Appendix D

Landscape Character, Visual Impact Assessment and Urban Design Report
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

*Landscape Character, Visual Impact Assessment and Urban Design Report*

Prepared by Tract Consultants for JACOBS on behalf of Roads and Maritime Services
Executive Summary

Roads and Maritime Services (Roads and Maritime) proposes to upgrade the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow (the proposal) from a current single lane in each direction to a dual carriageway, with two lanes in each direction separated by a central median, over a distance of about 1.6 kilometres. This would improve traffic flow and increase safety for road users, including cyclists and pedestrians. In addition, there are also a number of associated local road adjustments including the upgrade of traffic control signals at Chamberlain Road, new signals at Macdonalds Road and Railway Crescent with a new rail over bridge replacing the existing bridge over the Main North Rail Line at Railway Crescent.

This Visual Impact, Landscape Character and Urban Design assessment has been prepared as part of the Review of Environmental Factors (REF) currently being completed for the proposal and aims to identify the strategies to manage impacts to the environment during construction and operation of the proposal. As part of this process the impacts of the works will be assessed and a framework provided to assist in the mitigation of these impacts as part of the detailed design of the proposal. In doing so a landscape design vision and clear objectives will be established to ensure the design responds to its context and the language of upgrades to either side of the proposal.

The report provides an outline of the physical and cultural landscape context of the site. The way in which these attributes come together has been reviewed to define the Character Zones of the corridor. As part of this process three cultural character zones have been identified and assessed in terms of impact.

- Urban Precinct.
- Local Village.
- Suburban Edge.

And two natural character zones

- Swampland Forest.
- The Hillside Landscape.

The findings of this process revealed that the proposal will generally have a moderate to high impact. The greatest impacts on landscape character are on areas adjoining residential and commercial precincts and included the areas associated with Railway Crescent and Lisarow Anglican Cemetery. Natural areas were determined to have a moderate impact in terms of character due to the reduced sense of enclose and widening of the corridor.

Visually 10 viewpoints were assessed, of which the majority were views from within the corridor. The impact of the proposal upon the views was generally assessed to be moderate to low in terms of impact. This reflects the degree of screening provided by the natural communities and the absence of development immediately adjoining the corridor. Two areas of high impact were identified. These were associated with Railway Crescent local neighbourhood precinct and the Lisarow Anglican Cemetery. The assessment identified that in both locations substantial changes in views would be experienced.

Following from this assessment an Urban Design strategy has been put forward to address and mitigate the impacts identified. This addresses the corridor as a whole before focusing on the management of various elements of the corridor including bridges, retaining walls and the implication of the changes to local access. Along with specific treatments to address key interfaces such as a new identity to Railway Crescent through street tree planting and the manner in which the frontage to Lisarow Cemetery may be handled.
## Contents

1 **Introduction**  
1.1 Purpose of Report 5  
1.2 Proposal Description and Location 6  
1.3 Proposal Objectives 8  
1.4 Reference Documents 9

2 **Proposal Context** 10  
2.1 Land Use 10  
2.2 Traffic and Transport 13  
2.3 Landform and Hydrology 15  
2.3.1 Landform 15  
2.3.2 Hydrology 15  
2.4 Geology and Soils 17  
2.4.1 Yarramalong Soil Landscape 17  
2.4.2 Erina Soil Landscape 17  
2.5 Flora 19  
2.5.1 EEC Swamp Sclerophyll Forest 19  
2.6 Heritage 23

3 **Opportunities and Constraints** 24  
3.1 Constraints 24  
3.2 Opportunities 24

4 **Urban Design Objectives and Principles** 26  
4.1 Urban Design Vision 26  
4.2 Urban Design Objectives and Principles 26

5 **Urban design Concept** 28  
5.1 Introduction 28  
5.2 Urban Design Strategy 28  
5.2.1 The Urban Interface 28  
5.2.2 The EEC Swamp Sclerophyll Forest 29  
5.2.3 EEC Freshwater Wetlands Interface 29  
5.2.4 Coastal Narrabeen Moist Forest 29  
5.3 Access 40  
5.4 Built form 40  
5.4.1 Bridges 40  
5.5 Retaining Walls 43  
5.5.1 Retaining walls below the road 45  
5.5.2 Retaining walls above the road 45

6 **Impact Assessment Methodology** 47
6.1 Landscape Character Impact Assessment 47
6.2 Visual Impact Assessment 48
6.3 Landscape Character and Visual Assessment Matrix 48

7 Landscape Character and Visual Assessment 49
7.1 Landscape Character Assessment 49
7.1.1 Character Zone 1 – Urban Precinct 49
7.1.2 Character Zone 2 – Swampland Forest 52
7.1.3 Character Zone 3 – Local Village 53
7.1.4 Character Zone 4 – The Hillside Landscape 54
7.1.5 Character Zone 5 – Suburban Edge 57
7.2 Landscape Character Impact Assessment Summary 58
7.3 Visual Impact Assessment 58
7.3.1 Visual Envelope Mapping 58
7.4 Visual Assessment Summary 66

8 Mitigation Strategies 68
8.1.1 Environmental Management Zone adjacent Lisarow Station to the railway over pass 68
8.1.2 Lisarow Anglican Cemetery 69
8.2 Noise Mitigation 70

9 Conclusion 71

10 References 72

List of Figures

Figure 1 – Regional Map (Base source Sixviewer, 2014) 7
Figure 2 – Local Map (Base source: Sixviewer, 2014) 8
Figure 3 – Land Use Map (Based on Hillard Civil, 2013 ‘Land Use and Property Impact Plan) 11
Figure 4 – Traffic and Transport Map (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’) 14
Figure 5 – Landform and Hydrology (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’) 16
Figure 6 – Soil landscape map (Jacobs, 2013 ‘Geological Formation’) 18
Figure 7 – Vegetation mapping 20
Figure 8 – Landscape Strategy 31
Figure 9 – Landscape Plan Sheet 1 31
Figure 10 – Sections A and B 32
Figure 11 – Landscape Plan Sheet 2 33
Figure 12 – Section C 34
Figure 13 – Landscape Plan Sheet 3 35
Figure 14 – Section D 36
Figure 15 – Landscape Plan Sheet 4 37
Figure 16 – Section E 38
Figure 17 – Section F 39
Figure 18 – Bridge Details 42
Figure 19 – Retaining wall plan 44
Figure 20 – Character Zone Map (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’) 50
Figure 21 – Visual Envelope Map 59
Figure 22 – Section F: Alternative proposal 69

List of Tables

Table 1 – Noxious Weed Species 22
Table 2 – Wall Option Assessment 43
Table 3 – Landscape Character and Visual Assessment Matrix 48
Table 4 – Character Zone 1: Character Attribute Summary 51
Table 5 – Character Zone 2: Character Attribute Summary 52
Table 6 – Character Zone 3: Character Attribute Summary 54
Table 7 – Character Zone 4A Hillside Landscape – Forest: Character Attribute Summary 55
Table 8 - Character Zone 4B Hillside Landscape – Lisarow Anglican Cemetery: Character Attribute Summary 56
Table 9 – Character Zone 5: Character Attribute Summary 57
Table 10 – Character Zone Impact Summary 58
Table 11 – Visual Assessment Summary 66

List of Plates

Plate 1 – View from within Townhouse complex (left) 12
Plate 2 – View of town houses from Pacific Highway (right) 12
Plate 3 – Lisarow Anglican Cemetery 12
Plate 4 – View of Neighbourhood Centre - Railway Crescent 13
Plate 5 – Cut Rock Creek between Chamberlain and Macdonalds Roads 15
Plate 6 – Wetland adjoining Chamberlain Road 15
Plate 7 – Cutting at the intersection of Dora Street and the Pacific Highway typical of the Terrigal Formation 17
Plates 8 & 9 – EEC Swamp Sclerophyll Forest adjoining Chamberlain Road 19
Plate 10 – View of EEC Freshwater Wetlands opposite Macdonalds Road surrounded by EEC Swamp Sclerophyll Forest 21
Plate 11 – Canopy of the Coastal Narrabeen Moist Forest, Dora Street 22
Plates 12 & 13 – Sculptural forms of Coreten structures 41
Plate 14 – Retaining wall on the Great Western Highway depicting rebated profile with dark colouring 45
List of Plates

Plates 15 & 16 – Sandstone cladding to retaining wall on the Great Western Highway 46

Plate 17 – Landscape Character Zone 1 - Urban Precinct defined by housing and warehouses to either side of the alignment 51

Plate 18 – Character Zone 2 – Swamp Forest – defined by the canopy which lines the corridor 53

Plate 19 – Character Zone 3 – Local Village 53

Plate 20 – Hillside Landscape approaching railway bridge 55

Plate 21 – Hillside Landscape across the Lisarow Anglican Cemetery frontage 56

Plate 22 – Parsons Road looking east along Pacific Highway 60

Plate 23 & 24 – Townhouse development looking over Pacific Highway and View of townhouse development from Pacific Highway 61

Plate 25 – View of Chamberlain Road and wetland from Lisarow Station 61

Plate 26 – Vegetation enclosed alignment between Chamberlain Road and Macdonalds Road 62

Plate 27 – Railway Crescent Local Neighbourhood precinct 62

Plate 28 – View to Pacific Highway and railway from Dora Street 63

Plate 29 – View of Pacific Highway from Lisarow Anglican Cemetery and the heritage gates 63

Plate 30 – View along Pacific Highway along Lisarow Anglican Cemetery frontage 64

Plate 31 – View of northern approach to railway overbridge along the Pacific Highway past the Lisarow Anglican Cemetery 65

Plate 32 – View of Pluim Park 65

Plate 33 – View westward across EEC Freshwater Wetlands 66

Plate 34 – Type of boardwalk structure which could be considered 68
INTRODUCTION

1.1 Purpose of Report

Roads and Maritime Services (Roads and Maritime) propose to upgrade the Pacific Highway, Ourimbah Street to Parsons Road, Lisarow (the proposal). This Visual Impact, Landscape Character and Urban Design Assessment has been prepared as part of the Review of Environmental Factors (REF) currently being completed for the proposal and aims to identify the strategies to manage impacts to the environment during construction and operation of the proposal. As part of this process the impacts of the works will be assessed and a framework provided to assist in the mitigation of these impacts as part of the detailed design of the proposal. In doing so a landscape design vision and clear objectives will be established to ensure the design responds to its context and the language of upgrades to either side of the proposal.

A key element of this report is the landscape character and visual assessment. There are two main purposes of landscape character and visual impact assessment, as defined in the Environmental Impact Assessment Practice Note: Landscape Character and Visual Impact Assessment (EIA No.4) (Roads and Maritime, 2013)

"1. To inform the development of the preferred route and concept design so that the proposal can avoid and minimise impacts up front. It must be commenced early in the environmental impact assessment (EIA) process to achieve this goal and integrate with the design process.

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

The guide differentiates between the two categories of assessment with them defined as follows:

"Landscape character assessment - the impact on the aggregate of an area’s built, natural and cultural character or sense of place and visual assessment – the assessment of impact on views.

