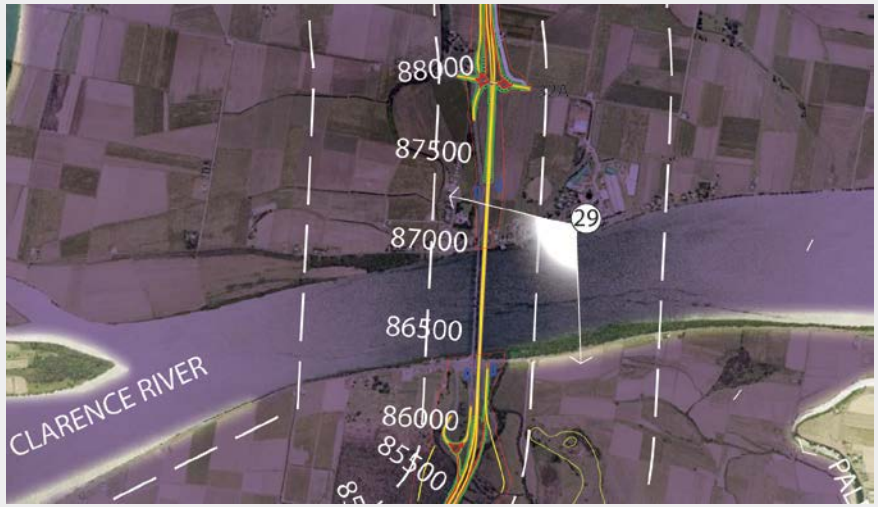


Table 11-27: Visual impacts of the project from viewpoint 32A (Section 5)

32A_Watts Lane (East), Harwood Interim option (Foreground view)	
Magnitude	Moderate–high An elevated interchange would be built in an agricultural/ floodplain landscape.
Sensitivity	Moderate–high Low number of residents with a changed foreground view.
Impact	Moderate–high
32A_Watts Lane (East), Harwood Ultimate option. (Foreground view)	
Magnitude	Moderate–high A new service road is proposed at this interchange.
Sensitivity	Moderate–high Low number of residents with changed foreground view.
Impact	Moderate–high

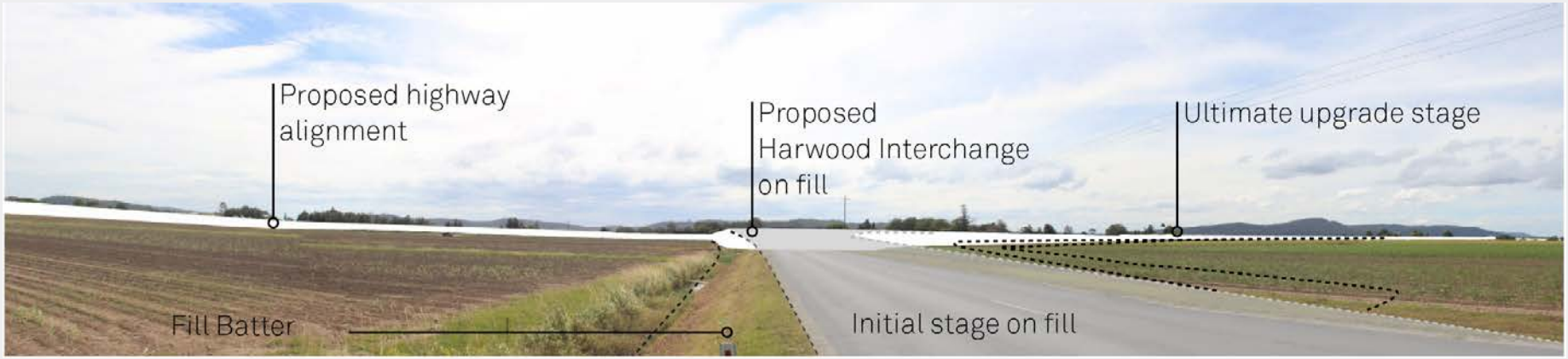


Table 11-28: Visual impacts of the project from viewpoint 32B (Section 5)

32B_Watts Lane (West), Harwood (Foreground view)	
Magnitude	High A highly prominent overpass (9 metres high) would be built in an agricultural/ floodplain landscape. New embankments would be squeezed around existing homes.
Sensitivity	Moderate A low number of residents would have long duration views of the project. Many motorists on the highway have fleeting views of the project.
Impact	Moderate –high

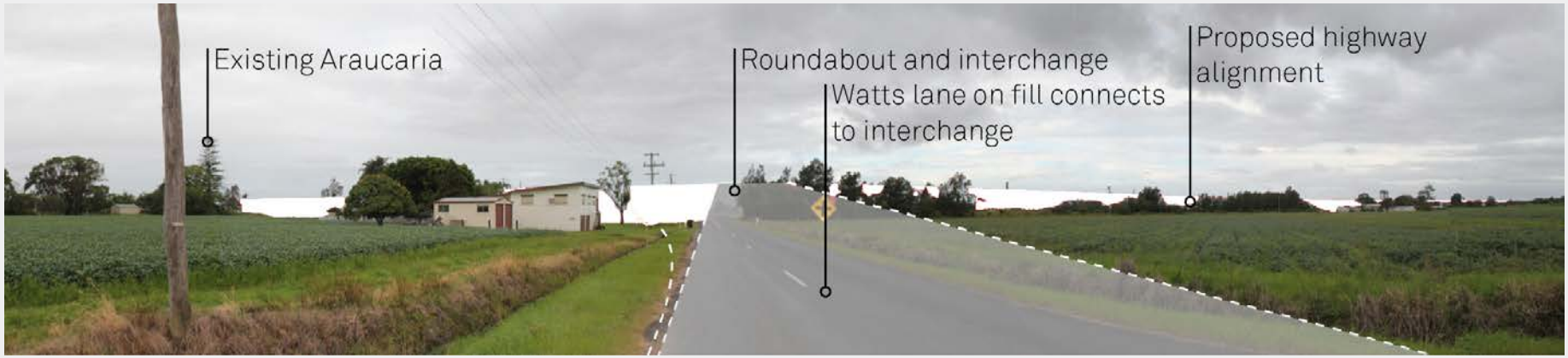


Table 11-29: Visual impacts of the project from viewpoint 36B (Section 5)

