

## 7 IMPACT ASSESSMENT

This chapter provides an assessment of the landscape character, visual and overshadowing impacts of the proposed project on the character of a place and the views within that place. The landscape character assessment relates to the built, natural and cultural aspects that makes a place unique, while the visual impact assessment is intended to identify design improvements that can address adverse impacts either through design integration or as mitigation measures.

This landscape character and visual impact assessment is related to the Roads and Maritime urban design process that addresses visual and character issues, both of which are key aspects for delivering good urban design outcomes.

The landscape character and visual impact assessment for the proposed levee upgrades is provided separately in the Environmental Impact Statement.

## 7.1 IMPACT ASSESSMENT METHOD

### BRIDGE AND APPROACH ROAD METHOD

A landscape character and visual impact assessment of the projects concept design has been undertaken. Based on the results of the assessment, appropriate mitigation measures have been developed to assist in reducing the identified visual impacts, which are included in Chapter 8.

The method used to undertake this study follows the ‘Guideline for Landscape Character and Visual Impact Assessment’ (Roads and Maritime, 2013) and is summarised as follows:

- Site visits and field investigations, reviewing relevant literature, analysing aerial photographs and topographic maps to understand the study area.
- Reviewing the engineering, urban design and landscape concept designs, and other supporting material to gain an appreciation of the project.
- Defining landscape character through a study area analysis.
- Identifying and describing landscape character zones.
- Evaluating the impact of the project on these landscape character zones by combining the sensitivity of the zone and the magnitude of the works to provide an overall impact rating as indicated by the Impact Assessment Grading Matrix (Table 7.1).
- Identifying the visual catchment of the proposed works for the visual impact assessment.
- Selecting viewpoints within the visual catchment representing a range of different land uses.
- Evaluating the visual impact of the project by comparing the sensitivity of viewpoints and the magnitude of the impact of the

project upon them to provide an overall impact rating as indicated by the Impact Assessment Grading Matrix (Table 7.1).

The issue of overshadowing is addressed separately in this section after the visual impact assessment. It looks at two main times of year, specifically 21 June (winter solstice) and 21 December (summer solstice), when shadowing from the proposed bridge would potentially have the most dramatic impact on the surrounding landscape.

Specifics of how the method is applied to the landscape character zone and visual impact assessment are described on the following pages.

The impact assessment grading matrix, adopted from Guideline for Landscape Character and Visual Impact Assessment (Roads and Maritime 2013), shown in Table 7.1, is used in both the landscape character and visual impact assessments. The matrix is applied based on specific criteria relevant to each type of assessment. These criteria are described at the beginning of each assessment section.

Table 7.1: IMPACT ASSESSMENT GRADING MATRIX

		MAGNITUDE			
		High	Moderate	Low	Negligible
SENSITIVITY	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

## 7.2 PROPOSED BRIDGE AND APPROACH ROADS LANDSCAPE CHARACTER IMPACT

Roads and Maritime's 'Guidelines for Landscape Character and Visual Impact Assessment' (Roads and Maritime, 2013) provides the following definition of landscape character:

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

Applying this definition to the specific conditions within the study area, and the features of the proposal, the landscape character assessment also considers how the area is used and how it functions in the Grafton area.

### LANDSCAPE CHARACTER ZONES

The study area has been divided into five Landscape Character Zones (LCZ) as illustrated in Figure 7.1. The zones are based on the general landscape character types in the area. This allows for a more detailed discussion of each character zone within the proposal; and a more specific understanding of the likely impact on the landscape character to be experienced as a result of the proposal. Each zone has been defined through the development of an understanding of urban form, topography, and vegetation in combination with other factors, such as land use activities as previously described in Chapter 4.

The five Landscape Character Zones from north to south are listed below and shown on Figure 7.1:

- LCZ1 - Grafton town centre and established residential.
- LCZ2 - Grafton established residential.
- LCZ3 - Clarence River and foreshore
- LCZ4 - South Grafton industrial and rural hinterland.
- LCZ5 - South Grafton industrial and commercial

The existing landscape character of the area is topographically dominated by the Clarence River and its flat river plain. Either side of the river sit the town centres of Grafton and South Grafton which consist of wide gracious streets laid out on a square grid. Outside of the town centres, there are established and newly developing residential areas, and industrial areas, generally concentrated around the regional road and rail corridors. These urban areas are surrounded by the agricultural areas that comprise the city's rural hinterland. Each LCZ is described in more detail in the following sections.

### LANDSCAPE CHARACTER ASSESSMENT CRITERIA

The landscape character zones facilitate detailed assessment of the character of the study area, of the proposal within it, and of the magnitude, sensitivity and impact likely on the landscape character of each zone to be experienced as a result of the project.

### Magnitude

In landscape character assessment, magnitude refers to the type of proposal and its compatibility with the existing landscape character. All anticipated elements of the project, including the bridge, alignment, road infrastructure, pedestrian and cycle paths, planting, lighting, etc, are considered. The scale of the elements (height, length), as well as its location or setting (on floodplain, near the town), all have a bearing on the magnitude of the physical presence of the works.

- A *high magnitude* results if the proposal is a major development or piece of road infrastructure and contrasts highly with the surrounding landscape, or entails heavy modification of the existing landscape, for example, the large scale removal of existing vegetation.
- A *moderate magnitude* rating would result if the proposal is moderately integrated into the landscape.
- A *low magnitude* rating would occur if the project is of a small scale and integrates well into the landscape.

The magnitude impact rating also considers whether the proposal has a positive or negative impact on the landscape character of the zone. For example, a proposal may be of a large scale but may provide beneficial outcomes such as increased open space, enhancement of the areas 'sense of place', and better connectivity and a safer road environment.

### Sensitivity

Sensitivity refers to how sensitive the character of the setting is to the proposed change. A judgement has been made as to the quality of the landscape, its cultural and historical importance to the community, scenic quality, and overall composition of the place and its inhabitants. The following sensitivity judgements have been used as the basis for this assessment:

- Places with high social, recreational, and historical significance to local residents have higher sensitivity.
- Generally, water and natural environments are more highly valued than modified areas, though views over rolling farmland are still highly valued.
- Areas of unique scenic quality have higher sensitivity.
- A pristine environment would have greater sensitivity with less ability to absorb new elements in the landscape than modified landscapes or those areas with contrast and variety of landscape types.
- The number and frequency of viewers effects sensitivity, with retail, residential and open space viewers generally more sensitive than workers and motorists.