Landscape character and visual assessment are equally important. Landscape character assessment helps determine the overall impact of a project on an area’s character and sense of place. Visual impact assessment helps define the day to day visual effects of a project on people’s views."

This assessment identifies impacts and opportunities to mitigate the findings of this assessment. Also as part of this process a clear understanding of the context of the site is established.
1.2 Proposal Description and Location

The proposal is the next section in the upgrade of the Pacific Highway to a 4 lane carriageway and lies between Ourimbah Street and Parsons Road, Lisarow a distance of about 1.6 km.

The Pacific Highway north of Gosford is an urban arterial road providing access to Gosford’s northern suburbs and to the Pacific Motorway (M1) at Ourimbah. The Pacific Highway is currently a single lane in each direction from Manns Road, Wyoming to the Glen Road at Ourimbah and experiences congestion during peak periods. The NSW State Infrastructure Strategy outlines the progressive upgrading of the Pacific Highway to a four-lane urban arterial road standard between North Gosford and the M1 Motorway.

Topography, urban development, property accesses, environmental issues and visual amenity considerations are expected to pose considerable challenges in upgrading this next section of highway.

The main features of the proposal include:

- Widening to include two additional 3.3 metre wide lanes (one northbound and one southbound).
- Widening of shoulders by up to 2 metres, for consistent widths along the length of the proposal.
- Maintaining a 60 km/h design and posted speed limit.
- A new rail over bridge replacing the existing bridge over the Main North Rail Line at Railway Crescent on the Pacific Highway.
- Intersection upgrades at:
  - Railway Crescent and Pacific Highway intersection: Providing a wider radius of the curve approaching the Pacific Highway, and traffic lights at the intersection.
  - Dora Street and Railway Crescent intersection: Adjusting the intersection to the south-west by about 30 metres, and enforcing a no right turn from Dora Street to Railway Crescent.
  - Macdonalds Road intersection: Installing new traffic lights at the intersection.
  - Rail maintenance access road: Relocation of the access road about 100 metres to the east, with all vehicle movements permitted at the intersection.
  - Chamberlain Road intersection: Line work and relocation of traffic lights.
- Raised concrete median along the length of the proposal, and at the approaches to intersections at Railway Crescent, Macdonalds Road and Chamberlain Road.
- Eight retaining walls at:
  - Pacific Highway, south west of Taylor Road, next to the southbound lane.
  - Pacific Highway, south west of Macdonalds Road, next to the southbound lane.
  - Pacific Highway, south of the rail over bridge, on both sides of the road.
  - Corner Pacific Highway and Railway Crescent, directly north of the rail over bridge.
  - Pacific Highway, north of Railway Crescent, on both sides of the road.
  - Along the boundary of the rail corridor between the Lisarow train station access road the rail overbridge.
- New pavement for the length of the proposal and tie ins to existing road.
- Shared pedestrian cycleways and footpaths throughout the proposal area. Safety fencing will be provided for pedestrians in steep areas.
- Removal of unused bus stops immediately north of Railway Crescent on the northbound carriageway and on both sides of Macdonalds Road.
- Installation of one water quality basin adjacent the northbound carriageway, between the highway and the rail corridor.
- Use of ancillary construction facilities, including a site compound and stockpile sites.

Construction of the proposal is anticipated to be undertaken in four stages to minimise impacts to road and rail traffic and property owners located adjacent to the proposal.
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 1 – Regional Map (Base source Sixviewer, 2014)
1.3 Proposal Objectives

The objectives of the proposal are as follows:

- Improve safety for motorists, cyclists and pedestrians by reducing the number of crashes.
- Increase traffic capacity and improve performance by reducing congestion.
- Improve accessibility for all road user groups by providing reasonable efficiency and acceptable levels of service. These include:
  - Minimise impact on the natural environment.
  - Be sensitive to surrounding land uses and the community.
  - Capitalise on opportunities in urban design.
- Provide the best value for money solution.
1.4 Reference Documents

In addition to the above proposal specific objectives and principles, the concept design should be informed by the following Roads and Maritime design guidelines:

- Road Design Guidelines.
- Landscape Guidelines, April 2008.
- Beyond the Pavement, Urban Design Policy, Procedures and Design Principles, January 2014.
2

PROPOSAL CONTEXT

An analysis of the proposals context has been undertaken to gain an understanding of the urban and landscape environment through which the Pacific Highway passes and its function within the landscape. This has involved a review of relevant reports, legislation, and the undertaking of a detail visual survey of the site to gain an understanding of the physical and legislative limitations of the site. This in turn has informed the landscape character and visual assessment for the works.

The following elements are defined as part of the works:

- Land use.
- Circulation.
- Landform and Hydrology.
- Geology and Soils.
- Flora.
- Heritage.

2.1 Land Use

Despite a relatively short corridor a number of uses have been identified as occurring along the corridor within the Gosford Local Environment Plan, 2014 (refer Figure 3). These uses include:

- R1 – General Residential.
- R2 – Low density Residential.
- B1 – Neighbourhood Centre.
- B2 – Local Centre.
- IN1 – General Industrial.
- SP2 – Special Use Infrastructure.
- RE1 – Public Recreation.
- RE2 – Private Recreation.
- E3 – Environmental Management.

Residential development along the corridor is located primarily to the west of the railway corridor and is dominated by R2 – Low Density Residential development typified by individual freestanding suburban development.

A small section of R1 - General Residential, is located at the southern end of the proposal and consists of a two storey townhouse development which backs onto the Pacific Highway.
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 3 – Land Use Map (Based on Hillard Civil, 2013 ‘Land Use and Property Impact Plan)
A number of recreational areas adjoin the corridor. At Chamberlain Road a large green space addresses the highway opposite the railway station. This is zoned RE1 Public Recreation but has generally not been improved being characterised by low lying lands dominated by Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Swamp Sclerophyll Forest) which is listed as vulnerable under the Threatened Species Conservation (TCS) Act. This area of EEC also contains areas of the threatened flora species *Melaleuca biconvexa* which is listed as vulnerable under the TSC Act and the Environment Protection Biodiversity Conservation 1999 (EPBC Act). The margins of this area have been disturbed and are either cleared or grass. Behind this area is Lisarow High School.

Lisarow Station, zoned SP1, occurs at the southern end of the alignment some 500m from its commencement at Parsons Road opposite Chamberlain Road. The station provides for commuters and includes off-street parking.

As you head north the alignment becomes more enclosed and the Swamp Sclerophyll Forest (EEC) dominates this zone. This is zoned E2 Environmental Conservation reflecting the flood prone nature of the land, and the protected nature of the vegetation community.

Pluim Park occurs to the north east of the alignment just prior to the alignment crossing the rail corridor. This Private Recreation (RE2) space is separated/screened from the alignment by remnant vegetation and is defined by the Pacific Highway, Macdonalds Road and Tuggerah Street. The park consists of three playing fields, car park and associated support buildings.

Lisarow Public School is located to the east of the alignment at the intersection of Tuggerah Street and Macdonalds Road. This use is not clearly evident from the corridor being set back some 100m.

Lisarow Anglican Cemetery is a listed heritage item under the Gosford LEP and located within the Low Density Residential area R2. It is a historic cemetery that began as a Church of England Reserve around 1858 on the land grant of Robert Cox. The first recorded burial in the cemetery is dated to 1841, which indicates that the land was used as a cemetery before services were held on the site. Burials have consisted of marked and unmarked graves. The graves sites consist of relatively small scale tombstone monuments and are set within a sandstone wall. Unmarked graves could occur between the current boundary and the Pacific Highway.
B1 Neighbourhood Centre is located in Railway Crescent near its intersection with Dora Street. There are three commercial/retail buildings here including the Pryor Brothers shop - a former general store, a boat and lawn mower shop, and a coffee wholesaler. The built form doesn’t create this as a focus with the latter two buildings set back on their blocks. The Pryor Brothers building is heritage listed under the Gosford LEP. A Development Application (DA) has been obtained by Roads and Maritime to remove under Part 4 of the Environmental Planning and Assessment Act (EP&A Act).

Plate 4 – View of Neighbourhood Centre - Railway Crescent

B2 Local Centre –Lisarow Plaza is located at the southern end of the proposal, at the intersection of Parsons Road and the Pacific Highway. This is a small scale shopping plaza with at grade car parking. The built form (nominal height 2 storeys) and landscape restricts views of the car park. Its context on the highway is defined by free standing shops including Subway and a Physiotherapy service. A landscape margin also exists along this edge which screens the parking largely from view.

Opposite this shopping precinct are a number of industrial warehouses in landuse zone IN1. These include self-storage, masonry sales and building product suppliers. All are simple warehouse structures with a substantial setback from the road.

2.2 Traffic and Transport

Access through and along the highways alignment is via a number of transport modes, these are depicted in Figure 4. These routes are an important part of the fabric of the community and should be retained or enhanced as part of the works.

Public transport passes through and across the corridor in the form of buses and rail.

Bus routes – These consist of route 36 servicing the western side of the railway line between Gosford Road and Tuggerah Street and route 37 servicing the eastern side of the railway line. Both routes provide services to the schools adjoining the corridor and provide a link from the railway to the broader community.

Railway - The Railway consists of the main northern railway line linking between Sydney and Newcastle. A small commuter car park adjoins the rail station. The station itself is a relatively low key station consisting of two platforms with small shelter structure, and a pedestrian overbridge.

Cycle paths – A shared pedestrian cycleway is located on the eastern side of the proposal between Chamberlain Road and Macdonalds Road, separated by a type ‘F’ barrier from the road alignment. This path forms an important connection between the station, schools and sporting ovals.
Figure 4 – Traffic and Transport Map (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’)

LEGEND
- Existing Bus Route
- Existing Train Line
- Existing Bicycle Path
- Existing Creek Line
- Existing Bus Stop
- Existing Train Station
- Existing Commuter Car Park

SCALE Limits - m
0 50 100 250m
2.3 **Landform and Hydrology**

The proposal is located on the Central Coast in a valley, which extends to the south to Brisbane Waters at Gosford, and to the north Tuggerah Lakes, near Wyong. The key landform attributes and hydrological features are defined in Figure 5.

### 2.3.1 Landform

The dominant character of the route is defined by a low-lying alluvial plain, which runs from the southern extent of the proposal through to the rail crossing in the north where the proposal intersects a spur of the western valley edge. The elevation of this plain varies from 20 to 40 metres Australian Height Datum (AHD). To the east, the valley floor and its low-lying land extends from 350 metres up to one kilometre from the road before the ground begins to rise.

A small but steep ridge defines the route to the west with the ground rising steeply from its edge to a high point of 100 metres (AHD). The Pacific Highway brushes against this ridge at the northern end of the corridor after crossing the railway line where a small cut is exposed.

### 2.3.2 Hydrology

The start of this section of the Pacific Highway, at Parsons Road, marks the boundary between two drainage catchments, Cut Rock Creek and Narara Creek, and is defined by a small crest. The Cut Rock Creek catchment drains to the north along and adjacent to the proposal corridor and Narara Creek drains to the south.