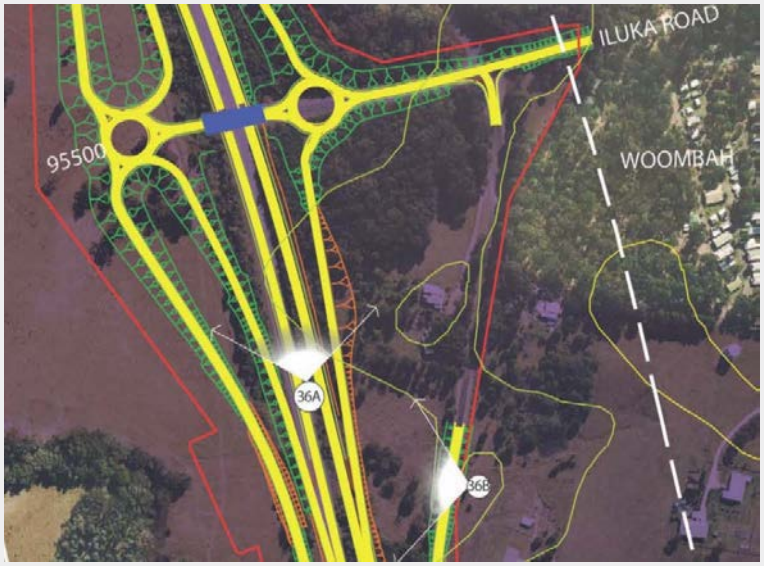
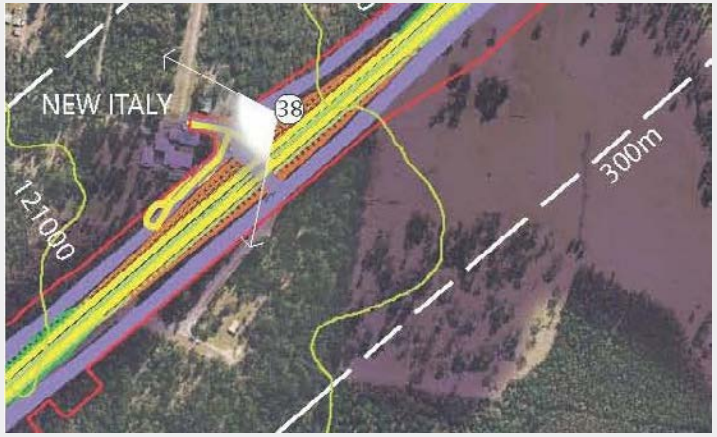
36B_Pacific Highway, Iluka (Foreground view)		
Magnitude	High Additional road infrastructure and an interchange would be visible due to vegetation removal near local residences. If some vegetation were retained, it would reduce visibility.	
Sensitivity	High The project would be repeatedly visible to a moderate number of local residents and from local roads.	
Impact	High	

Table 11-30: Visual impacts of the project from viewpoint 38 (Section 7)

38_Swan Bay – New Italy Road, New Italy Interim option (Foreground view)	
Magnitude	Moderate The project would comprise infrastructure typical of existing infrastructure, but with a major change in scale.
Sensitivity	High This is a highly sensitive heritage and cultural site and tourist destination.
Impact	Moderate –high
38_Swan Bay – New Italy Road, New Italy Ultimate option (Foreground view)	
Magnitude	High The project would comprise infrastructure typical of existing infrastructure, but with a major change in scale.
Sensitivity	High This is a highly sensitive heritage and cultural site and tourist destination.
Impact	High



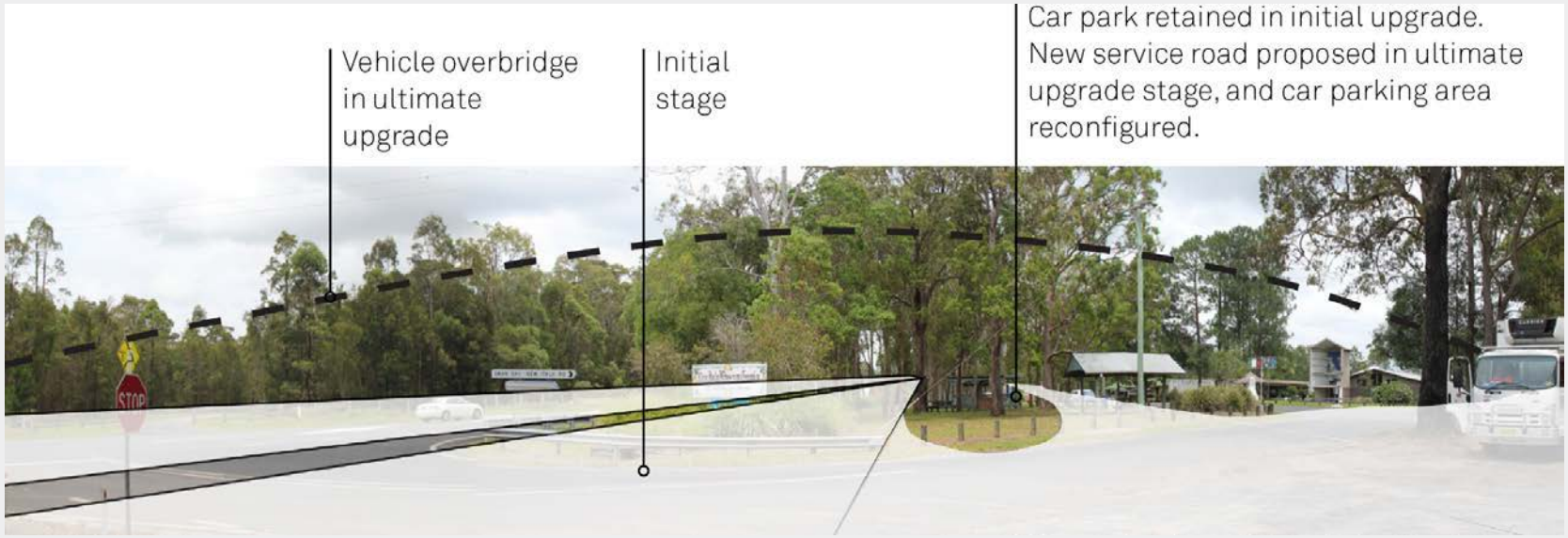


Table 11-31: Visual impacts of the project from viewpoint 39 (Section 8)

39_Pacific Highway, South Woodburn (Foreground view)	
Magnitude	High The project would involve major removal of forest for a new interchange.
Sensitivity	Moderate–low The project would be visible from a low number of local residences. A high number of motorists would also have fleeting glimpses of the project.
Impact	Moderate –high