### Impact

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix (refer to Table 7.1).

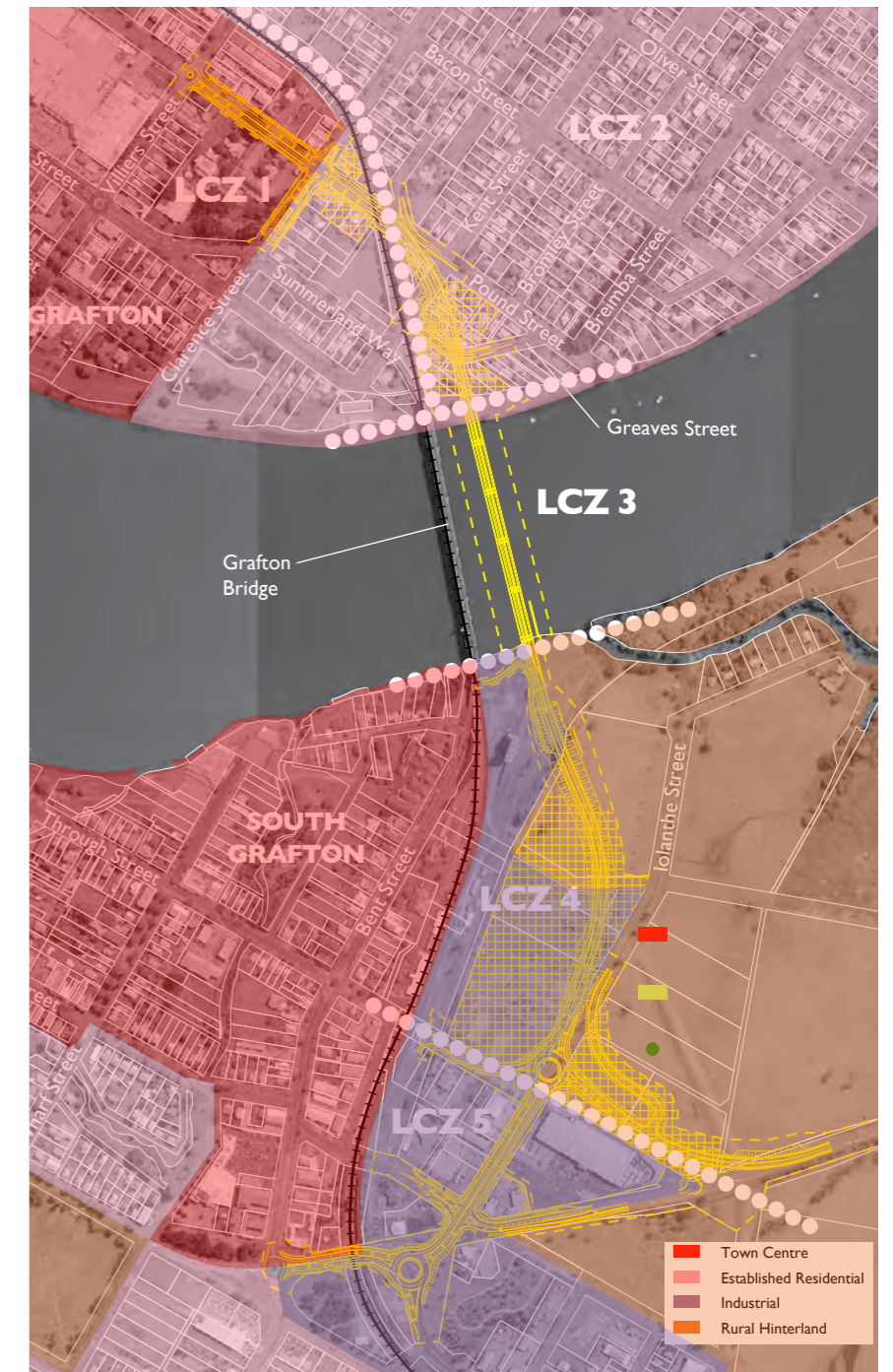


Figure 7.1: Landscape Character Zones - LCZs.

## LCZ 1: GRAFTON TOWN CENTRE AND ESTABLISHED RESIDENTIAL

### EXISTING LANDSCAPE CHARACTER

The landscape character in this part of the town centre is generally classified as a transitional area from the residential areas to the urban core. The Grafton TAFE campus is a visually prominent property, characterised by large trees in a park-like setting, at the entrance to the CBD which forms part of the educational precinct. The character attributes of this zone are described below.

### Built Form and Heritage

Grafton TAFE is the dominant property owner in the area, and is located over the majority of the block to the west. Local residential homes are scattered throughout the area but mostly located to the south and east. The northeast side of one block of Pound Street contains a number of light industrial and commercial businesses. There are a number of locally and National Trust listed heritage buildings and trees within this zone. The entire property of the Grafton TAFE is listed amongst these heritage listed items.

### Public Domain

Public open space within the zone consists of the tree lined streets with their wide grassed verges and footways. The grounds of Grafton TAFE are also accessible to the public.

### Connectivity and Access

Pound Street is an important vehicular access route into the Grafton town centre particularly the Grafton Shopping World and Prince Street, the traditional main street of Grafton, from the residential areas to the south and east. There are minimal formal pedestrian or cycle paths, with pedestrians having to utilise the grass verges of the street and cyclists the road pavement.

### Vegetation

A broad variety of street trees are located throughout this zone. Pound Street includes a number of trees including three Small Leaf Figs, Illawarra Flame Trees, Poincianas, Jacarandas and two very large Hill's Fig trees (30m high), of good health and ecological value, which have great cultural importance to the area. The five Fig trees have a crown spread ranging from 16-32m and are the dominant element in the section of Pound Street between Villiers Street and Clarence Street,

providing valuable shade as well as screening the light industrial and commercial buildings.