The section of Cut Rock Creek next to the proposal traverses a relatively flat valley floor at an elevation of approximately 30 metres. Adjoining this proposal is a combination of wetland and drainage channels reflecting the minimal grade.

A series of unnamed tributaries drain from these ridges feeding into Cut Rock Creek. Cut Rock Creek flows to the east of the proposal before crossing both the railway and highway corridors at Ourimbah Street. Cut Rock Creek continues to flow northward and into Ourimbah Creek before entering Tuggerah Lake.
Figure 5 – Landform and Hydrology (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’)
2.4 Geology and Soils

The geology and soils of the area are generally typical of the Central Coast, they contribute to the landform and determine the vegetation communities which can be supported. It is consequently important to have a broad understanding of the geology and soils in order to assist in the development of the landscape and structural response of project elements.

Based on information from the Department of Conservation and Land Management, the geology of the area has been identified as being made up of two soil units, (refer Figure 6). These are the Yarramalong, and Erina soil landscapes. These landscapes have distinct landforms and soil characteristics which influence the vegetation and in turn the landscape response for the upgrade.

2.4.1 Yarramalong Soil Landscape

The Yarramalong soil landscape consists of level to gently undulating dissected alluvial plains on Quaternary sediments within the Erina Hills. This soil landscape would have formerly supported the habitat of the Swamp Sclerophyll Forest. Today, this area has been extensively cleared of tall open forests for pasture land, housing and infrastructure. This soil landscape dominates the eastern side of the rail line through which the proposal passes.

The vegetation communities associated with the Yarramalong soil landscape within the study area are Sydney Freshwater Wetland, and Swamp Sclerophyll Forest (refer to 2.5 Flora and Fauna).

2.4.2 Erina Soil Landscape

The Erina Landscape consists of undulating to rolling rises and low hills overlying the Terrigal Formation. It is characterised by rounded narrow crests with moderately inclined slopes. Typically this has been extensively cleared of tall open-forests. The dominant Vegetation Community associated with the Erina Soil landscape within the study area is Coastal Narrabeen Moist Forest. This soil landscape is typically to the west of the railway corridor.

Plate 7 – Cutting at the intersection of Dora Street and the Pacific Highway typical of the Terrigal Formation
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 6 – Soil landscape map (Jacobs, 2013 ‘Geological Formation’)

LEGEND
- Yarramalong Soil Landscape
- Erina Soil Landscape
- Existing Creek Line

Figure 6 – Soil landscape map (Jacobs, 2013 ‘Geological Formation’)
2.5 Flora

The corridor has been substantially altered by development. Natural vegetation communities are partially preserved along creeklines and flood prone lands and on the steeper slopes of the elevated lands. The remnants of these natural communities provide an insight of what once occurred within the corridor as well as what is presently suited to the environmental conditions. A broad understanding of these communities is used to inform the landscape design but also refine the overall alignment design in the case of the presence of protected species or communities.

The flora of the study area is defined as part of the Pacific Highway Improvements Stage 4 – Manns Road Narara to Railway Crescent Lisarow – Preliminary Ecological Assessment Hyder Consulting, 2009 RTA and reflects the underlying geology. Two dominant communities have been identified. These are:

- EEC Swamp Sclerophyll Forest.
- Coastal Narrabeen Moist Forest.

Their distribution is depicted in Figure 7. A summary of the key findings of the Ecological Assessment in terms of community compositions is detailed below:

### 2.5.1 EEC Swamp Sclerophyll Forest

This community has been interpreted as being consistent with the TSC Act 1995 listing for EEC Swamp Sclerophyll Forest on the Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (Endangered Ecological Community).

EEC Swamp Sclerophyll Forest forms the dominant community on the eastern side of the railway corridor and relates to the floodplain of the Cut Rock Creek Catchment. This community is referred to as Alluvial Paperbark Sedge forest, in Gosford City Councils Vegetation mapping. Its canopy is dominated by a moderately dense cover of mature *Eucalyptus robusta*, with occasional occurrences of *Casuarina glauca* and *Angophora floribunda*. The sub canopy consists of dense cover of *Melaleuca* sp. (*Melaleuca biconvexa* and *Melaleuca styphelioides*), with the occasional *Glochidion feroadinandi* and *Callistemon salignus*. The introduced species Camphor Laurel (*Cinnamomeum camphora*) has dominated some areas. The understorey and ground covers consists of a range of introduced and native species these include: *Pittosporum undulatum* and juvenile *Melaleuca biconvexa*, *Melaleuca styphelioides*, *Acmena smithii* and *Callistemon salignus* within the shrub layer; and the following ground covers, vines and grasses *Dichondra repens* *Smilax australis*, *Entolasia marginata*, *Lomandra longifolia*, *Persicaria strigose*, and *Hypolepis muelleri*. The introduced species which impact the mid and understorey to varying degrees are: *Ligustrum spp.*, *Pennisetum clandestine*, *Rubus fruticosus*, *Plantago lanceolata* and *Senecio madagascariensis*.

8)

Plates 8 and 9 – EEC Swamp Sclerophyll Forest adjoining Chamberlain Road

The sub canopy species *Melaleuca biconvexa* (Biconvex Paperbark) is listed as vulnerable under the Threatened Species Conservation 1995 Act (TSC Act) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). *Melaleuca biconvexa* is widespread within the proposal and occurs as a dominant mid-storey species within the Alluvial Paperbark Forest along the length of the project corridor.

9)
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 7 – Vegetation mapping
The major locations of *Melaleuca biconvexa* in the study area are located to the:

- South of the Pacific Highway and north of the rail corridor.
- On the corner of the Pacific Highway and Chamberlain Road surrounding the freshwater wetland/body of water on the west side of Chamberlain Road and also found in disturbed regrowth on the eastern side of Chamberlain Road.

Within the Swamp Sclerophyll Forest a distinct community exists over a small area of the site. This has been identified as the EEC Freshwater Wetlands.

**EEC Freshwater Wetlands**

EEC Freshwater Wetlands is also referred to as Freshwater Typha Wetlands as part of Gosford Councils Vegetation mapping. This community occurs at the southern end of the site and also between the highway and the rail line on the western side of the road. Areas of this community are dominated by dense growth of Cumbungi (*Typha orientalis*), Tall Sedge (*Carex appressa*), Harsh Ground Fern (*Hypolepis muelleri*) and Knotweeds (*Persicaria spp.*). The wetland area at the southern end of the study area mainly consists of open water with macrophytes on the edges. Biconvex Paperbark and Swamp Mahogany occur on the edges of this community.

This community is in relatively high condition with limited weed invasion, however urban runoff and modified hydrology regimes is likely to have resulted in some modification to the community. Areas of this community are likely to be permanently inundated outside of extended drought periods, with fringing areas being inundated intermittently.

This community is listed as endangered under the TSC Act.

**Coastal Narrabeen Moist Forest**

Coastal Narrabeen Moist Forest is located on the higher steeper ground generally located to the west of the railway corridor. The most intact section of this community is located adjoining the Lisarow Anglican Cemetery. The canopy of the community consists of sparse to dense cover of mature trees *Eucalyptus saligna*, *Eucalyptus robusta*, *Eucalyptus pilularis* with the occasional occurrences of *Angophora costata*, *Syncarpia glomulifera*, *Eucalyptus piperita* and *Allocasuarina torulosa*. The midstorey is variable with both weed and native species present and consists of sparse to dense cover of *Melaleuca biconvexa*, *Allocasuarina torulosa* and *Glochidion feroadinandi*. Some areas dominated by the introduced species Camphor Laurel (*Cinnamomeum camphora*). The decline in quality continues in the understorey with sparse to dense cover of native shrub, fern and palm species including *Livistona australis*, *Pteridium esculentum* and *Pittosporum undulatum*, and introduced species including *Lantana camara* and *Ligustrum spp.*. The groundcovers are dominated by native grasses, herbs and climbers including *Parsonsia straminea*, *Dianella caerulea var. producta*, *Smilax glyciphylla*, *Microlaena stipoides*, *Wilkiea huegeliana*, and introduced grasses and herbs *Pennisetum clandestine*, *Senecio madagascariensis* and *Plantago lanceolata*.
Disturbed Regrowth

This vegetation community has been extensively modified by past land use and as a consequence has lost most of its native species and is significantly structurally modified with minimal native vegetation cover. Exotic species are dominant and have replaced the vast majority of the indigenous canopy, shrub layer, and groundcover. This area is typified by the vegetation to the north of Pluim Park, between the Pacific Highway and Macdonalds Road.

Weeds

The disturbed nature of the site and its catchment is reflected in the relatively large number of listed weeds. The following table summarises the noxious weeds identified within the corridor.

Table 1 – Noxious Weed Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
<th>Control</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternanthera philoxeroides</td>
<td>Alligator Weed</td>
<td>3</td>
<td>The plant must be fully and continuously suppressed and destroyed.</td>
</tr>
<tr>
<td>Cortaderia species</td>
<td>Pampas grass</td>
<td>3</td>
<td>The plant must be fully and continuously suppressed and destroyed.</td>
</tr>
<tr>
<td>Ligustrum lucidum</td>
<td>Broad-leaf Privet</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its flowering and reproduction</td>
</tr>
<tr>
<td>Ligustrum sinense</td>
<td>Narrow-leaf Privet</td>
<td>4</td>
<td>The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its flowering and reproduction</td>
</tr>
</tbody>
</table>
### Heritage

Two heritage items have been identified within or near the proposal as part of the Statement of Heritage Impact being prepared as part of the REF. These are the Pryor Brothers Store located at 12A Railway Crescent and the Lisarow Anglican Cemetery located at 960 Pacific Highway, around 200 metres to the South of Ourimbah Street, Lisarow. Both heritage items are identified are listed in Schedule 5 of the Gosford Local Environment Plan 2014 as being of local significance.

The Pryor Brothers Store has previously been assessed as part of a DA made to the Gosford City Council in 2013. Approval for the demolition of the Pryor Brothers Store was granted by Council on 13 August 2013.

The Lisarow Anglican Cemetery is a historic cemetery that began as a Church of England Reserve around 1858 on the land grant of Robert Cox. The first recorded burial in the cemetery is dated to 1841, which indicates that the land was used as a cemetery before services were held on the site. Burials have consisted of marked and unmarked graves. The graves sites present consist of relatively small scale tombstone monuments and are set within a site defined by vegetation and sandstone walls and gates.

The Lisarow Anglican Cemetery will be directly and potentially indirectly impacted by the proposal. Impacts will involve the removal and relocation of historic sandstone gate pillars and the gates, the vegetation along the boundary of the cemetery and has the potential to uncover unmarked graves close the Pacific Highway. The design response to the road needs to consider the address of the cemetery. At present the frontage of the cemetery is a defining element. The removal of trees and the gates and the change in their relationship to the road alignment all need to be carefully considered.
OPPORTUNITIES AND CONSTRAINTS

The proposal brings both positive and negative impacts on the surrounding contexts character. Measures to manage these impacts can be implemented to ensure that the visual experience including the identity and sense of place of the road environment and its surrounds are enhanced. This chapter summarises the key constraints and opportunities of the proposal.