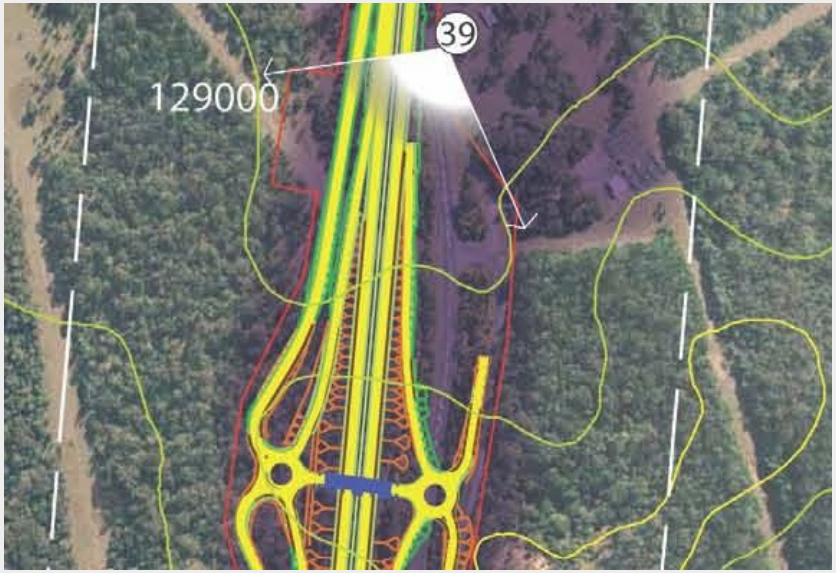


Table 11-32: Visual impacts of the project from viewpoint 42 (Section 8)

42_Evans Head Road, Woodburn (Foreground view)	
Magnitude	High The project would involve large embankments and loss of vegetation.
Sensitivity	Moderate The project would be visible to a low number of local residents and road users.
Impact	Moderate-high

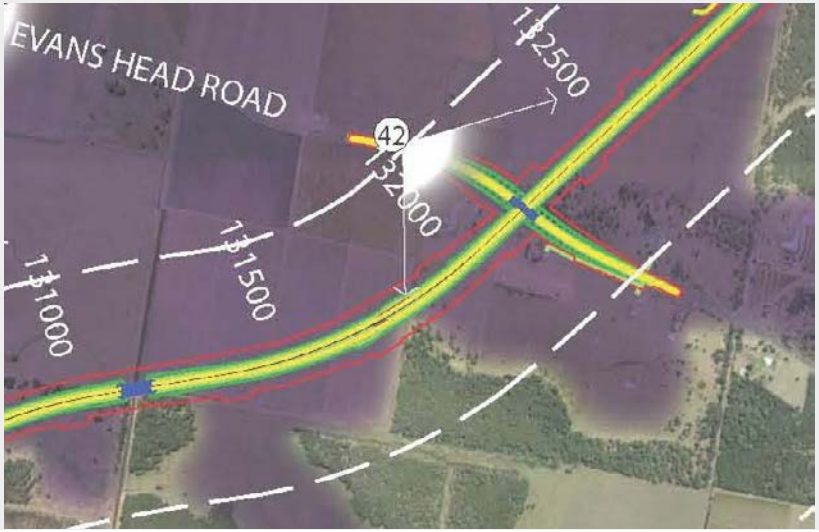


Table 11-33: Visual impacts of the project from viewpoint 43A (Section 9)

43A _Evans Head Road, Broadwater (Middle ground view)	
Magnitude	High The project would involve major infrastructure in a natural setting, requiring vegetation removal and major earthworks.
Sensitivity	Moderate–low The project would be visible to a low number of local people.
Impact	Moderate–high

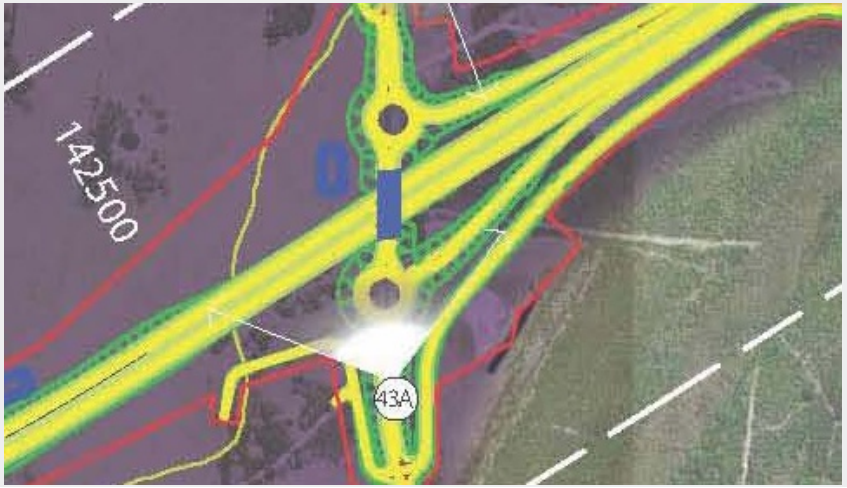


Table 11-34: Visual impacts of the project from viewpoint 43B (Section 9)

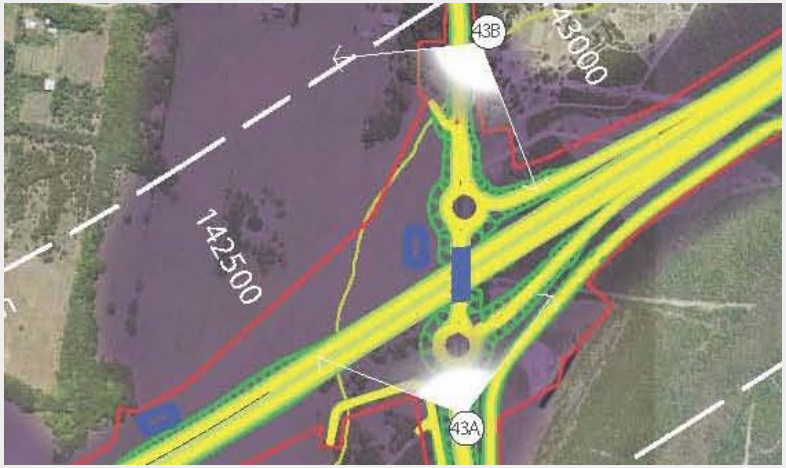
43B_Evans Head Road, Broadwater (Middle ground view)		
Magnitude	High The project would involve major infrastructure in a natural setting, requiring vegetation removal and major earthworks.	
Sensitivity	Moderate–low The project would be visible to a low number of local people.	
Impact	Moderate–high	