### Key Activity Areas

Grafton TAFE is the main activity generator in this zone and is accessed from both Pound Street and Clarence Street. The light industrial and commercial businesses located along northern section of Pound Street are also activity generators in this zone.

### Spatial Quality

The wide streets and low rise buildings contribute to the open character of the zone. Both Pound Street and Clarence Street are characterised by a relatively narrow road pavement carriageway with large, open grassed swales and do not have formal kerb and gutter. Street trees, particularly those on Pound Street, dominate the landscape in this area.



Plate 7.1: View along existing Pound Street looking south east



Plate 7.2: View along existing Pound Street looking south east



Plate 7.3: View along existing Clarence Street looking south west

## THE PROPOSAL

The proposal in LCZ 1 is summarised as:

- Two lanes of traffic in both directions along Pound Street.
- Signalised intersection at Pound Street and Clarence Street.
- Provision of angle parking to the northern side and parallel parking to the southern side of Pound Street.
- One lane of traffic in both directions along the southern section of Clarence Street, angle and parallel parking on both sides of the street, and 90° parking to the centre of the street.
- New pedestrian and cycle path on the southern side of Pound Street.
- New footpath on the north side of Pound Street.
- Removal of a majority existing trees in Pound Street, between Clarence Street and Villiers Street, and Clarence Street between Pound Street and Fitzroy Street.
- Demolition of two houses and the construction of a small carpark on the north eastern corner of the Pound and Clarence Street intersection.

## PROPOSED LANDSCAPE CHARACTER

Landscape character changes and effects to LCZ 1 that would result from the project are described below.

### Built Form and Heritage

The proposal would result in the demolition of seven (7) houses, including one (1) locally heritage listed buildings. The land on the corner of Pound and Clarence Streets would be converted into a carpark, altering the built form structure of Pound Street. The dominance of vehicular parking and road pavement would change the appearance of the area, which would become an additional arrival point to Grafton. There would be slight encroachment of the proposed works on the Grafton TAFE property and another heritage listed dwelling on Pound Street.

### Public Domain

The proposal would result in the formalisation of the grass and tree lined street verges, which would improve pedestrian and cycle access along Pound Street. However, the removal of the trees would reduce shade and visual amenity until the new plantings mature. The property

encroachment on Grafton TAFE would also be an impact to the public domain. The residual land on Pound Street, east of Clarence Street has the potential to increase and improve public open space amenity in the area.

### Connectivity and Access

The proposal would provide an additional vehicular access route into Grafton town centre. It would also provide another access to Grafton Shopping World and would provide an alternative route to Prince Street from South Grafton.

Pedestrian and cycle access would be improved by the construction of a pedestrian and cycle path next to Grafton TAFE, linking the town centre with the proposed bridge.

### Vegetation

The majority of trees along Pound Street and Clarence Street, including five large Fig trees, would be removed. Feature trees would be planted at the ends of the angled car parking bays on the northern side of Pound Street, and on the southern side, some partially with Grafton TAFE land. Medium sized trees are proposed closer to the intersections, in conformance with sight line requirements.

### Key Activity Areas

Traffic activity may slightly increase within this zone, particularly on Pound Street, due to the increased number of lanes and formalised parking. Additional parking in Clarence Street and the proposed carpark at the corner of Pound and Clarence Streets would increase pedestrian activity, particularly students attending Grafton TAFE, key activity area in this zone.

### Spatial Quality

The spatial quality of Pound Street would be greatly impacted due to the removal of the trees, particularly the large Figs. The planting of replacement trees would leave the street open until the trees mature over time.

There would also be impacts to the spatial quality of Clarence Street, with the removal of existing trees, wide traffic islands in centre of the road and doubling the extent of hard surface in the area. Angle, parallel and 90° parking bays would be the dominant feature in this area as there is limited space for street tree planting.

## Construction Activities

During construction, land on the eastern corner of Pound Street and Clarence Street, and the land occupied by five houses on the southern side of Pound Street, east of Clarence Street would be used for ancillary facilities, temporarily impacting on the character of the zone. The sites would be surrounded by temporary fencing and include site compounds, stockpile areas for materials and temporary storage of spoil and mulch.

Following construction, the corner site would be converted into a carpark, and the Pound Street frontage would be grassed and planted with an avenue of feature trees with scattered native trees, to form a park like character

## LANDSCAPE CHARACTER ASSESSMENT

### Magnitude

The proposal increases the scale of road infrastructure to Pound and Clarence Streets, changing them from narrow, two lane streets with wide, tree lined verges, to predominately road pavement thoroughfares, making the road environment the dominant feature. It also requires the demolition of seven houses. The addition of new tree plantings would reduce the magnitude of the project as they mature over time.

Overall, the qualitative assessment indicates that the magnitude of the project would be High due to the proposed changes taking place.

### Sensitivity

Grafton town centre and established residential area has a High sensitivity due primarily to the social, cultural, heritage and recreational values placed on it by the local community. It includes a number of retail outlets, education institutions heritage buildings, and open space, and the high number and frequency of users within the zone, due to its proximity to Grafton Shoppingworld, reinforce this rating.

### Landscape Character Impact

The qualitative assessment indicates that the landscape character impact of the proposal in this zone is likely to be **High**.

Magnitude	High
Sensitivity	High
<b>Landscape Character Impact</b>	<b>High</b>

## LCZ 2: GRAFTON ESTABLISHED RESIDENTIAL

### EXISTING LANDSCAPE CHARACTER

The established Grafton residential area is strongly defined by the street grid pattern, wide streets and single storey dwellings. The character attributes of this zone are described below.

#### Built Form and Heritage

The housing stock in Grafton generally consists of single storey dwellings of varying ages and styles. Many houses are elevated, with garages and storage located on the lower level, as a response to the frequent flooding of the Clarence River. The rail line viaduct also runs through this zone and is a unique architectural element in the urban character of this residential neighbourhood zone.

There is also a large number of locally significant heritage buildings in this zone.

#### Public Domain

Public open space within the zone consists of attractive, wide tree lined streets with wide grassed verges and footways, with connections to the existing bridge footpaths, Girl Guide Park and the river foreshore area.