3.1 Constraints

The following have been identified as constraints to the proposal.

- The proximity to existing dwellings, retail and commercial properties to the road corridor.
- The proximity to and crossing limitations of the Main Northern Rail Line. Rail design parameters will be a key determinate on height and clearance of structure and consequently form.
- The implications of crossing a floodplain both to how the road is built but also the consequences of this to those properties within the floodplain.
- The crossing of the alignment by both Cut Rock Creek and its tributaries will require construction of bridges/culverts in order to retain flow paths.
- The grades of the steep terrain to the west of the railway alignment at Dora Street will introduce a new built form to alignment as the height of the cut is increased with the change in footprint.
- The proposal will involve the removal and relocation of the gate on the eastern boundary, changing the interface between the Pacific Highway and Lisarow Anglican Cemetery. As the cemetery is listed as a heritage item, this will impact the proposal and construction methodology.
- The implications of vegetation clearance to the overall visual outcome of the corridor. The increase in footprint will impact the vegetation of the floodplain and the ridge. This could open up the corridor to increased views from the hinterland beyond.
- The location of services, particularly high voltage power easements. Significant electrical easements exist both to the east and west of the Main Northern Rail Line. The potential to relocate to better address the servicing needs of the service and meet the needs of the highway should be reviewed.

3.2 Opportunities

The proposal provides the opportunity to:

- Provide a consistency of form for the Pacific Highway which is a major arterial corridor. The design should consider the upgraded sections to either side to establish both an understanding of the changing nature of the alignment and how it fits within the broader corridor.
- Upgrade access to, from and along the alignment through the provision of turning lanes, control of intersections, and provision of shared and pedestrian paths. Consideration of the key pedestrian features along the route should be considered in the design of these facilities. This would include the Lisarow train station and its connection to housing beyond; connections to both the high school and
primary school, sports facilities and shopping centre at the southern end of the alignment of Parsons Road.

- Utilisation of the existing alignment to minimise the degree of change and to minimise footprint. By retaining the works over the existing footprint the extent of clearing would be minimised.

- Remove weeds and enhance management of the adjoining vegetation through control of water quality and removal of weeds and re-establishment of the native endemic species. The clearance works to construct the road provide the opportunity to remove weed growth and reinstate the endemic community.

- Incorporate service upgrades into the proposal to achieve an integrated outcome which meets the needs of service authorities and the road alignment, and provides for better ongoing maintenance of the service asset.

- Reinforce the natural character of the floodplain between Parsons Road and Dora Street through the use of vegetation, and retaining view opportunities.
4 URBAN DESIGN OBJECTIVES AND PRINCIPLES

4.1 Urban Design Vision

The basis of the urban and landscape design vision for the Narara to Lisarow upgrade to the main road network can be found in the Roads Traffic Authority’s (RTA’s) now Roads and Maritime Central Coast HW10 Pacific Highway Urban Design Framework – Kariong to Doyalson (2004) and refined by the RTA Narara to Lisarow: Urban and Landscape Design Strategy Report (2009). The urban and landscape design vision for this proposal is stated as, to:

“Create a green corridor that recognises and enhances the intrinsic qualities of the Central Coast character and journey experience of the natural environment, public domain local built form, historic and cultural settings and provides enhanced local resident amenity.”

(RTA, 2009)

4.2 Urban Design Objectives and Principles

In order to address the impacts of the proposal, a number of objectives have been developed to provide direction to the project team in order to improve the concept being developed and ensures it responds appropriately to its context.

The objectives and guiding principles are applicable for all design disciplines and they should inform the concept design and be carried through to detailed design and construction to ensure a unified and consistent approach to the development of the proposal.

The following objectives and associated principles should be adopted as part of the proposal.

Objective 1

*Provide a road that is responsive to and integrated with its context*

Principles:

- Respond appropriately to the heritage interface of the Lisarow Anglican Cemetery
- Integrate the road landscape into existing vegetation patterns responding to sensitive vegetation communities and drainage corridors within the corridor.
- Scale and form of structures should reflect those of the context and where not possible adopt strategies which assist in mitigating against these impacts.

Objective 2

*Provide a well vegetated, natural road reserve*

Principles:

- Provide a densely planted highway: Native seed all disturbed landscape areas and supplement with planting.
- For seeding and tubestock planting, endemic species of local provenance should be used wherever they can be sourced.
- Where appropriate maximise the adoption of the borrowed landscape to ensure the retention of the green corridor as the basis of the design vision.
- Relate to the design of the adjoining upgrade sections of the corridor.
Objective 3

Provide an accessible and connected corridor

Principles:

- Provide for pedestrian and cycle access along and across the corridor through the provision of paths and crossing points both controlled (at traffic lights) and uncontrolled (incorporating refuge islands).
- Retain and reinstate bus stops to facilitate access to public transport. Relocate to appropriate sites when alignment changes have resulted in changes which make the current location no longer viable.
- Retain and enhance access to Lisarow Station including provision of commuter parking.
- Provide for a continuous pedestrian and cycle link along the corridor.

Objective 4

Provide an enjoyable and interesting highway

Principles:

- Create a varied sequence of views and enclosure to match the existing spatial patterns of the landscape. Reinforce planting in wooded sections of highway and keep views available in open sections of highway. Ensure that the corridor responds to the context with appropriate built form in urban areas and appropriate vegetation in vegetated areas.
- Where views are available consider the selection of species to maintain view corridors such as low growing groundcovers and shrubs.
- To maximise open views use wire rope barrier types where possible, taking into account engineering issues, safety requirements, and clearance zones and retaining existing vegetation.
- On retaining wall structures, where engineering parameters allow, the use of double rail barriers instead of solid walls/parapets or walls with one rail is desirable so that the road user is visually connected to the surrounding environment through which they travel.
- Bridge design should integrate its component parts in to a complete composition rather than considered as disparate kit of parts.
5 URBAN DESIGN CONCEPT

5.1 Introduction

A desired semi-rural character has been defined for the corridor by the Roads and Maritime Services in the Central Coast SH10 Pacific Highway Urban Design Framework – Kariong to Doyalson (2004). This character is consistent with the context and has informed the aesthetic design decisions for the proposal.

The urban design response addresses the highway design response to its context. In order to assist the understanding of the proposal the design has been broken down into its elements. A broad overall strategy is provided before being broken down into its built elements and landscape response. This enables an understanding of the nature of the elements which form the corridor and how their form addresses the impacts.

5.2 Urban Design Strategy

The strategy for the alignment is responsive to the changing context of the alignment. The strategy reflects both the cultural and natural contexts through which the alignment passes. Four distinct responses have been identified and are depicted in Figure 8, these are as follows:

- Urban interface.
- EEC Swamp Sclerophyll Forest.
- EEC Freshwater Wetlands.
- Coastal Narrabeen Moist Forest.

5.2.1 The Urban Interface

The urban interface addresses cultural landscape settings relating to areas of development. There are three sites along the alignment where this condition occurs and where a similar response is adopted to reflect the developed context. These are:

- Lisarow shops.
- The local shopping precinct Railway Crescent.
- Lisarow Anglican Cemetery frontage.

Lisarow Shops

To enhance the road environment and provide greater definition it is proposed that a structured planting be used as you enter the works. To the eastern edge of the alignment it is proposed to plant with an avenue of clean trunked eucalypts - the spotted gum (*Corymbia maculata*). This provides definition while maintaining a visual connection to the landuses beyond. To the western side of the alignment the potential for planting is limited by overhead wires and so it is suggested that a small tree be used – the bottlebrush (*Callistemon* sp.). Refer Figure 9 and 10 for the general location and design intent.
This urban treatment is continued through to the Railway station precinct on the western side of the alignment. The use of an avenue of clean trunked eucalypts is adopted here to reinforce the character of the earlier shopping precinct and to identify the station as a destination.

The provision of planting along the western edge of the corridor enhances the pedestrian environment of this section providing shade to the path which lines the road and links to the station.

A new path is also to be installed along the eastern edge of the alignment providing a continuous link along this side enhancing connectivity to the schools and open space facilities within the broader study area.

**Railway Crescent**

The alignment of Railway Crescent, west of the Northern Rail line, has been realigned from Pryor Brothers store north, refer Figure 13. The changes in alignment sees the loss of the built edge along the western edge of the road and the need to provide definition to the corridor pending the redevelopment of the surplus lands adjoining the road. To re-establish an identity to this precinct it is proposed that street trees, such as Corymbia maculata should be installed to provide definition to the road edge. If overhead power line clearances impact this opportunity it is suggested a small tree such as Callistemon sp. be used.

A key strategy as part of the realignment of Railway Crescent has been the retention of the existing bus stops to ensure that impacts on connectivity are minimised or enhanced by the works.

**Lisarow Anglican Cemetery**

The frontage of Lisarow Anglican Cemetery is impacted by the proposal resulting in the loss of the avenue of Camphor Laurel along the frontage. These trees are a weed species and are of poor form but provide a sense of separation and definition to the edge of the cemetery.

The proposal is for the reinstatement of street trees to define the corridor and the edge of the cemetery, refer Figure 17. There is potential for these trees to continue along the remaining verge to its intersection with Ourimbah Street. Following discussions with Council and Cemetery Representatives a layered approach has been suggested where fast growing trees are proposed to be planted with slower trees behind. This strategy has been proposed to ensure rapid screening is provided as soon as possible to provide separation and give a sense of enclosure from the road.

5.2.2 **The EEC Swamp Sclerophyll Forest**

The EEC Swamp Sclerophyll Forest is the dominant community along the corridor refer Figures 9, 11 and 13. Its protection and reinstatement through the central body of the alignment forms a critical component of the landscape strategy. Walls have been used to contain the footprint of the road and limit its impact on this community. Where the canopy is cleared its reinstatement is promoted. This is to be undertaken with material sourced from the local plants to ensure genetics of the community are maintained.

5.2.3 **EEC Freshwater Wetlands Interface**

The EEC Freshwater Wetlands forms a localised incursion in the EEC Swamp Sclerophyll Forest, refer Figure 13. This community creates its own character due to its open character and consistent vegetation cover. The road alignment impacts the eastern edge of the wetland but retains a core body of the wetland. The interface between the new work and the wetland are to be reinstated to maintain the vegetation community.

5.2.4 **Coastal Narrabeen Moist Forest**

This community dominates the ridge west of the railway corridor, refer Figure 15. Its interface with the Pacific Highway is at the rail bridge through to the Lisarow Anglican Cemetery. The works will see the loss of a small area of forest and the installation of a retaining wall. It is an important component of the response that this landscape community is read as the background of the proposed wall. The reinstatement of this community is to occur along the edge of the highway where it has been disturbed and at the intersection of Railway Crescent and the Pacific Highway.
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow
Figure 8 – Landscape Strategy

Figure 9 – Landscape Plan Sheet 1
Figure 10 – Sections A and B
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 11 – Landscape Plan Sheet 2
Figure 12 – Section C
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 13 – Landscape Plan Sheet 3
Figure 14 – Section D
Figure 15 – Landscape Plan Sheet 4
Figure 16 – Section E
Figure 17 – Section F
5.3 Access

As part of any arterial road development the consideration of how access for all road corridor users is to be provided is an important urban design consideration. If all users are not adequately considered the facility has the potential to act as a barrier to movement and social interaction reducing the liveability of the area.