Table 11-35: Visual impacts of the project from viewpoint 51 (Section 10)

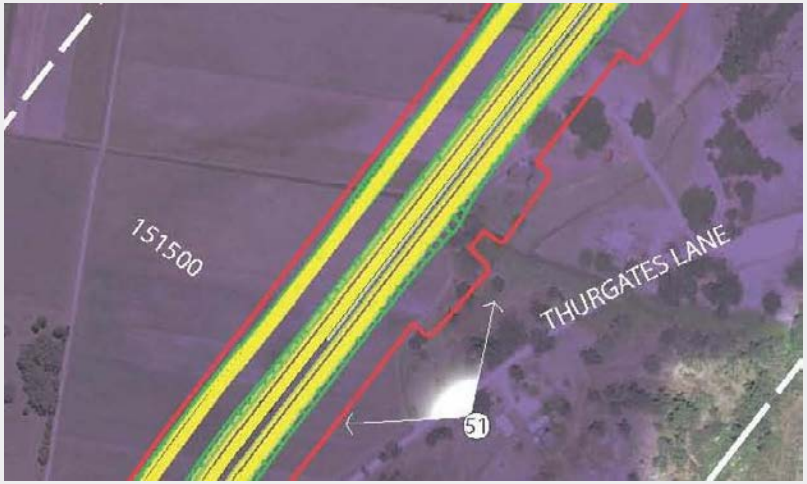
51_Thurgates Lane (Foreground view)		
Magnitude	High Major infrastructure would be in a scenic agricultural setting.	
Sensitivity	Moderate A low number of residents would have direct and repeated views of the project.	
Impact	Moderate– high	

Table 11-36: Visual impacts of the project from viewpoint 52 (Section 10)

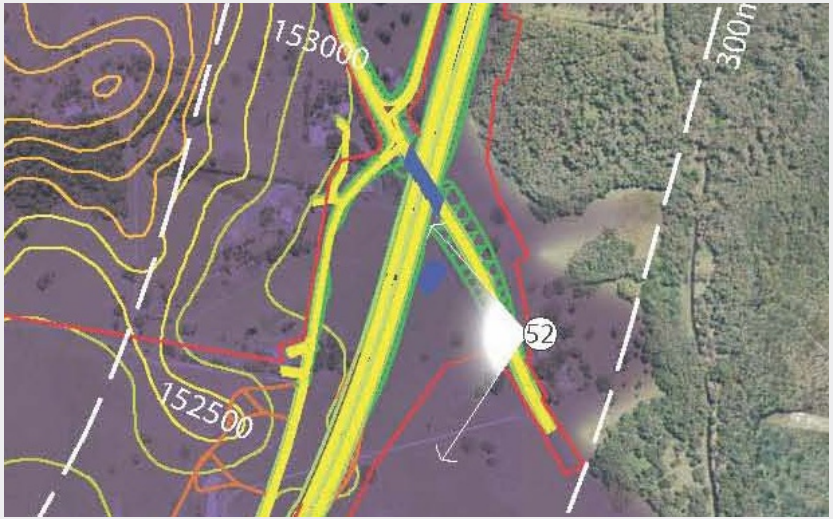
52_Wardell Road (Foreground view)		
Magnitude	High Major infrastructure would be in a scenic agricultural setting, with earthworks and vegetation removal. In particular, a cut batter would be visible at this location. The extent of excavation would be reviewed at the detailed design stage.	
Sensitivity	Moderate A low number of local people would have repeated and/or long-duration views of the project.	
Impact	Moderate-high	

Table 11-37: Visual impacts of the project from viewpoint 53 (Section 10)

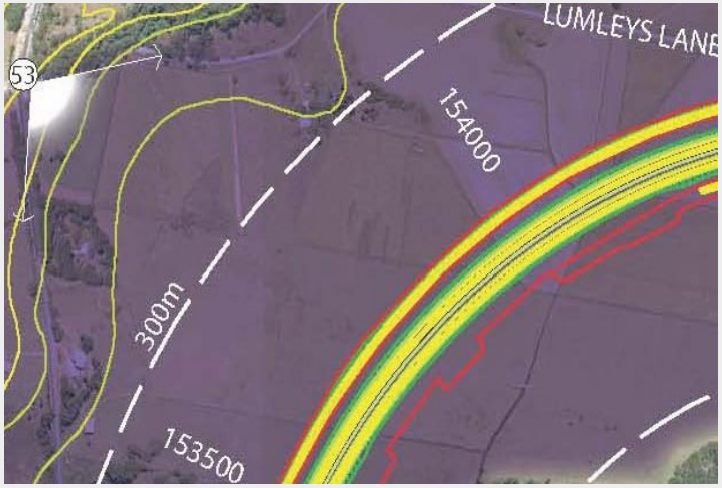
53_Lumleys Lane, Wardell (Middle-ground view)		
Magnitude	High Major infrastructure would be in a scenic agricultural setting.	
Sensitivity	Moderate A low number of local people would have repeated and/or long-duration views of the project.	
Impact	Moderate– high	

Table 11-38: Visual impacts of the project from viewpoint 54 (Section 10)

54_Lumleys Lane, Wardell (Foreground view)	
Magnitude	High Major infrastructure would be in a scenic agricultural setting.
Sensitivity	Moderate The project would be visible to motorists using the new highway and local residents.
Impact	Moderate–high

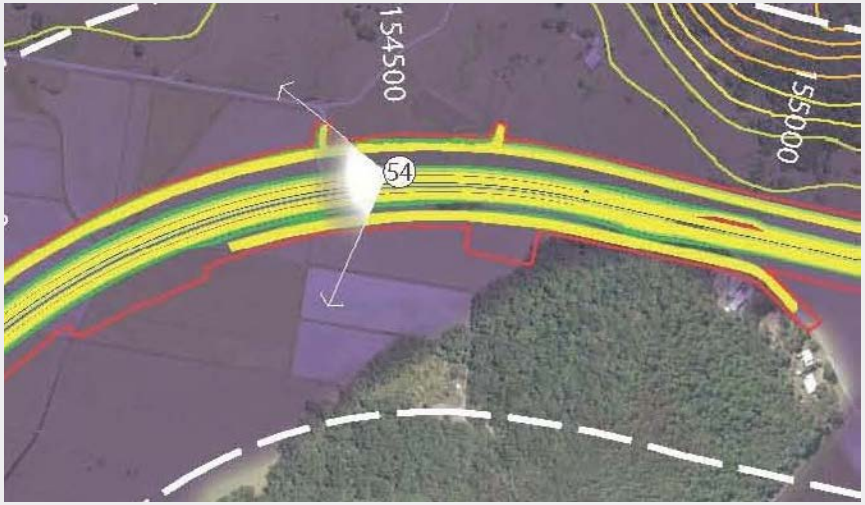


Table 11-39: Visual impacts of the project from viewpoint 55 (Section 10)