#### Connectivity and Access

Pound Street is an important vehicular access route into the Grafton town centre and for connections to the existing bridge. North from the existing bridge, Kent Street, Oliver Street and Queen Street form part of the Coastline Cycleway route. There is no formal pedestrian access, with pedestrians generally having to utilise the grass verges of the street.

#### Vegetation

A broad variety of street trees are located throughout this zone, but the area is dominated by Jacaranda's. This zone is one of the key areas for tourists to visit during Grafton's Jacaranda Festival. This zone also has a grand avenue of Fig trees which begins near Girl Guide Park at the intersection of Pound Street and Breimba Street. This is also an attraction for visitors to the area.

### Key Activity Areas

Whilst the area is mostly a residential neighbourhood, it is used by cyclists and tourists passing through the area during the Jacaranda Festival.

### Spatial Quality

The LCZ has a generally open character due to the flat topography, low level dwellings and wide street reservations. The houses are set well back on streets with wide grass verges and prominent street trees.

The existing road and rail viaducts add another vertical element to the landscape.



Plate 7.4: View along existing Pound Street, near Girl Guide Park, looking north west



Plate 7.5: View along existing Pound Street, at Kent Street intersection, looking north west



Plate 7.6: View along existing Greaves Street looking east

**THE PROPOSAL**

The proposal in LCZ 2 is summarised as:

- A steel truss bridge to connect the North Coast Railway Line over Pound Street west of Kent Street.
- Realignment of Pound Street as the approach road to the proposed bridge.
- Proposed bridge from Greaves Street to the Clarence River, with the bridge abutment immediately north of Greaves Street.
- Lowering of Greaves Street at the bridge abutment to provide the necessary height clearance to the bridge above for vehicles.
- A retaining wall on the southbound side of the approach road, opposite the intersection of Pound Street and Kent Street.
- A noise barrier on the southbound side of the approach road from the river's edge at Grafton running north to steel truss bridge at Pound Street. .
- A pedestrian and cycle path on the northbound side of the approach road, including a connection via Greaves Street adjacent to the drainage detention basin.
- A drainage detention basin north of Greaves Street, between the bridge approach road and the railway viaduct.
- Drainage culverts under the bridge approach in the vicinity of Kent Street.
- A flood pumping station south of Greaves Street that would extract water from the detention basin and convey it to the Clarence River.

**PROPOSED LANDSCAPE CHARACTER**

Landscape character changes and affects to LCZ 2 that would result from the project are described below.

**Built Form and Heritage**

The proposal would result in the removal of most of the Greaves/Kent Street neighbourhood precinct. It is proposed to demolish 15 houses, including six (6) locally heritage listed buildings, as part of the works in this zone.

The houses would be replaced by a new elevated four lane road, with a pedestrian and cycle path and a section of noise wall on a large embankment as it approaches the bridge. Additionally, a drainage detention basin would be constructed with a 1800 mm high chain wire

fence around its perimeter which would be planted with native species around its base. Overall, the proposal would have a considerable impact on the built form and heritage in this zone.

**Public Domain**

The large areas of land acquired for the proposal would alter the existing public domain by providing additional areas of open space. These areas may potentially improve pedestrian connections to the river foreshore.

**Connectivity and Access**

The new approach road, whilst providing additional access between Grafton and South Grafton, restricts access to Grafton town centre from the area north and east of Pound Street.

The new pedestrian and cycle path would improve pedestrian and cycle access and would also link with the existing bridges path system just west of Greaves Street, however it would affect the route of the existing regional Coastline Cycleway, which would require minor realignment to link with the existing path on Kent Street.

**Vegetation**

A large number of trees would be removed from Greaves Street, Pound Street, Kent Street, and acquired individual properties. New native tree plantings would be provided on the approach road embankments, to screen the road and noise wall. Native tree planting, as well as the planting of species culturally important to Grafton, such as Jacaranda, Figs and Flame Trees, would also be provided to the potential areas of open space. Overall there would be an increase in the number of trees in the area.

**Key Activity Areas**

The proposal would have little impact on the key activity areas in the zone, however, it would alter access to some of these areas. There is the potential to add activity areas, in the form of parkland, to the areas of land acquired for the proposal.

**Spatial Quality**

The proposal would add another vertical element, along with the existing road and rail viaducts, into the landscape. Additionally, the removal of the houses would result in a more open views which would be dominated

by new road and existing rail infrastructure, until the proposed tree plantings reach maturity.

**Construction Activities**

During construction, an area bound by Kent Street, Pound Street and the railway viaduct would be used for ancillary facilities, temporarily impacting on the character of the zone. The sites would be surrounded by temporary fencing and include site compounds, stockpile areas for materials, temporary storage of spoil and mulch and other construction activities.

Following construction, the land would be grassed and planted with scattered native trees, to form a park like aesthetic.

**LANDSCAPE CHARACTER ASSESSMENT**

**Magnitude**

The proposal increases the scale of road and related infrastructure into this residential landscape. It requires the demolition of 15 houses and the removal of a number of trees in an area bounded by Pound Street, Greaves Street and the railway line, which would be replaced by areas of open space.

Although impacts are localised, the qualitative assessment indicates that the magnitude of the project would be High due to the scale of the proposed changes taking place.

**Sensitivity**

The local residents along with cyclists, visitors and tourists have a High sensitivity as there is a strong social and cultural significance to this part of Grafton. The area contains a number of houses and trees of historical value, reinforcing this rating.

**Landscape Character Impact**

The qualitative assessment indicates that the landscape character impact of the project in this zone is likely to be **High**.

Sensitivity	High
<b>Landscape Character Impact</b>	<b>High</b>

### LCZ 3: CLARENCE RIVER AND FORESHORE

#### EXISTING LANDSCAPE CHARACTER

The Clarence River winds across a wide floodplain. The bridge is the dominant visual feature on the river in the Grafton area and strongly defines the landscape character of LCZ 3. The character attributes of this zone are described below.

#### The Bridge

The State, local and National Trust heritage listed bridge was opened to road and rail traffic in 1932. The upper deck contains a two way road, whilst the lower level supports a rail line, two footpaths, and water mains. The bridge, despite sitting comfortably within the river setting, remains, the dominant piece of infrastructure within the river and its surrounds.