The proposal has considered a number of key focal points along or adjacent the corridor which will drive demand for pedestrian and shared paths and flexibility in the use of these elements so that multiple destinations can be serviced. It is important that the network is constructed in acknowledgement of these sites complete with links.

Key focal points are:

- Lisarow Plaza, located at the southern end of the corridor.
- Lisarow High School located on Chamberlain Road.
- Lisarow Public School located on Macdonalds Road.
- Pluim Park.
- Lisarow Train station.

In addition, it is important that connections are maintained between the uses to ensure connectivity with land use and transport linkages. As part of the design shared paths are being provided which augment the existing services enhancing continuity of the existing path between Chamberlain Road and Macdonalds Road.

5.4 Built form

The built form of the alignment and the characteristics it poses play an important role in fulfilling the urban design requirements for the proposal. Built form includes the structural elements of the corridor, including bridges, retaining walls, and pavements etc.

5.4.1 Bridges

The proposal requires the construction of a bridge across the northern railway line. The crossing of the railway line represents a complex engineering problem. Its design is determined by parameters defined by Sydney Trains who prefer a clear span for the entire width of the rail corridor. This parameter drives the form and method of construction of the resultant bridge.

A number of options have been reviewed in terms of functional requirements and impact. The critical issue identified is that the span of the bridge must be in the order of 53 to 60m in length, in order to limit the impacts on the railway corridor. The resultant bridge form proposed to meet this efficiently is a steel box girder, which is supported off an abutment at either end. No central piers or supports are to be provided within the corridor. This provides a sense of openness to the railway passing beneath. The clear span, however, has resulted in a deeper bridge form which in turn has pushed the alignment slightly higher. Opportunities to reduce the span and consequently deck thickness would reduce this change in level have been investigated but have been rejected as they do not meet the State Rail requirements. The proposed design is 55m in length and provides a reasonable balance between elevation and the requirements of Sydney Trains. In order to minimise the impact of the increased depth of structure it is proposed that the girder be a dark colour to enable the girders to better blend with the shadow below the bridge, reducing the perceived depth of the structure by putting the focus on the parapet.

The large span and skewed alignment also results in a section of the bridge structure extending beyond the road alignment, as the road alignment cuts diagonally across the bridge form. As part of the bridge design it will be important that the alignment of the road and the adjoining structures including barriers, through screens etc, relate to the road rather than the bridge deck. This will enhance the legibility of the road corridor which would otherwise be weakened by responding to the form of the bridge deck.

Throw screens are to be integrated with the bridge barrier. The composition of the throw screen is to consist of a mesh panel to minimise its mass and maintain a sense of transparency as you cross the bridge.

Bridge barrier is to be designed in accordance with AustRoads. To minimise the bulk of this element it is suggested that a double rail rather than solid barrier be used. The double rail barrier provides a higher level of transparency and enables views through the barrier by road users and those looking upon the bridge.
By emphasising the road form across the bridge deck it provides the opportunity to develop the left over zones of the bridge deck as markers of the changing alignment context with either structural art or as planted elements. The adoption of either solution would assist in reducing the visual bulk of the bridge and provide the opportunity to better integrate with the surroundings. The markers could consist of a lightweight sculptural form constructed in the zone left. It is suggested that the use of Coreten may be appropriate due to its weathered state and minimal ongoing maintenance requirements. The images below (refer Plates 29 and 30) depicts the material and its sculptural form.

Plates 12 and 13 – Sculptural forms of Coreten structures

As the surplus areas of the bridge structure are to be in diagonally opposite corners, ie south-western and north-eastern corners, of the bridge the two elements provide an opportunity to strengthen the definition of the road edge and provide a sequence as you pass through the space.
Figure 18 – Bridge Details
5.5 Retaining Walls

The RTA Urban Design Framework Kariong to Doyalson recommends that the retaining walls should be designed to complement the character of the precinct in which they occur with an emphasis on natural materials. Its suggested treatments are gabion walls, treated timber, and random rubble for semi-rural environments and, square cut stone, concrete block and precast concrete panels with artistic treatment for urban situations.

The design response for the walls within the corridor has considered these requirements. They have also reviewed the context in which the walls occur along the corridor. A wall which is below the alignment and screened from its surrounding catchment poses less impact than a wall above the road and visible to all road users and the community beyond Refer Table 2 and Figure 19.

Retaining walls along this section of road can be defined as one of two types:

1) Below the road – occurring either across the floodplain or as part of the bridge and approach abutment.
2) Above the road a product of a cutting into the existing topography.

Table 2 – Wall Option Assessment

<table>
<thead>
<tr>
<th>Wall</th>
<th>Location</th>
<th>Type</th>
<th>Visibility</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW1</td>
<td>5690(MC10) 60(MCV1)</td>
<td>L Shaped</td>
<td>Located the eastern side of the alignment the wall is screened by the adjoining swamp land.</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW2</td>
<td>6210(MC10) 6460(MC10)</td>
<td>L Shaped</td>
<td>Located the eastern side of the alignment the wall is screened by the adjoining swamp land.</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW3</td>
<td>6420(MC00) 6650(MC00)</td>
<td>RE Wall</td>
<td>Located western side of the alignment wall is screened by the existing swamp land.</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW4</td>
<td>6510(MC10) 6635(MC10)</td>
<td>L Shaped</td>
<td>Located the eastern side of the alignment the wall is screened by the adjoining vegetation.</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW5</td>
<td>6705(MC00) 30(MCY1)</td>
<td>RE Wall</td>
<td>Located adjacent the rail corridor under the rail bridge</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW6</td>
<td>6720(MC10) 6975(MC10)</td>
<td>L Shaped / RE Wall</td>
<td>Located adjacent the rail corridor beyond the rail bridge</td>
<td>Wall should be dark and textured to minimise risk of graffiti</td>
</tr>
<tr>
<td>RW7</td>
<td>6785(MC00) 6985(MC00)</td>
<td>L Shaped / Soldier pile</td>
<td>Located adjacent the road and cemetery</td>
<td>Wall treatment needs to reflect visibility from road and heritage context.</td>
</tr>
<tr>
<td>RW8</td>
<td>6170(MC00) 664 (MC00)</td>
<td>L Shaped</td>
<td>Located adjacent to the rail corridor and remote from the road. It is visible from passing trains and housing west of the railway.</td>
<td>Wall should be dark and textured to minimise risk of graffiti and be able to integrate with RW5</td>
</tr>
</tbody>
</table>
Figure 19 – Retaining wall plan
5.5.1 Retaining walls below the road

These walls are generally of low visibility and so do not need a high level of finish. Key elements of concern however are the walls susceptibility to graffiti, potential views from the rail corridor, and a need for them to vanish into the surrounding vegetation so as to limit their impact on overlooking properties.

Treatments which would aid this include:

1) The use of a dark colouring so that the wall sits within the shadows. This could be achieved by colouring and/or the use of an exposed aggregate.

2) The use of texture to discourage the application of graffiti and to reduce its effectiveness (refer to Plate 14).

Plate 14 – Retaining wall on the Great Western Highway depicting rebated profile with dark colouring.

The retaining wall RW7 located along the edge of the Lisarow Anglican Cemetery poses a special case as the historic cemetery over looks and abuts the wall. The existing sandstone cemetery gate to be relocated as part of the proposal will be re-built within the new retaining wall.

It is suggested that a sandstone finish would be appropriate and relate to the wall that adjoins it. The use of sandstone however should be undertaken in such a way that it is robust and durable (refer to Plate 16).

5.5.2 Retaining walls above the road

Two retaining walls RW 7 and RW8 will be above the road and exposed to the user.

RW7 is a highly visible wall which terminates the view across the railway bridge when looking west. The management of the treatment of this wall will form a critical role in the presentation of the road and needs to consider its relationship to the railway bridge, the cemetery and the bushland backdrop behind. The opportunity to clad the wall with a sandstone finish would present a response which relates to the underlying geology as well as the urban/bushland interface of this context. Such a response is illustrated in Plates 15 and 16.

RW8 presents with a lesser impact than RW7 is located away from the alignment along the edge of the railway corridor and being relatively modest in size with a maximum height of 1300mm. This wall however is visible to rail users and those, west of the railway alignment. Like the walls below the road alignment the intent with this wall should be to make it recede into the landscape beyond and consequently should adopt the strategy adopted for these walls.
Plates 15 and 16 – Sandstone cladding to retaining wall on the Great Western Highway. A similar treatment to this could be utilised for the cladding of RW 7.
This section of the report aims to review the proposal assessing the visual impact and effect on the landscape character of the area.

Roads and Maritime (2013) Environmental Impact Assessment Practice Note: Guidelines for Landscape Character and Visual Impact Assessment (EIA No.4 Guidelines, 2013) sets out two main purposes of landscape character and visual impact assessment:

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

To inform the Roads and Maritimes managers, other agencies and the community about the landscape character and visual impact of the proposal and what mitigation strategies would be implemented.”

And defines visual impact assessment and landscape character assessment as follows:

“Landscape character assessment – the assessment of impact on the aggregate of an area’s built, natural and cultural character or sense of place are equally important and visual assessment – the impact on views.

Landscape Character and Visual assessment are equally important. Landscape character assessment helps determine the overall impact of a project on an area’s character and sense of place. Visual impact assessment helps define the day to day visual effects of a project on people’s vie.

This dual assessment will help differentiate options, improve route alignment decisions and improve design outcomes.”

### 6.1 Landscape Character Impact Assessment

To assess the landscape character a number of stages are undertaken to understand the context and the implications of the work. These include the defining of character zones (zones of similar spatial or character properties), and the analysis of changes to these zones as a result of the proposed widening.

Landscape character is defined as:

“The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.”

(Roads and Maritime, 2013).

The proposals are assessed in terms of their impacts on these character zones and the impact ranked in terms of sensitivity to change. This assessment differs from a visual assessment in that it assesses the overall impact of a project on an area’s character and sense of place.
6.2 Visual Impact Assessment

Visibility
The view fields of a road corridor are composed of static receptors ie those that adjoin the corridor and mobile receptors those that travel along the corridor. The impacts of the two groups are unique in that the time and frequency of the exposure differ. The extent from which views can be obtained is referred to as the view catchment.

Static Receptors
Static receptors occur within the visual catchment of the corridor ie they are points, which have a view of or can be viewed from the corridor. The alignment of the proposal is visually defined by both the topography and vegetation, which adjoins the corridor.

Mobile Receptors
Mobile receptors are the users of the corridor; in this instance the vehicles, pedestrians and cyclists that travel along part or all of the alignment. Their experience of the space is short term.

6.3 Landscape Character and Visual Assessment Matrix

Landscape character and visual assessment are equally important. Landscape character assessment helps determine the overall impact of a project on an area’s character and sense of place including all built, natural and cultural aspects, covering towns, countryside and all shades between. Visual impact assessment helps define the day to day visual effects of a project on people’s views.