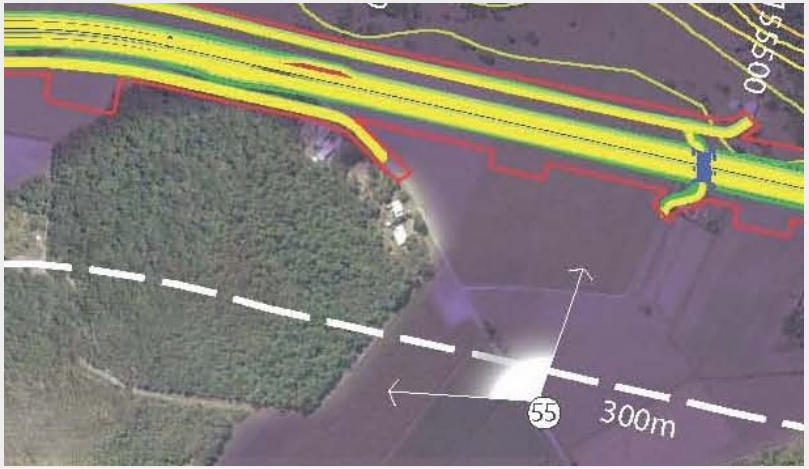
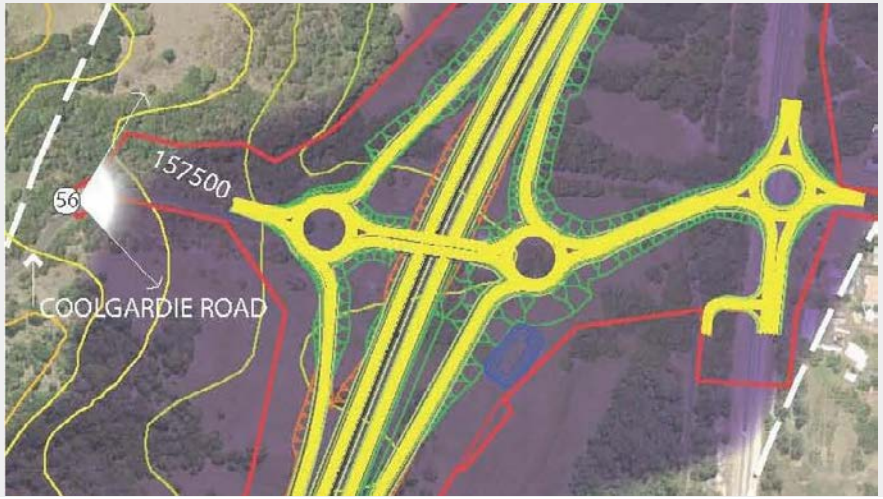
55_Lumleys Lane, Wardell (Middle ground view)		
Magnitude	Moderate–high Major infrastructure would be in a scenic agricultural setting.	
Sensitivity	Moderate The project would be repeatedly visible from the local road network.	
Impact	Moderate– high	

Table 11-40: Visual impacts of the project from viewpoint 56 (Section 10)

56_Coolgardie Road, Coolgardie (Foreground view)	
Magnitude	High The project would involve large-scale vegetation removal.
Sensitivity	Moderate The foreground view would be changed from a low number of residences. The project would be generally well screened by woodland, and mostly visible only to highway motorists.
Impact	Moderate–high



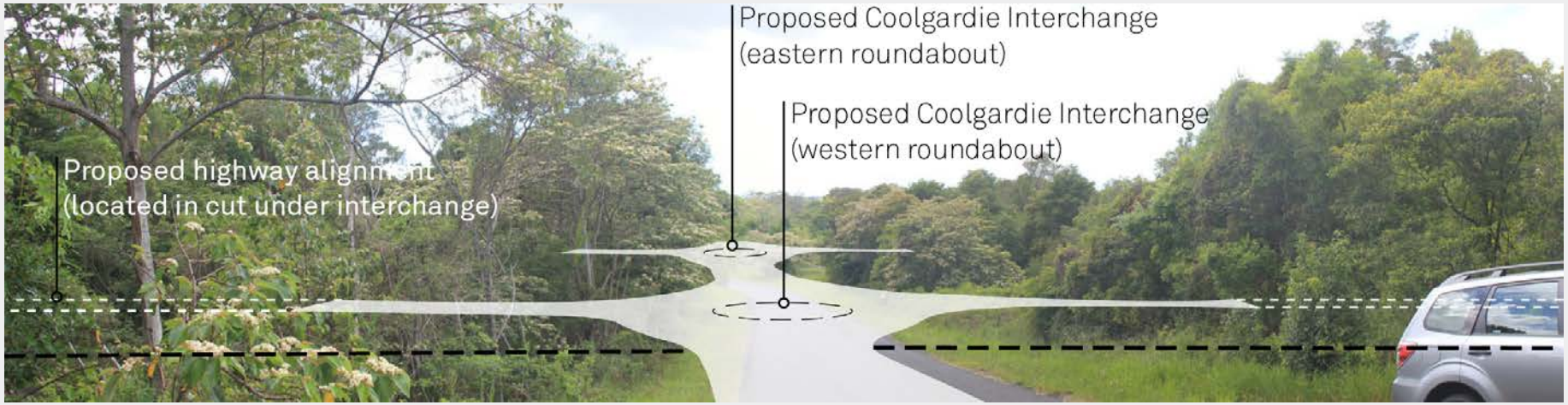


Table 11-41: Visual impacts of the project from viewpoint 60 (Section 11)

60_Whytes Lane, Pimlico (Foreground view)	
Magnitude	High Elevated infrastructure would be on floodplain agricultural land but typical of existing infrastructure. Vegetation removal would increase visibility of the project.
Sensitivity	Moderate A low number of local residents would experience a changed foreground view.
Impact	Moderate–high

11.4 Management of impacts

The implementation of management and design measures would achieve an elegant, simple and durable design solution and would assist in mitigating the identified landscape character and visual impacts. The landscape character and visual impact assessment has been undertaken concurrently with development of the engineering design in an iterative and collaborative process which has allowed coordination of engineering, urban design and landscape aspirations. Urban design and visual considerations have influenced the design itself as well as determined the future management strategies.