#### The River and Foreshore

The Clarence River is the dominant visual element in the local landscape, and the existing steel truss bridge contributes to this by allowing views to continue through the superstructure of the bridge. This section of the river is characterised by its wide oxbow form that provides for sweeping views across the river plain. The two pedestrian paths, on either side of the railway line on the lower level of the bridge, provide the best views of the foreshore and floodplain both upstream and downstream along the river.

The river edge is defined by levee banks on both sides, protecting Grafton and South Grafton from periodic flooding of the river. The foreshore is a predominately public open space, the exception to this being the northern foreshore, in areas both east and west of the bridge, where some parcels of foreshore land are privately owned.

Susan Island and Elizabeth Island are located either side of the bridge and are important elements in the character of the river. Susan Island is visible from the bridge, and due to its size, visually blends in with the surrounding landscape.

#### Key Activity Areas

There are a number of public facilities along the foreshore, including the Grafton Mens Bowling Club, Grafton Rowing Club and Clarence River Sailing Club on the northern foreshore, and the South Grafton Ex-Servicemens Club and Skinner Street Wharf on the southern foreshore. Public open space includes Grafton Memorial Park, and Girl Guide Park on the northern foreshore.

The river itself is also a key activity area for boating, sailing, fishing and other recreational activities.

#### Vegetation

Vegetation is mixed along the foreshore area. Reeds are dominant at the waters edge, while generally exotic planting and weeds are found amongst the grassed foreshore areas. There are several trees, including Jacaranda's and Flame Tree's on the both foreshores. Further to the east, riparian planting is located on the banks of Alipou Creek which is of great cultural significance to the Aboriginal community.

#### Connectivity and Access

The existing bridge provides one lane of vehicular traffic in each direction. There are also two pedestrian paths, on either side of the railway line on the lower level of the bridge. Access to the pedestrian paths is via relatively steep ramps, which both have poor sight lines and limited surveillance. The paths are relatively narrow, particularly as it is used as a pedestrian and cycle path for both pedestrians and cyclists, yet these paths do offer very attractive panoramic views both of the upstream and downstream reaches of the river.



Plate 7.7: The existing bridge viewed downstream from South Grafton CBD



Plate 7.8: Pedestrian path on the downstream side of the existing bridge, looking south



Plate 7.9: Pedestrian path on the downstream side of the existing bridge, looking east



## THE PROPOSAL

The proposal in LCZ 3 is summarised as:

- 553 metres long concrete bridge, approximately 70 metres east of the existing Grafton Bridge with a crest in the centre and a longitudinal grade falling back toward Grafton and South Grafton.
- The road level on the proposed bridge would be approximately halfway between the levels of the road deck and the railway deck on the existing Grafton Bridge with one lane of traffic in each direction on the new bridge.
- The bridge would have 10 spans, with five piers in the Clarence River and four piers on land – two piers at each foreshore.
- The bridge spans would be a concrete box girder. The girder would be five metres deep at the piers and three metres deep at mid spans.
- The viaduct spans would be 1.2 metres deep Super T girders.
- At the crest of the bridge (at Pier 5), the road level would be approximately 15.4 metres above the river at Mean High Water Spring (MHWS). The top of the vehicle barrier would be about 16.7 metres above the river at this point.
- Precast concrete parapets on both sides of the bridge.
- Twin rail steel barriers at the edge of both carriageways.
- A pedestrian and cycle path on the northbound (upstream) side of the bridge, facing the existing Grafton Bridge.



Plate 7.10: View from northern foreshore to existing bridge

## PROPOSED LANDSCAPE CHARACTER

Landscape character changes and affects to LCZ 3 that would result from the project are described below. It is noted that the impacts on landscape character would be different on the upstream and downstream sides due to the existing bridge partly obscuring the proposed bridge on the upstream side. For this reason, landscape character assessment has been provided for both sides of the river setting

### The Bridge

The proposed bridge would be constructed about 70 metres downstream of the existing bridge. The scale of the proposed bridge would be slightly less than the existing bridge, however, the accumulative effect of both bridges substantially increases the scale of infrastructure on the river setting. Additionally, the road level on the proposed bridge would be approximately halfway between the levels of the road deck and the railway deck on the existing Grafton Bridge.

### The River and Foreshore

Whilst the Clarence River would remain the dominant visual element in the local landscape, the proposed bridge would have an adverse impact on the spatial quality of the existing bridge in its setting.

Downstream views of the Clarence River and Alipou Creek would no longer be visible to pedestrians, cyclists and train passengers on the lower deck of the existing bridge as the views would be blocked by the concrete box girder of the proposed bridge. These views would also not be accessible from the proposed bridge as the pedestrian and cycle path would be on the upstream side. However, this path would provide a continuous and relatively close view of the existing bridge.

Upstream views from the existing bridge would not be affected. Downstream views of the existing bridge would also be maintained, however the proposed bridge would be visible through the existing bridge structure, increasing the overall visual bulk of the more light weight truss bridge.

### Key Activity Areas

The proposal would have limited impact on boating and river foreshore use, mostly during the construction phase of the bridge. There would be some slight overshadowing of the foreshore areas and an impact on views from the existing bridge and river foreshore (including Girl Guide Park), which would be obscured by the new bridge. Other foreshore areas would not be affected.

## Vegetation

The proposed bridge works would require the removal of vegetation, including a number of Jacarandas and Flame Trees. New tree plantings would replace those removed. Scour protection works directly under the new bridge would provide a harder edge to the river bank.

## Connectivity and Access

The project would incorporate a pedestrian and cycle pedestrian/cycle path across the western side of the new bridge, an alternative route between Grafton and South Grafton, and a path linking with the existing path network over the existing bridge on the southern foreshore. Access along the northern foreshore would not be affected.

## LANDSCAPE CHARACTER ASSESSMENT

### Magnitude

The proposed works include the construction of a new bridge which together with the existing bridge, increase the scale of infrastructure on the river setting which would be particularly visible from the downstream side.

Overall, the qualitative assessment indicates that the magnitude of the project would be Moderate on the upstream side and High on the downstream side due to the proposed changes taking place.