To quantify these impacts it is important to assess two qualities in relation to landscape character or view point these are: - Sensitivity and Magnitude

*Sensitivity* refers to the qualities of an area, the type number and type of receivers and how sensitive the existing character of the setting is to the proposed change. For example a pristine natural environment will be more sensitive to change than a built up industrial area.

*Magnitude* refers to the nature of the project. For example a large interchange would have a very different impact on landscape character than a localised road widening in the same area.”

(EIA No.4 Guidelines, 2013).

As part of the process of assessment the Roads and Maritime Services has adopted a matrix which combines rankings of sensitivity with magnitude of change in broader to determine the overall impact of the proposal. This has been used to inform the undertaking of Landscape Character and Visual Assessment, refer Table 3.

**Table 3 – Landscape Character and Visual Assessment Matrix**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Magnitude</th>
<th>Magnitude</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>High</td>
<td>High Impact</td>
<td>High – Moderate</td>
<td>Moderate</td>
<td>Negligible</td>
</tr>
<tr>
<td>Moderate</td>
<td>High – Moderate</td>
<td>Moderate</td>
<td>Moderate – low</td>
<td>Negligible</td>
</tr>
<tr>
<td>Low</td>
<td>Moderate</td>
<td>Moderate – low</td>
<td>Low</td>
<td>Negligible</td>
</tr>
<tr>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
<td>Negligible</td>
</tr>
</tbody>
</table>
LANDSCAPE CHARACTER AND VISUAL ASSESSMENT

7

7.1 Landscape Character Assessment

A review of the corridor identifies five distinct character zone precincts from the start of the proposal to the south at Parsons Road to the north of the proposal at Ourimbah Street, refer to Figure 20. These are defined by their built form, vegetation, and topography and include the following:

1. Urban Precinct
2. Swampland Forest
3. Local Village
4. The Hillside Landscape
5. Suburban Edge

7.1.1 Character Zone 1 – Urban Precinct

Located at the southern end of the proposal and extending from Parsons Road north for a distance of 300m. The zone is characterised by a western edge zoned as industrial and comprised of large free standing warehouses within a planted setting. To the east the shopping precinct presents a landscaped address to the Pacific Highway with the main building set within an at grade carpark. The scale and spatial quality of this development is consistent with the adjoining industrial facilities. Signage plays an important part of the visual character of this section with the identity of the shopping precinct and warehouses clearly defined by large scale signage. At the northern transition of this zone is a small pocket of medium density housing is present. This is defined by a high masonry wall along the frontage and two storey dwellings behind.
Figure 20 – Character Zone Map (Based on Hillard Civil, 2013 ‘Grading and Existing Drainage Plan’).
Table 4 – Character Zone 1: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>The corridor is essentially flat with a slight fall to the north from the roundabout. The land rises to the east of the Pacific Highway and west of the railway defining the valley through which the corridor passes.</td>
<td>The proposal has minimal impact due to the shallow grades.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>A manicured garden edge is defined as part of the built form. Large remnant Eucalypts form a sporadic edge to the corridor.</td>
<td>The landscape edge will be reduced as part of the widening with the reduction in width of the grass verge but would still provide definition to the corridor.</td>
</tr>
<tr>
<td>Hydrology</td>
<td>The drainage within this zone is structured and part of the road alignment itself.</td>
<td>This will continue to be the case as part of the new design.</td>
</tr>
<tr>
<td>Land-use</td>
<td>Adjoined by industrial and local centre the road is defined by the commercial uses this entails</td>
<td>No impact</td>
</tr>
<tr>
<td>Built form</td>
<td>Built form is typically two storeys in height. The road alignment is present but will be expanded</td>
<td>An increase in the road footprint will be experienced</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>Alignment is defined by the canopy of remnant trees or a formal landscape zone defining the property edge. Presently there is a sense of openness when compared to the adjoining precinct to the north</td>
<td>The width of the verge will be reduced resulting in a slight reduction of the sense of space.</td>
</tr>
</tbody>
</table>

**Landscape Qualities**

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>The area is a busy commercial hub. Dominated by the colour and graphics of signage and building. It is considered to be of low sensitivity to the change as it is reliant on passing traffic.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnitude</td>
<td>The scale of change through this section is minimal as the Pacific Highway in part is already four lanes wide and within a wide road corridor. The impact is low.</td>
</tr>
</tbody>
</table>

**Summary:**

The overall impact within this character zone is considered to be low with the land-use compatible and of a scale which relates to the proposal.
7.1.2 Character Zone 2 – Swampland Forest
Located just south of Chamberlain Road through to the railway crossing north of Macdonalds Road, the swamp forest community is defined by the remnant natural vegetation community. The landscape is zoned as a combination of open space and environmental management. Generally the area has not been developed for any active use and consequently retains stands of Melaleuca and Eucalypt trees. The corridor itself is not defined by kerb and guttering which provides a less defined edge to the road itself and a greater sense of being part of the landscape.

Table 5 – Character Zone 2: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>The corridor is essentially flat with the rail corridor raised above the road alignment</td>
<td>The proposal sees the existing formation widened and continued on fill. The increase in footprint sees the filling of some of the watercourses and their subsequent realignment</td>
</tr>
<tr>
<td>Vegetation</td>
<td>A strong definition is provided by the trees of the alluvial forest. This is punctuated at various points where the corridor opens out</td>
<td>A reduction in the scale and depth of the vegetation which defines the corridor will occur as the corridor is widened.</td>
</tr>
<tr>
<td>Hydrology</td>
<td>A series of creek crossings and a wetland emphasis the presence of water and its role within this floodplain. Drainage from the road is dispersed with the absence of kerb and gutters</td>
<td>Drainage will continue its role within the landscape but will be controlled more through the use of kerb and guttering. The realignment of a tributary to Cut Rock Creek is required as part of the works</td>
</tr>
<tr>
<td>Land-use</td>
<td>The open space and environmental zoning adjoin the corridor will not change. Services cut through the vegetation providing an existing level of disturbance.</td>
<td>No impact to zoning, service relocation may be required</td>
</tr>
<tr>
<td>Built form</td>
<td>The road forms the only built element within this section.</td>
<td>Road footprint will be doubled. The introduction of retaining walls will see a change in the edge character of the road</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>Alignment is defined by the canopy of remnant trees and water courses.</td>
<td>The doubling in width of the road and associated clearing will reduce the sense of enclosure</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landscape Qualities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>The area generally presents a natural edge to the corridor. The scale of this limits the degree to which it can be disturbed without a significant change in character. The area has consequently been assessed of moderate sensitivity.</td>
</tr>
<tr>
<td>Magnitude</td>
<td>The scale of change varies throughout the character zone influenced by the width of vegetation cover and the definition it provides. The proposal has been assessed to have a moderate impact.</td>
</tr>
</tbody>
</table>

Summary:
The overall impact within this character zone is considered to be moderate with an impact on the overall sense of enclosure, loss/reduction in extent of vegetation, and impact on watercourses all considered to combine to result in a change in character.
7.1.3 Character Zone 3 – Local Village

Located on Railway Crescent to the west of the railway line, the character zone, the village, refers to the cluster of commercial premises within Railway Crescent. This small scale commercial precinct provides for the sale of boats and mowers, and wholesale foods. The built form of this precinct is inconsistent with the heritage Pryor Bros store located hard against the footpath and the facilities for the wholesale foods and boat saleyard setback to enable display or parking. A local widening in the road alignment provides for angled parking and bus stop.

The topography of the zone is steep with Railway Crescent located at the base of an east facing valley wall which slopes steeply to the west. To the rear and sides of these properties the land-use is residential dominated by free standing dwellings. These often consist of a house on piers to accommodate the slope of the site. The landscape associated with this residential usage is primarily exotic.
Table 6 – Character Zone 3: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>Located west of the railway the village is set within a small valley between two spurs at the base of the ridge. The road dips down to the village from the bridge over the railway.</td>
<td>Access from the new bridge over the railway will require the filling and building up of levels to achieve appropriate road geometry.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>The village has limited vegetation cover. Within the residential properties adjoining it there are small scale exotic plantings.</td>
<td>No impact</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Although located in a depression the drainage network has been controlled and surface drainage is not evident.</td>
<td>No impact</td>
</tr>
<tr>
<td>Land-use</td>
<td>Characterised by small shopping precinct of boat and wholesale food sales. This area does not function as local shops.</td>
<td>All properties will be resumed as part of the proposal resulting in a complete change in address</td>
</tr>
<tr>
<td>Built form</td>
<td>Built forms ranges from the heritage shop front of Pryron Bros building, to small warehouse type buildings set back from the property frontage. Free standing residential properties adjoin this.</td>
<td>All commercial properties and two residential properties will be resumed as part of the proposal resulting in a complete change in address</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>The village with a widened road reserve to facilitate angle parking provides a sense of openness.</td>
<td>The revised geometry of Railway Crescent will change this as the road is lifted and is located on fill</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landscape Qualities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>The commercial precinct is dependent on its present configuration to function. The realignment of Railway Crescent and consequent resumption make the precinct Highly sensitive to the change</td>
</tr>
<tr>
<td>Magnitude</td>
<td>The scale of change is significant with the removal of the commercial edge to the road, and significant change in levels and road geometry. Its impact is considered to be high.</td>
</tr>
</tbody>
</table>

Summary:
The overall impact within this character zone is considered to be high with a substantial impact on the commercial centre and some residential properties. This results in a new road alignment west of the existing and a change of address to the properties behind.

7.1.4 Character Zone 4 – The Hillside Landscape
Located between Dora Street and the northern end of the Lisarow Anglican Cemetery, the character zone marks the highest point within the alignment and the steepest terrain. Located at the western edge of the railway crossing it consists of a well vegetated spur line which has been cut by the present Pacific Highway alignment with a small rock cutting and slope formed creating a near vertical edge to the road. It presents a heavily vegetated edge to the road at this point.

Two distinct subzones exist within this unit.