11.4.1 Urban design and landscape strategy

An urban design and landscape strategy has been prepared in accordance with Beyond the Pavement (RTA, 2009a) and Pacific Highway Urban Design Framework (RTA, 2005) to provide a high quality design consistent with the overall design of the Pacific Highway Upgrade Program. The strategy also seeks to integrate the project sensitively into the character of the built and natural environment including affected localities.

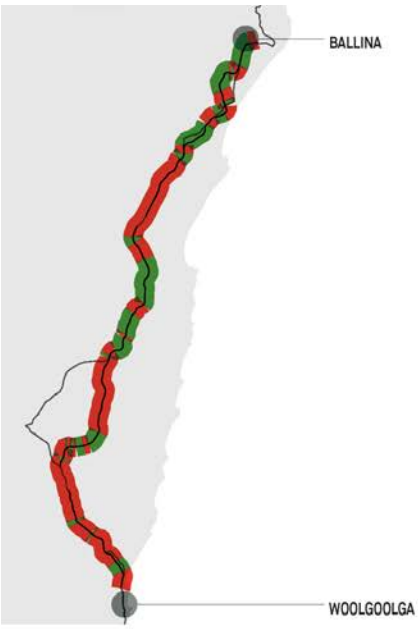
The objectives of the urban design and landscape strategy, in accordance with Pacific Highway Urban Design Framework and its vision statement are to:

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

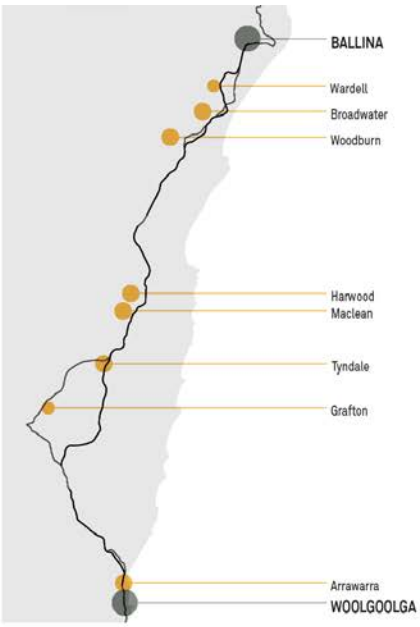
Four key landscape and urban design strategies underpin the formulation of the landscape and urban strategy for the project. These are summarised as:

1. Retain the strong contrasting experience of driving through forest and open agricultural land as a feature of the Pacific Highway experience.
2. Acknowledging and celebrate the small and medium sized coastal towns that mark progress along the coastal Pacific Highway journey.
3. Highlight and celebrate the numerous minor and major creek and river crossings that punctuate the Pacific Highway journey over the coastal floodplains.
4. Acknowledge and preserve the natural and cultural landscapes and landmarks identified along the full length of the Pacific Highway journey.

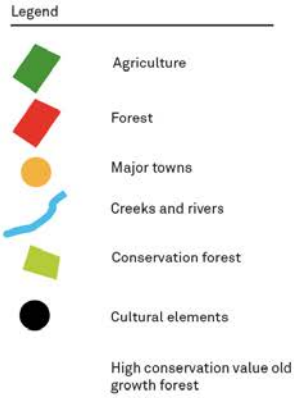
These strategies are shown in Figure 11-14.The strategy that incorporates these project objectives and principles is shown in Working paper – Urban design, landscape character and visual impact (Figures LA 1 to LA36)

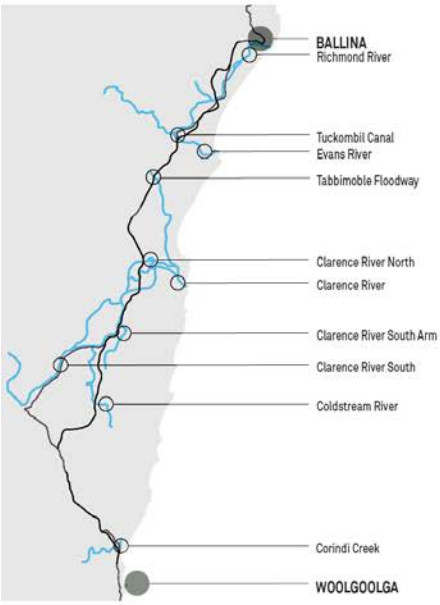


Principle 1: Retain the strong contrasting experience of driving through forest and open agricultural land as a feature of the Pacific Highway experience.

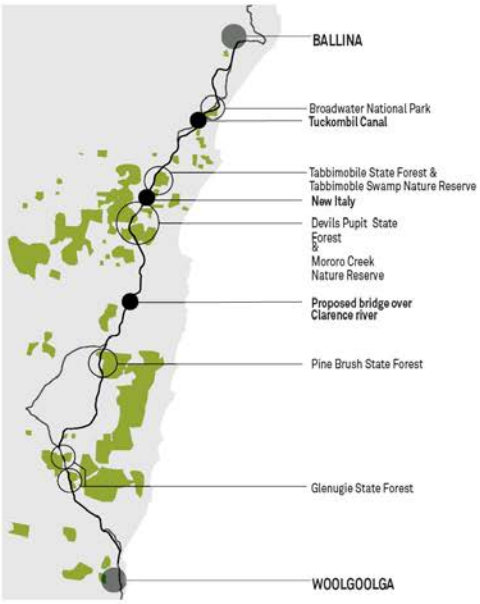


Principle 2: Acknowledging and celebrate the small and medium sized coastal towns that mark progress along the coastal Pacific Highway journey.





Principle 3: Highlight and celebrate the numerous minor and major creek and river crossings that punctuate the Pacific Highway journey over the coastal floodplains.



Principle 4: Acknowledge and preserve the natural and cultural landscapes and landmarks identified along the full length of the Pacific Highway journey.