### Sensitivity

Due to the highly scenic character of the river setting, the heritage listed bridge, Alipou Creek Aboriginal site and the generally flat topography of the surrounding area, the zone would have a High sensitivity to the proposed works on both sides.

### Landscape Character Impact

The qualitative assessment indicates that the landscape character impact of the project in this zone is likely to be **High to Moderate** on the upstream side and **High** on the downstream side.

	upstream	downstream
Magnitude	Moderate	High
Sensitivity	High	High
<b>Landscape Character Impact</b>	<b>High to Moderate</b>	<b>High</b>

## LCZ 4: SOUTH GRAFTON INDUSTRIAL AND RURAL HINTERLAND

### EXISTING LANDSCAPE CHARACTER

The landscape character of LCZ 4 is that of rail lines, vacant industrial land and flat, open agricultural fields in the floodplain. The character attributes of this zone are described below.

### Built Form and Heritage

Buildings within this LCZ are limited to a small number of residential homes along Butters Lane, the sugar loading facility and the buildings and structures at Grafton Railway Station. The Grafton Railway Station is a State, local and National Trust listed heritage site. Alipou Creek is also an important Aboriginal heritage location and has significant cultural value to the local Aboriginal community.

### Public Domain

The Grafton Railway Station and Coastline Cycleway are the main areas of public domain in this zone. The railway and cycleway corridors have slightly elevated views over this zone.

### Connectivity and Access

Access is limited to the local and service roads. Iolanthe Street is the main road in the area which connects Butters Lane with the rest of South Grafton at Iolanthe Street. The Coastline Cycleway, a separated pedestrian and cycle path that connects the existing bridge crossing, is the only formal pedestrian or separated cyclist access in the zone. The regional Coastline Cycleway is a pedestrian and cycle pedestrian and cycle path that runs parallel to the railway line, linking the existing bridge to the Grafton Railway Station and Through Street, Spring Street and the South Grafton Bus Interchange in this zone.

### Vegetation

Tree planting is sparse in this zone and is limited to plantings along the roadside, to property boundaries, along Alipou Creek, and scattered plantings within the paddocks. This zone contains a range of trees including Jacarandas, Figs and Brush Boxes, which are readily visible throughout the area and particularly from the Coastline Cycleway and Grafton Railway Station.

### Key Activity Areas

The main activities in this LCZ focus around the sugar loading facility and farming activities. The rail line and the Coastline Cycleway form key transport corridors on the western edge of the zone.

### Spatial Quality

The LCZ is generally flat and open providing relatively unobstructed views throughout the area. The narrow industrial land area quickly transitions to rural hinterland, which consists of flat, open country on the floodplain. To the southeast, the land rises with the rolling hills.



Plate 7.12: View along existing Butters Lane looking east



Plate 7.11: View south east from the Bent Street layby south of the existing bridge



Plate 7.13: View north east from the Bent Street layby south of the existing bridge

**THE PROPOSAL**

The proposed construction and operational changes in LCZ 4 include:

- A two lane approach road connecting the proposed bridge to Iolanthe Street at Through Street. The approach road would be elevated on a fill embankment up to approximately 7.25 metres high and would intersect with the Heber Street Levee.
- A large roundabout at the intersection of the bridge approach road, Through Street, Iolanthe Street and the realigned Pacific Highway.
- Realignment of northern section Butters Lane to connect along the new alignment of the Pacific Highway east of the new roundabout.
- A pedestrian and cycle path on the western side of the bridge approach road.
- A pedestrian and cycle path connection between the bridge approach road at Abutment A and the existing regional Coastline Cycleway at the existing Grafton Bridge.

**PROPOSED LANDSCAPE CHARACTER**

Landscape character changes and affects to LCZ 4 that would result from the project are described below.

**Built Form and Heritage**

The proposal would not directly impact buildings within the zone.



Plate 7.14: View along existing Iolanthe Street looking north

However, it would be partially visible from the small group of houses on Butters Lane as well as the Grafton Railway Station, railway line and the regional Coastline Cycleway along the boundary of this zone.

**Public Domain**

The proposal would have no direct impact on the public domain areas in this zone. However, the new approach road would be visible from the Grafton Railway Station and Coastline Cycleway.

**Connectivity and Access**

The new road works would provide an alternative access between Grafton and South Grafton. It would also divert the existing Iolanthe Street and the Pacific Highway between Bunnings Warehouse and the Heber street levee.

The new pedestrian and cycle path would be located on the western side of the approach road and would connect the bridge with South Grafton and the Coastline Cycleway in Derek Palmer Place, providing additional access.

**Vegetation**

A moderate amount of exotic and native vegetation would be removed throughout the zone for both the construction compounds and the proposed approach roads. The proposed planting strategy would allow views east over the zone from the approach road, and the native avenue treatment on the western side would provide shade for pedestrians and a visual identity for the road as it nears the bridge.

New feature trees would be planted around and within the Through Street roundabout to help to reduce its visual scale and to provide a visual identity to this point of entry to the approach road to the new bridge.

**Key Activity Areas**

The proposal would have limited impact on the key activity areas, mostly to changes to the grazing areas, parts of the old rail line as well as areas around Alipou Creek

**Spatial Quality**

Despite its proximity to the existing road and rail embankment, and levee bank, the proposal introduces a new vertical element, in the form of a 7.25 metre high embankment, into the relatively flat topography of the zone. This would result in the large embankment being highly visible

from local residents, the Grafton Railway Station, railway line and the Coastline Cycleway.

**Construction Activities**

During construction, a large area of land between Iolanthe Street and the railway line would be used for ancillary facilities, impacting on the character of the zone for up to three years. The site would be surrounded by temporary fencing and include site compounds, stockpile areas for materials, temporary storage of spoil and mulch, a concrete batching plant and pre-cast facilities.

Following construction, the site would revert to its pre-construction state.

**LANDSCAPE CHARACTER ASSESSMENT**

**Magnitude**

The works increase the scale of road infrastructure and require the construction of a 7.25 metre high fill embankment. However, its proximity to the existing road and rail embankment, the poor quality of the nearby post industrial land and proposed tree plantings would reduce its rating.