Zone 4A Hillside Landscape – Forest: This is largely undeveloped and is characterised by the natural vegetation of the Coastal Narrabeen Moist Forest community. This precinct occurs immediately adjacent Dora Street and extends northward 100 metres.
Table 7 – Character Zone 4A Hillside Landscape – Forest: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>Steeply sloping at 1 in 4 slope. This marks the highest point along the corridor within the study area. A small cutting delineates its edge with the highway</td>
<td>The proposed alignment lifts the alignment and widens the corridor requiring additional cutting into the hill, and the construction of a retaining wall.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>The native vegetation community, Coastal Narrabeen Moist Forest, dominates this precinct</td>
<td>Clearing of the native vegetation for the wall construction will see a reduction in vegetated area although forest will remain.</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Water drains to either side of the spur but is contained within the Cut Rock Creek Catchment.</td>
<td>No impact</td>
</tr>
<tr>
<td>Land-use</td>
<td>The vegetated hill side and is the primary landuse evident although the site is zoned residential.</td>
<td>Clearing of some of the forest will occur</td>
</tr>
<tr>
<td>Built form</td>
<td>The presence of a cutting is the main intervention within this zone. This consists of an exposed rock/earth cutting</td>
<td>Construction of a retaining wall will be required</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>A general sense of enclosure is provided by the steepness of the slope, the presence of a cutting and the heavily wooded nature of the site</td>
<td>The overall feel of this corner will remain constrained although revised geometry and widened footprint will give a greater sense of openness.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Landscape Qualities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>The forest is reasonably robust, in terms of its ability to absorb change because of the scale of forest and so is considered of low sensitivity.</td>
</tr>
<tr>
<td>Magnitude</td>
<td>The forest experiences a relatively low impact in terms of changing character as a forest backdrop remains despite the widening of the corridor. The magnitude is consequently considered low.</td>
</tr>
</tbody>
</table>
Zone 4B Hillside Landscape – Lisarow Anglican Cemetery: Located to the north of Zone 4A the landscape is marked by a change in the vegetation to Camphor laurel (*Cinnamomum camphora*) and a transition in grade to the flat of the valley once more. This marks the edge of the Lisarow Anglican Cemetery. This is relatively inconspicuous with its presence largely concealed by the vegetation. Small stone gate pillars mark its presence on the Pacific Highway.

Table 8 - Character Zone 4B Hillside Landscape – Lisarow Anglican Cemetery: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>Steeply sloping at 1 in 4 slope. This marks the highest point along the corridor within the study area. A small cutting delineates its edge with the highway</td>
<td>The proposed alignment lifts the alignment and widens the corridor requiring additional cutting into the hill, and the construction of a retaining wall.</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Cultural plantings of Camphor Laurel across the cemetery frontage define this zone from that of the natural community to the south</td>
<td>Camphor laurels will be removed revealing the cemetery to passing traffic</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Water drains to either side of the spur but is contained within the Cut Rock Creek Catchment.</td>
<td>No impact</td>
</tr>
<tr>
<td>Land-use</td>
<td>Lisarow Anglican Cemetery is the primary landuse evident although the site is zoned residential.</td>
<td>The cemetery frontage will be impacted requiring relocation of boundary fence and gate posts</td>
</tr>
<tr>
<td>Built form</td>
<td>The grave stones define the landuse of the cemetery</td>
<td>Construction of a retaining wall will be required across its frontage</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>A general sense of enclosure is provided by the steepness of the slope, and the heavily wooded nature of the site’s frontage</td>
<td>A greater sense of openness will be created as a result of clearing exposing views into the cemetery.</td>
</tr>
</tbody>
</table>

Plate 20 – Hillside Landscape across the Lisarow Anglican Cemetery Frontage
Summary:
The overall impact within this character zone is considered to be moderate. The cemetery zone experiences the higher impacts with changes to its overall character and feel of the space with the removal of the row of Camphor Laurel and relocation of the heritage gate. This will require careful consideration of the interface between cemetery frontage and the proposal.

7.1.5 Character Zone 5 – Suburban Edge
The northern section of the corridor, suburban edge, has been subdivided and is in part occupied by residential dwellings – dominated by free standing residential properties. These vary in age and construction being a mix of fibro and brick veneer. All are single storey. The frontal address of these properties varies with some with open gardens and others with high colorbond fences. Vegetation is also variable with most consisting of shrub planting which is a mix of exotic and native.

A number of properties have been purchased by Roads and Maritime and demolished in preparation for the construction of the proposal.

Table 9 – Character Zone 5: Character Attribute Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landform</td>
<td>Flat low lying land at base of western ridge</td>
<td>No impact</td>
</tr>
<tr>
<td>Vegetation</td>
<td>Mix of exotic and native private garden plantings</td>
<td>No impact</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Drainage from road is uncontrolled and reliant on surface drainage in swales</td>
<td>Alignment to control drainage uses a piped system in association with kerb and guttering.</td>
</tr>
<tr>
<td>Land-use</td>
<td>Residential properties of single storey in height. Those impacted by the proposal have already been demolished.</td>
<td>No change in use is anticipated.</td>
</tr>
<tr>
<td>Built form</td>
<td>Residential properties of single storey in height. Those impacted by the proposal have already been demolished.</td>
<td>No change in form is anticipated for private works. An expansion of the road footprint will however be experienced.</td>
</tr>
<tr>
<td>Spatial quality</td>
<td>The road sees an expansion in its width and a formalisation of its margins.</td>
<td>The removal of trees to frontage of the cemetery sees this space exposed to the road and without strong definition to the space.</td>
</tr>
</tbody>
</table>

Landscape Qualities

<table>
<thead>
<tr>
<th>Landscape Qualities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>The character zone reflects the land-use adjoining the corridor. As a residential zone the impacts are heightened. The expansion in footprint results in a high sensitivity being assessed.</td>
</tr>
<tr>
<td>Magnitude</td>
<td>The scale of the road essentially is doubled with the proposed widening and is formalised with defined kerb and gutter where previously the definition of the corridor has been lacking. The magnitude of the change is considered to be high</td>
</tr>
</tbody>
</table>

Summary:
The overall impact within this character zone is considered to be high. This reflects the close proximity of a sensitive landuse – residential, immediately adjacent the expansion of the highway.
7.2 Landscape Character Impact Assessment Summary

Based on the definitions included in Table 2, the landscape character assessment reveals that the proposal will generally have a moderate to high impact. The scale of these impacts is defined for each of the five character zones, refer to Table 8 below. The greatest impacts on landscape character are on areas adjoining residential and commercial precincts. In particular the local village, cemetery and suburban edge have the greatest impact where properties are partially or completely acquired to facilitate the expansion. In the case of elements which are retained such as the cemetery this changes the way the cemetery addresses the proposal and the spatial quality of the cemetery.

The natural zones experience some change as a result of the expansion in road formation and a reduction in area but this is in part mitigated by the continuity of character of a naturally vegetated corridor based on the retention of the natural community beyond. To minimise the impacts of the clearance, revegetation of disturbed zones will be required. Of particular importance will be the management of the interface with the three EEC and Threatened species *Melaleuca biconvexa*.

Table 10 – Character Zone Impact Summary

<table>
<thead>
<tr>
<th>Character Zone</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Character Zone 1 – Urban Precinct</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Character Zone 2 – Swampland forest</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Character Zone 3 – Local village</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Character Zone 4 A – The hillside landscape -Forest</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Character Zone 4 B – The hillside landscape – Lisarow Anglican Cemetery</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Character Zone 5 – Suburban Edge</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

7.3 Visual Impact Assessment

The potential visual impact assessment of the proposal has been assessed in relation to a number of key viewpoints and group of viewpoints. It is based on the existing land-use pattern and development adjoining the highway corridor.

The assessment method has involved:

- Defining the scale of the proposal.
- Identification of key visual envelopes viewpoints and groups of viewpoints from which the proposal is visible.
- Assessment of the level of impact on the proposed viewpoints from the proposal.

7.3.1 Visual Envelope Mapping

A detailed field and desktop assessment of the alignment was undertaken to determine the area from where the proposal is visible as defined in the Visual Envelope mapping, (Figure 9). The visibility of the highway is primarily from the corridor itself. It is influenced primarily by land use, vegetation and topography.
Upgrade of Pacific Highway HW10, between Ourimbah Street and Parsons Road, Lisarow

Figure 21 – Visual Envelope Map
Key Viewpoints

Vp1 – Parsons Road looking south along Pacific Highway

Views: The views from Parsons Road looking north along the Pacific Highway (refer to Figure 21) are essentially of the immediate surrounds of the highway corridor. Foreground is dominated by the local shopping centre and industrial/commercial holdings (refer Plate 22). Mid ground is characterised by vegetation and a small section of townhouse development.

Sensitivity: The sensitivity has been assessed as low – the work occurs within the existing alignment and the predominant use of retail/commercial and industrial is dependent on the road for marketing. The town house development has been developed with the road in mind with a high wall to control noise.

Magnitude: The magnitude of the impact of the proposal on Vp1 is moderate with an increase in the width of the pavement. The pavement extent fits within the existing extent of disturbance and results in a slight narrowing of the verge.

Summary: The combined visual impact for Vp1 has been assessed as moderate to low, largely as a result of the expansion of pavement with the overall character of the road retained.

Plate 22–Parsons Road looking east along Pacific Highway

Vp2a and 2b– Townhouse development looking over Pacific Highway

Views: This view field covers two view points, refer Figure 21, and relates to how a town house development at the southern end of the proposal is viewed from the road (Vp2a) and how the development views the road (Vp2b).

Vp2a from the Pacific Highway looking east towards the townhouse development are limited by the presence of a high masonry wall (see Plate 23). This provides a defined hard edge to the corridor which is only broken by the occasional tree.

Vp2b represents the views from the townhouse development to the road corridor (see Plate 24). In this instance the wall screens the ground floor level from views of the alignment. The upper storey provides potential for views of the alignment but is partially filtered by vegetation and presently already possible.

Sensitivity: The sensitivity of Vp2a is low as the general experience of the road user is unlikely to change. The sensitivity of Vp2b has been assessed as moderate as the work occurs within the existing alignment. While partially screened by the tall boundary wall, the development is still exposed to the road. The expansion of pavement will be discerned from the properties.

Magnitude: The magnitude of the impact of the proposal on Vp2a and 2b is moderate with an increase in the width of the corridor fitting within the existing extent of disturbance and resulting in a slight narrowing of the verge to accommodate the expanded pavement width.

Summary: This view point has been divided into two with a view towards the road and a view from the road. Vp2a is as moderate to low and Vp2b is assessed as moderate. The increase in impact reflects the permanent nature of the viewer and their sensitivity being a residential land use.
Vp3 Lisarow Train Station and Chamberlain Road Intersection

Views: Vp3 is from the Lisarow train station overlooking the Pacific Highway corridor, which lies to its east (see Figure 21 and Plate 25). From the station, views are defined by a backdrop of trees of the EEC Swamp Sclerophyll Forest community. This vegetation cover restricts any views of the adjoining land use including Lisarow High School and residential properties beyond. The presence of a water body or water course is not evident from the station.

Sensitivity: Sensitivity has been assessed as low: The station presents a transitory experience to the railway station user as they interface between one transport mode and another. The highway dominates the foreground of the view from the station.

Magnitude: The magnitude of the proposal will cause a moderate level of change to existing conditions at Vp3. The alignment will be almost doubled in width and sees a general move eastward impacting the adjoining EEC Swamp Sclerophyll Forest.

Summary: The impact of the changes to Vp3 have been assessed as moderate to low, reflecting the expansion in road corridor but retention of overall backdrop to the road corridor.

Vp4 View of Pacific Highway Corridor between Chamberlain Road and Macdonalds Road

Views: Vp4 (see Figure 21 and Plate 26) along Pacific Highway between Chamberlain Road and Macdonalds Road reveals an enclosed view along a tree lined corridor with vegetation reaching over the alignment. Views from the alignment are contained by the vegetation cover.