Figure 11-14: Summary of landscape and urban design strategy for the project

11.4.2 Mitigation measures

Mitigation measures have been identified for the design of the project elements as well as to mitigate visual impacts to viewpoints (detailed in Table 11-43). These mitigation measures are a summary of those identified in Working paper – Urban design, landscape character and visual impact.

Mitigation measures for the viewpoints identified in section 11.3.3 are detailed in Table 11-42.

Table 11-42: Viewpoint mitigation measures

Viewpoint	Management of impacts
Project Section 1	
02B_Flinty Road, Dirty Creek Range	• Minimise the area of trees to be removed • Plant local woodland trees on fill batters.
Project Section 3	
9_ Old Six Mile Road, near Wants Lane	• Minimise loss of existing trees • Plant dense low grasses / ground covers on low fill batters • Reinstate woodland trees between Six Mile Lane and the project.
10_Avenue Road – crossing at Wants Lane	• Plant dense low grasses / ground covers on low fill batter • Highlight new interchange with landscape treatment including local woodland trees in accordance with detailed landscape design.
17_Pine Brush Forest	• Minimise loss of existing trees • Plant local forest trees on cut / fill batters • Reinstate local forest vegetation where applicable.
18_Pacific Highway, Tyndale	• Minimise loss of existing forest trees • Lay back and feather top cut batters (1:3) to blend with natural landform • Plant local forest trees on cut / fill batters • Provide new landscape treatment in accordance with the concept design • Use steep batters (0.25H:1V) wherever there is competent rock to minimise the loss of forest vegetation.
Project Section 4	
20B_Cane fields, Tyndale (north)	• Minimise loss of existing vegetation • Provide screen tree and shrub planting on embankments and between access and service roads in accordance with the landscape concept strategy and to provide a screen to nearby homes. • Prepare detail landscape designs in accordance with the landscape concept strategy.
20C_Byrons Lane, Tyndale (north)	• Minimise loss of existing vegetation • Provide screen tree and shrub planting on embankments and between access and service roads in accordance with the landscape concept strategy and to provide a screen to nearby homes. • Prepare detail landscape designs in accordance with the landscape concept strategy.
24A_Ferry Park, Maclean	• Provide landmark tree planting to highlight to entry to Maclean from the exiting highway. In accordance with the concept design • Consider additional fill between highway service roads to minimise the excessive height of embankments.
24B_Schwonberg Street, Townsend	• Replace existing roadside screen vegetation to provide a screen between the highway and local homes along Schwonberg and Jubilee Streets.

Viewpoint	Management of impacts
Project Section 5	
26B_Yamba Road, South Harwood	• Minimise the loss of existing riparian vegetation as much as possible • Minimise the depth of the bridge deck • Avoid adding acoustic barriers above the bridge deck. If this is necessary use transparent barriers • Provide a high quality bridge design in accordance with the Bridge Aesthetic Guideline, Centre for Urban Design (RMS, 2012) • Refer to specific landscape and urban design strategies • Provide screen planting to the new elevated approach road embankment in accordance with the concept design.
28_Public Jetty, Clarence River, Harwood	• Minimise the loss of existing riparian vegetation • Minimise the depth of the bridge deck • Avoid use of acoustic barriers above the bridge deck. If this is necessary, transparent barriers would be used • Align new bridge piers with existing bridge piers • Provide a high quality bridge design in accordance with the Bridge Aesthetic Guideline, Centre for Urban Design (RMS, 2012). • Refer to specific landscape and urban design strategies.
29_ End Harwood Road, Harwood	• Minimise the loss of existing riparian vegetation • Minimise the depth of the bridge deck • Avoid adding use of acoustic barriers above the bridge deck. If this is necessary use transparent barriers would be used • Align new bridge piers with existing bridge piers • Provide a high quality bridge design in accordance with the Bridge Aesthetic Guideline, Centre for Urban Design (RMS, 2012) • Refer to specific landscape and urban design strategies.
32A_Watts Lane (East), Harwood Interim option	• Minimise loss of existing trees • Plant dense low grasses / ground covers on fill batters • Reinstate agricultural land where possible
32A_Watts Lane (East), Harwood Ultimate option	• Minimise loss of existing trees • Plant dense low grasses / ground covers on fill batters • Reinstate agricultural land where possible
32B_Watts Lane (West), Harwood	• Provide screen tree and shrub planting on embankments and between access and service roads in accordance with the landscape concept strategy and to provide a dense screen to nearby homes • Highlight the highway and over pass routes with formal tree planting • Prepare detail landscape design in accordance with the landscape concept strategy • Consider filling between service roads and highway to reduce height of embankments • Retain existing Araucaria which is prominent in the existing landscape.
36B_Pacific Highway, Iluka	• Retain existing vegetation wherever possible to provide a natural screen to the project • Provide new screen and forest planting along the alignment of the new upgrade (including all service roads) in accordance with the concept design • Revegetate between the interchange at Iluka Road and existing homes located on the east side in accordance with the concept design.

Viewpoint	Management of impacts
Project Section 7	
38_Swan Bay – New Italy Road, New Italy	• Minimise loss of existing trees • Plant local woodland / forest trees on cut / fill batters • Reinstate local forest vegetation where applicable.
Project Section 8	
39_Pacific Highway, South Woodburn	• Minimise loss of existing trees • Plant local woodland / forest trees on cut / fill batters • Reinstate local forest vegetation where applicable.
42_Evans Head Road, Woodburn	• Provide new screen planting buffer to existing homes in accordance with the concept design • Provide new woodland / forest trees to extend existing trees to extend existing tree patterns in the landscape in accordance with the concept design.
• **Project Section 9**	
43A and 43B_Evans Head Road, Broadwater	• Minimise loss of existing trees • Provide new screen planting buffer to existing residences in accordance with the concept design • Provide new native heath vegetation to reinstate existing heath land in accordance with the concept design • Reinstate agricultural land where possible.
• **Project Section 10**	
51_Thurgates Lane	• Minimise loss of existing trees • Plant dense low grasses / ground covers on fill batters • Reinstate agriculture land were possible.
52_Wardell Road	• Minimise loss of existing trees • Lay back and feather top cut of large batters to blend with natural landform • Plant local forest trees on large cut batter. Blend into existing landscape. • Provide new landscape treatment in accordance with the concept design.
53_Lumleys Lane, Wardell	• Minimise loss of existing trees • Plant dense low grasses / ground cover on fill batters • Reinstate agricultural land where possible.
54_Lumleys Lane, Wardell	• Minimise loss of existing trees • Plant dense low grasses / ground cover on fill batters • Reinstate agricultural land where possible.
55_Lumleys Lane, Wardell	• Minimise loss of existing trees • Plant dense low grasses / ground cover on fill batters • Reinstate agricultural land where possible.
56_Coolgardie Road, Coolgardie	• Minimise loss of existing trees • Plant local forest trees on cut / fill batters • Reinstate local forest vegetation where applicable • Provide new screen planting buffer to existing homes and landscape treatment generally in accordance with the concept design.
• **Project Section 11**	
60_Whytes Lane, Pimlico	• Plant dense low grasses / ground cover on fill batters • Reinstate agricultural land where possible • Provide intermittent screen planting on batters to screen the project from individual residences in accordance with the concept design.