Overall, the qualitative assessment indicates that the magnitude of the project would be Moderate due to the proposed changes taking place.

**Sensitivity**

Despite being a modified and flat, open landscape, the zone has an attractive rural character and has a direct visual relationship with the river and surrounding hills. The proposal is located in the transition between the rural landscape and the urban landscape of South Grafton. However, the poor quality of the land between Iolanthe Street and the railway line result in this zone having a Low sensitivity to the proposed works.

**Landscape Character Impact**

The qualitative assessment indicates that the landscape character impact of the project in this zone is likely to be **Moderate to Low**.

Magnitude	Moderate
Sensitivity	Low
<b>Landscape Character Impact</b>	<b>Moderate to Low</b>

## LCZ 5: SOUTH GRAFTON INDUSTRIAL AND COMMERCIAL

### EXISTING LANDSCAPE CHARACTER

The landscape character of LCZ 5 is distinguished by a range of medium and large industrial and commercial buildings. The character attributes of this zone are described below.

### Built Form and Heritage

The buildings within this zone are predominately large industrial and commercial buildings. The newer buildings are typically 'big box' warehouse developments, for example, Bunnings Warehouse on the Pacific Highway. There are a number of fast food outlets in this zone in addition to the Clarence River Tourist Information Centre. Older buildings tend to be user specific and cater to either industrial and commercial uses. There are no identified heritage items in this zone.

### Public Domain

Recreation and public open space areas are located adjacent to both the Pacific Highway and Gwydir Highway. These open space areas include Derek Palmer Place, Truck Drivers Memorial Park, and the Clarence River Visitors Information Centre. User amenity in these locations is generally poor and the spaces are divided by the highways and railway line.

### Connectivity and Access

The Pacific Highway provides the main vehicular thoroughfare in the zone and connects to the Gwydir Highway and Iolanthe Street. The regional Coastline Cycleway is a pedestrian and cycle pedestrian and cycle path that runs parallel to the railway line, linking the Grafton Railway Station, Through Street, Spring Street and the South Grafton Bus Interchange in this zone. Pedestrian access is limited to the grassed roadside verges as there are no formalised footpaths in the area.

### Vegetation

Tree planting is sparse in this zone and is limited to plantings along the roadside and to property boundaries. There is a cluster of planted palms, pines and groundcovers that serve as an arrival feature at the Pacific and Gwydir Highway intersection.

### Key Activity Areas

The key commercial activities in the area are Bunnings Warehouse and a variety of major fast food retail outlets and a highway service station. Derek Palmer Place, the Truck Drivers Memorial Park, and the Clarence River Visitors Information Centre are also used by travellers stopping along the Pacific Highway and Gwydir Highway.

### Spatial Quality

The spatial arrangement of the LCZ is generally open and relatively flat. Due to the flat landform and limited tree plantings, the road, railway and buildings visually dominate this zone. The northern part of the LCZ consists of large building footprints with large yards or car parks. The open space areas in the southern portion of the LCZ focused around the Pacific Highway and Gwydir Highway intersection.



Plate 7.16: View along existing Pacific Highway looking west



Plate 7.15: View along existing Pacific Highway, near Iolanthe Street intersection, looking north east



Plate 7.17: View along existing Pacific Highway, near Gwydir Highway intersection, looking east

## THE PROPOSAL

The proposed construction and operational changes in LCZ 5 include:

- A two lane approach road connecting the proposed bridge to Iolanthe Street at Through Street. The approach road would be elevated on a fill embankment up to approximately 7.25 metres high and would intersect with the Heber Street Levee.
- Realignment of the Pacific Highway (Charles Street) to connect with Iolanthe Street at Through Street.
- Extension of the northern section of Iolanthe Street to connect with the realigned Pacific Highway to the east of the bridge approach road.
- A large roundabout at the intersection of the bridge approach road, Through Street, Iolanthe Street and the realigned Pacific Highway.
- Reconfiguration of the former Pacific Highway (Charles Street) to intersect with Iolanthe Street at Spring Street.
- An intersection between the former Pacific Highway and the realigned Pacific Highway to the east of Iolanthe Street (north).
- A large roundabout at the intersection of Iolanthe Street, the Pacific Highway (Schwinghammer Street) and the Gwydir Highway.
- A pedestrian and cycle path on the western side of the bridge approach road, Iolanthe Street and the Gwydir Highway that connects with the existing regional cycleway west of the railway line.
- A pedestrian and cycle path connection between Iolanthe Street and the southern side of the former Pacific Highway, with mid block pedestrian refuge crossings on Iolanthe Street and the former Pacific Highway. In the future, the pedestrian and cycle path on the former Pacific Highway would be extended (by others) to Clarenza.



Plate 7.18: View to Derek Palmer Place looking north

## PROPOSED LANDSCAPE CHARACTER

Landscape character changes and affects to LCZ 5 that would result from the project are described below.

### Built Form and Heritage

The proposal would not impact on existing buildings or heritage items.

### Public Domain

There would be some impact on the public domain due to encroachment of the Clarence River Visitors Information Centre and Derek Palmer Place, resulting in a loss of green space. New tree planting to these areas would reduce some of the impacts on visual amenity.

### Connectivity and Access

Vehicular access to Through Street would be improved by the construction of a new road pavement. The construction of the Spring Street roundabout would improve traffic flow for motorists on the Pacific Highway and Gwydir Highway.

A new pedestrian and cycle path would be provided on the western side of Iolanthe Street linking the new bridge with the existing Coastline Cycleway running through Derek Palmer Place.

### Vegetation

The proposal would have an adverse impact on vegetation in this zone, with a number of existing trees removed in the vicinity of the large roundabout at the intersection of the Pacific Highway and Charles Street. New feature trees would be planted around and within the roundabout to help to reduce its visual scale and to provide a visual identity to this point of entry into South Grafton.

### Key Activity Areas

The proposal would have a slight impact on the existing key activity areas.

### Spatial Quality

The upgraded road infrastructure occurs within an established road corridor which is generally open. The proposal would increase the area of hard surface, however proposed tree planting within and around the large roundabouts would assist in reducing its impact.