Sensitivity: Sensitivity has been assessed as low. This relates to the transitory nature of the user ie the road user and the fact that the alignment is concealed from the adjoining land use. The vegetation adjoining the corridor will be cut back but will continue to define the corridor.

Magnitude: The magnitude of the proposed changes at Vp4 will see a substantial change in the road with a doubling of the road corridor’s width. This will see an opening of the overall canopy cover which results in a moderate impact on visual amenity for the road user.

Summary: The transitory nature of the viewer, along with the expansion in corridor width, combines to create a visual impact which is moderate to low.
Vp5 Railway Crescent Local Neighbourhood Precinct.

Views: Vp5 looking along Railway Crescent is defined to the east by the railway line and to the west by the sides of the valley through which the Pacific Highway and railway pass (Figure 21). The Pryor Brothers general store provides strong definition to the western edge of the corridor with this definition weakened as you move towards Dora Street and the land use changes. The presence of vegetation adjacent to Dora Street terminates the view.

Sensitivity: The area is dominated by residential uses which overlook Railway Crescent. Five properties a mix of commercial and residential are to be acquired. Given the nature of the uses and the changes proposed the area is considered to have a high sensitivity to the changes proposed.

Magnitude: The magnitude of change at Vp5 is high with the acquisition of properties to the south of the alignment, the lifting of the railway bridge and with that the road alignment and the expansion of the road corridor itself all result in substantial change in the views both along Railway Crescent as well as over Railway Crescent.

Summary: The scale and nature of change to Railway Crescent and the properties which currently front it, sees the overall visual impact assessed as high.
Vp6 View from Dora Street looking north east towards Pacific Highway

**Views:** Vp6 looking down Dora Street to the Railway crossing and Pacific Highway alignment, refer Figure 21. The view is defined by the adjoining natural vegetation communities and is terminated by the vegetation to the eastern side of the Railway.

**Sensitivity:** The presence of the native vegetation which will be maintained and will provide a level of buffering which should see the changes contained within the bushland context. The sensitivity is consequently considered to be low.

**Magnitude:** The changes to the alignment will see the Pacific Highway raised and some vegetation clearance in the mid-ground views. The extent of vegetation retained will see the scale of change mitigated due to the screening this provides. The magnitude of change is consequently considered to be low.

**Summary:** The overall visual impact of the proposal from Vp6 is considered to be low due to the dominance of vegetation on the viewscape.

Plate 28 – View to Pacific Highway and railway from Dora Street

Vp7 View from Lisarow Anglican Cemetery of Pacific Highway

**Views:** Vp7 (refer to Figure 21 and Plates 29 and 30) is comprised of views from Lisarow Anglican Cemetery to the north looking over the Pacific Highway and rail corridor. The viewpoint overlooks the highway through a screen of mature trees providing partial glimpses of the highway and a sense of separation.

Plate 29 – View of Pacific Highway from Lisarow Anglican Cemetery and the heritage gates
**Sensitivity:** Sensitivity has been assessed as high due to the nature of the land use and the potential for change due to the limited buffer between Pacific Highway and cemetery.

**Magnitude:** The widening of the Pacific Highway corridor has the potential to remove all screen planting from the cemetery frontage. In addition the proposal will require the construction of a retaining wall. This would result in a substantial change in the character of this viewpoint and consequently the magnitude of the change is considered to be high.

**Summary:** The impact on Vp7 is considered to be high due to the extent of clearing, the exposure of the cemetery to the road, and the scale of structures associated with the road.

---

**Vp8 View looking south along Pacific Highway just south of Lisarow Anglican Cemetery**

**Views:** Vp8 (refer to Figure 21 and Plate 31) looks south west along Pacific Highway and is framed by the rail corridor to the east and a vegetated verge to the west. The view depicts a corridor defined by vegetation. The western verge in particular provides a strong sense of enclosure as it arches over the corridor.

**Sensitivity:** The area is largely defined by natural vegetation community which defines the character of the road. The depth of vegetation will see the edge of the corridor retained as a forested edge. The sensitivity is therefore considered to be low.

**Magnitude:** The proposed change will see a doubling of the corridor width and with this an opening up of the spatial qualities of the corridor as vegetation is cleared and the alignment moves to the west. A vegetated buffer will however remain as the bushland extends beyond the footprint of the corridor. The character of the eastern verge however should remain relatively intact as the railway corridor provides separation between the vegetated backdrop and the proposal. The impact has been assessed as moderate.

**Summary:** The impact on Vp8 is considered to be moderate to low. The scale of the works sees an increase in dominance of the road corridor but the natural vegetation still provides a strong sense of definition to the corridor.
Vp9 View of Pluim Park looking west towards Pacific Highway

**Views:** Vp9 (refer to Figure 21 and Plate 32) is from Tuggerah Street looking north west towards Pacific Highway. The view over Pluim Park reveals a highly maintained sports ground defined by native vegetation to the west screening views of the railway and Pacific Highway.

**Sensitivity:** The sensitivity of the area has been assessed as low due to the strong screen of vegetation to the west of the site which adjoins the Pacific Highway and railway corridor.

**Magnitude:** The magnitude of change at Vp9 is assessed as low due to the limited impact which occurs on the surrounding vegetation corridor.

**Summary:** The impact on Vp9 is considered to be low. This reflects the location of the site being remote from the proposal and the ability of the vegetation on the margins to the corridor to minimise the exposure of the site.
Vp10 View west of the alignment across the EEC Freshwater Wetlands

Views: Vp10 (refer to Figure 21 and Plate 33) is located near the intersection Macdonalds Road and the Pacific Highway and looks west from the Pacific Highway towards the Northern Railway. An opening in the EEC Swamp Sclerophyll Forest reveals EEC Freshwater Wetlands providing views westward. These views however are terminated adjoining the railway where the EEC Swamp Sclerophyll Forest closes in once again. This acts as a visual barrier to properties to the west of the railway line and the railway line itself.

Sensitivity: The alignment and wetland through this zone have a low sensitivity with the user of the highway transitory in nature and the wetland of a scale that it is able to moderate the change visually within its composition.

Magnitude: The widening of the corridor sees a contraction in the extent of EEC Freshwater Wetlands as the alignment moves westward. The scale of the change does not change the overall visual composition of the wetland and so the impact is considered low.

Summary: The impact on Vp10 is considered to be low. The impact of the proposal including the scale of and nature of the change is contained largely to the corridor footprint. The natural vegetation beyond the initial impact of the road itself is retained and so the impact has been assessed as low.

7.4 Visual Assessment Summary

The visibility of the corridor from the adjoining community is limited with the majority of views either along the corridor or from facilities which front the corridor. The visual impact assessment completed in section 7.3 is summarised in Table 10.

Table 11 – Visual Assessment Summary

<table>
<thead>
<tr>
<th>View Point</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPT 1</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate - Low</td>
</tr>
<tr>
<td>VPT 2a</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate – Low</td>
</tr>
<tr>
<td>VPT 2b</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>VPT 3</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate - Low</td>
</tr>
<tr>
<td>VPT 4</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate - Low</td>
</tr>
<tr>
<td>VPT 5</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Plate 33 – View westward across EEC Freshwater Wetlands
<table>
<thead>
<tr>
<th>View Point</th>
<th>Sensitivity</th>
<th>Magnitude</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPT 6</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>VPT 7</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>VPT 8</td>
<td>Low</td>
<td>Moderate</td>
<td>Moderate - Low</td>
</tr>
<tr>
<td>VPT 9</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>VPT 10</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
</tbody>
</table>
8 MITIGATION STRATEGIES

The concept design has responded to the constraints and opportunities posed by the site. A plan to address these has been presented which addresses the majority of issues associated with the proposals impacts on its surroundings.

Areas where further development and refinement could be used to further reduce impacts include:

- Lisarow Anglican Cemetery
- Environmental Management zone from adjacent Lisarow Station to the railway overpass.
- Noise Management

8.1.1 Environmental Management Zone adjacent Lisarow Station to the railway overpass

To the east of the alignment the opportunity to separate the shared path from the road could be used to enhance its functionality and experience for the path user. This would enable it to be related to the adjoining wetland, creek line system, and provide a more amenable path on which to travel. It would however also provide potential risks in terms of maintaining surveillance and potentially would reduce the directness of the path. Any such development would need to balance the potential impact on the adjoining EEC vegetation community. It is recommended that this be investigated further in collaboration with service authorities and Council in order that the impacts on the EEC can be kept to a minimum as part of the proposal.

Plate 34—Type of boardwalk structure which could be considered
8.1.2 Lisarow Anglican Cemetery

An alternate scheme for the path arrangement across the front of the cemetery, refer Figure 22, may also provide opportunities to further reduce the impact across this frontage. This would provide a footpath separated from the road in order to move the retaining wall from the cemetery boundary and as a result of this reduce the scale of the structure immediately adjoining the cemetery and limit the impact on the existing trees. The pathway would need to be constructed as a slightly raised boardwalk to further minimise impacts on tree route zones. Further studies would be required to determine the constructability of this proposal and this would need to be agreed with the Council and Anglican Church who have already commented on the proposed option.

Figure 22 – Section F: Alternative proposal
8.2 Noise Mitigation

There are no proposals for noise walls as part of the works. If noise treatments are determined to be required as part of the detailed these would be managed as property adjustments.
CONCLUSION

The proposed widening of the Pacific Highway between Parsons Road and Ourimbah Street passes through a section of corridor which is largely adjoining by natural vegetation communities including the EEC communities of Swamp Sclerophyll Forest and Freshwater Wetlands. Despite the primarily natural community interface there are a number of cultural interfaces which adjoin the corridor and add to its character.

Five character Zones were identified and assessed in terms of impact three of these were cultural and included the Urban Precinct, Local Village and Suburban Edge, the latter two having a high impact on character due to the acquisition of properties. Two natural character zones were identified the swamp forest and the hillside landscape both of which were assessed as having a moderate impact due to the changing scale of the road corridor.

Visually 10 viewpoints were analysed in terms of impact of the ten two were assessed as having a high impact. These viewpoints related to the local neighbourhood in Railway Crescent where a number of properties are acquired and the Lisarow Anglican Cemetery. The remaining locations varied from moderate to low.

To address the identified visual and character impacts a number of strategies have been suggested as part of an integrated urban design plan which responds to the identified constraints and proposes treatments which minimises or addresses the changes to provide a corridor that relates to its surrounds. The overall impact on character and visual attributes of the corridor has been assessed as being moderate with an ability to enhance and response to the constraints to provide a considered and integrated response which relates to it surrounds.
REFERENCES


Roads and Traffic Authority, June 2010, Pacific Highway Upgrade: Stage 3 - Lisarow to Ourimbah - Urban and Landscape Design 100% Concept Design Report. HBO + EMTB


Roads and Traffic Authority (2005) Shotcrete Design Guidelines: Design Guidelines to avoid minimise and improve the appearance of shotcrete

Roads and Traffic Authority Road Design Guidelines

NSW Roads & Traffic Authority, 2009 Pacific Highway Improvements Stage 4 - Manns Road Narara to Railway Crescent Lisarow Preliminary Ecological Assessment; Hyder Consulting