Table 11-43: Visual amenity, urban design and landscape mitigation measures

Issue	Mitigation ID no.	Mitigation measure	Timing	Relevant section
Noise wall visual impacts	UD1	If further noise modelling undertaken during detailed design identifies that noise walls would be required, further visual assessment will be required to address the visual implications of the change. Their location and design would be in accordance with the Noise Wall Design Guideline (RTA, 2007) and the principles identified in Working paper – Urban design, landscape character and visual impact (Section 4.6.3).	Pre-construction	All
Clarence River and Richmond River bridge impacts	UD2	If the design of the Clarence and Richmond rivers bridges changes from the structures identified and assessed in this EIS, further visual assessment would be required, including assessment of any shadowing impacts. Any changes would consider the principles identified in Working paper – Urban design, landscape character and visual impact (Section 4.6.2).	Pre-construction	5, 9
Landscaping and planting strategy	UD3	The project would be carried out in accordance with the urban design and landscaping strategy, as identified in Section 11.4.1 of this EIS. It would be further developed into detailed landscape design for all project batters, and median planting areas would be developed in accordance with the Landscape Guidelines (RTA, 2008), the requirements of the Working paper – Biodiversity (Section 5.2.2) and the landscape strategy to provide a robust, successful and effective planting design.	Pre-construction	All
	UD4	Mitigation measures identified to mitigate visual impacts to viewpoints would be implemented as per the Working paper – Urban design, landscape character and visual impact (Section 4) and the urban design and landscape strategy.	Pre-construction and construction	All
Design of urban design features and road furniture	UD5	The built form of the project, including consideration of the height, bulk, scale, materials and finishes for: • Bridges • Retaining walls • Cuttings and embankments • Road barriers • Signage • Fences • Clear zones • Topsoil management • Water quality control ponds • Fauna crossing • Place marking and cultural plantings would be designed in accordance with the design principles identified in Working Working paper – Urban design, landscape character and visual impact, and relevant RMS guidelines including Beyond the Pavement (RTA, 2009a), Pacific Highway Urban Design Framework (RTA, 2005) and Bridge Aesthetic Guidelines (RMS, 2012).	Pre-construction	All

Issue	Mitigation ID no.	Mitigation measure	Timing	Relevant section
Shadowing	UD6	Further assessment would be undertaken of the impact of overshadowing on areas surrounding the project, particularly around Harwood Bridge, interchanges and overpasses near residential properties.	Pre-construction	All
Visual impacts from viewpoints	UD7	Measures to mitigate visual impacts on particular residences would be implemented, as identified in Table 11-42 and Working paper – Urban design, landscape character and visual impact. If any further viewpoints were identified during detailed design that would have a moderate–high or high impact, screen planting would also be considered.	Construction	All
Construction visual impacts	UD8	Disturbed areas would be progressively revegetated throughout the construction period.	Construction	All
Visual impacts of ancillary facilities	UD9	Typical landscape treatments for ancillary facilities in forest areas would include: • Providing screen planting at ancillary facility locations to minimise visual impact and disturbance • Considering reinstatement of disturbed forest in heavily forested areas to ensure existing ecological corridors are maintained • Considering the importance of the visual landscape at each ancillary facility location and allowing restoration of important forest vegetation to prominent ridge lines or other landscape elements as appropriate • Negotiating with private landowners, as applicable, to determine future treatments for other non-forested ancillary facility locations. • Regrading disturbed areas to achieve a sustainable and functional landform • Stabilising all surfaces in accordance with good engineering and environmental practice	Construction	All
Visual impacts of ancillary facilities	UD10	Typical landscape treatments for ancillary facilities in agricultural areas would include: • Considering returning remnant agricultural land to agricultural uses • Providing screen planting to ancillary facility locations to minimise visual impact and disturbance • Reinstating ’fingers‘ of riparian vegetation through ancillary facilities, where practicable, in the open landscape • Considering the visual landscape at each ancillary facility and considering restoration of important forest vegetation to prominent ridge lines or other landscape elements as appropriate • Regrading disturbed areas to achieve a sustainable and functional landform. • Stabilising all surfaces in accordance with good engineering and environmental practice.	Construction	All
Visual impact of Lang Hill and Lumleys hill material source	UD11	The extent of excavation and landscaping strategy at Lang Hill and Lumleys Hill would be reviewed considering material requirements on the project and the visual impact on the resultant cutting.	Pre-construction	Section 8 and 10

Issue	Mitigation ID no.	Mitigation measure	Timing	Relevant section
Monitoring of landscaping and rehabilitation	UD12	Landscape and rehabilitation works would be monitored and remedial measures implemented where required until vegetation has stabilised.	Operation	All
Earth mounds	UD13	Any earth mound design is to ensure the mounding profile blends suitably into the existing landscape setting. Any mounding to be landscaped should be compacted in 1.5m layers with 1:3 maximum batter slopes. Permanent mounds should be treated with ameliorants and overlaid with topsoil to minimum 150mm to ensure suitable planting conditions are achieved.	Construction	All
	UD14	Where mounding batters are to be steeper than 1:3, treatments such as the use of gabions or retaining walls should be considered.	Construction	All

References

Hassell 2012; Working paper – Urban design, landscape character and visual impact; Hassell, Sydney, Australia

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Roads and Traffic Authority of NSW (RTA) 2009a B*eyond the Pavement: RTA urban regional design policy, procedures and design principles*, Roads and Traffic Authority of NSW, Sydney, Australia.

Roads and Traffic Authority of NSW (RTA) 2009b *RTA Guidance Note EIA-N04 Guidelines for Landscape Character and Visual Impact Assessment*, Roads and Traffic Authority of NSW, Sydney, Australia.