## LANDSCAPE CHARACTER ASSESSMENT

### Magnitude

The proposed works increase the scale of road infrastructure in the zone, however, these take place in an established road corridor within an industrial/ commercial area. The proposed feature tree plantings in and around the roundabouts would help to reduce the visual scale of the works and provide the opportunity improve the landscape character of the area as the southern entry to Grafton, reducing the magnitude rating.

Overall, the qualitative assessment indicates that the magnitude of the project would be Moderate due to the scale of the proposed changes taking place.

### Sensitivity

The character setting of the zone is industrial and commercial which suggests it has a low sensitivity to the proposed changes. However, the addition of the Clarence River Visitors Information Centre, retail establishments, and parks, as well as a high frequency of viewers due the area being at the intersection of the two highways making this an important entry point to Grafton, increases the rating to Moderate.

### Landscape Character Impact

The qualitative assessment indicates that the landscape character impact of the project in this zone is likely to be **Moderate**.

Magnitude	Moderate
Sensitivity	Moderate
<b>Landscape Character Impact</b>	<b>Moderate</b>

## SUMMARY OF LANDSCAPE CHARACTER IMPACT

The landscape character impact assessment of the proposal described above, represents a qualitative assessment based on the five LCZ's. The results of these assessments range from High to Moderate and are summarised below.

Landscape Character Zone	Magnitude	Sensitivity	Landscape Character Impact
LCZ 1: Grafton town centre	High	High	High
LCZ 2: Grafton established residential	High	High	High
LCZ 3: Clarence River and foreshore (upstream)	Moderate	High	High to Moderate
LCZ 3: Clarence River and foreshore (downstream)	High	High	High
LCZ 4: South Grafton industrial and rural hinterland	Moderate	Low	Moderate to Low
LCZ 5: South Grafton industrial and commercial	Moderate	Moderate	Moderate

Overall, the proposal would have an adverse impact on landscape character. The works would cause adverse impact on all Landscape Character Zones due to the scale of the works and to the high sensitivity of the historic river setting, its value to the community and its generally low ability to absorb change. The existing bridge is a State listed heritage item and sits comfortably within the scale of the landscape. The new bridge, with its proximity to the existing bridge, substantially increases the scale of infrastructure on the river. The works would impact on a number of the wide tree lined streets in LCZ 1 and LCZ 2 by increasing pavement widths and by the removal of existing mature trees and a number of houses.

The moderate to low impacts occur on the southern side of the river where the rural and industrial and commercial land uses are better able to absorb the impacts of the proposed works.



Plate 7.19: Existing landscape character of the Grafton area without the proposed bridge and approach roads



Plate 7.20: Artist impression of the landscape character of Grafton with the proposed bridge and approach roads. Artist impression represents anticipated view during opening year.



Plate 7.21: Existing landscape character of the South Grafton area without the proposed bridge and approach roads





Plate 7.22: Artist impressions of the landscape character of South Grafton with the proposed bridge and approach roads. Artist impression represents anticipated view during opening year.

## 7.3 PROPOSED BRIDGE AND APPROACH ROADS VISUAL IMPACT

The potential visual impact of the project has been assessed in relation to a number of key viewpoints. It is based on the existing pattern of land uses adjoining the proposal bridge and approach road design. The method of assessment involved:

- Defining the scale or size, form and type of project within the context of the study area.
- Establishing an estimated visual catchment, through desktop analysis and ground truthing on site.
- Identifying key viewpoints from where the proposed works would be visible.
- Assessing the level of potential visual impact on viewers at these viewpoints from the proposed works.

### VISUAL CATCHMENT

The extent from which the proposal would be visible from adjoining areas varies throughout the study area. It is influenced by topography, vegetation, buildings, heritage and land use patterns. A detailed desktop and field assessment was undertaken to determine the area from where the proposal would be visible, defined as the Visual Envelope Map (VEM), as illustrated in Figures 7.2 and 7.3.

Views to the proposal within Grafton are generally contained to the road corridors by the commercial and residential buildings. Views become more widespread closer to the river.

From the existing bridge, extensive views are available along the river and foreshore. These are constrained by the curvature of the river both upstream and downstream. The topography and openness of the landscape to the east allows far reaching views into the floodplain, reaching to the undulating hill range in the Clarenza area.

Views to the proposal from South Grafton are also generally contained to road corridors by the density of buildings in the area.

The visual receivers of the proposed bridge and approach road sections of project include residents, commercial tenants, shoppers and tourists, recreational water users, pedestrians, cyclists and motorists.

### VIEWPOINT LOCATIONS

Within the VEM, key viewpoints have been identified along adjacent streets and at other public domain areas, for example, Girl Guide Park.

This involved the analysis of views from the road and bridge to identify the extent to which houses and other buildings were visible. Locations and directions of chosen viewpoints are representative of the range of viewpoints both within and beyond the proposal, and are indicated on Figures 7.2 and 7.3.

### VISUAL IMPACT ASSESSMENT CRITERIA

The magnitude of change to existing views and the sensitivity of the viewer has been assessed for each of the chosen viewpoints.

#### Magnitude

Magnitude of change to existing views refers to the nature and scale of the proposal, and the extent and proximity of the view to it. Magnitude represents the contrast in scale, form and type of proposal to the location and context to which it is to be placed. It also takes into consideration landscape and urban design treatments and improvement that are included in the Concept Design.

- A *high magnitude* results if the proposal is of a major scale and is considered out of scale or uncharacteristic of the existing visual character, or if there is considerable modification to the existing landscape.
- A *moderate magnitude* would result if the proposal is prominent but not considered to be substantially uncharacteristic with the existing visual character.
- A *low magnitude* results if there is minimal alteration to the existing view and the proposal is of a scale and nature that is consistent with the existing visual character.

#### Sensitivity

Sensitivity is the measure of the visual importance of the nominated view and is dependent on:

- Distance between viewer and the proposal.
- The category of viewer, for example, residence, workplace, shops, open space.
- The elements of the proposal that are visible.
- Importance of the view, for example identified in tourist guides, do people deliberately seek the view.

Visual sensitivity includes the consideration of the perceived cultural and historical values of the visual environment and the elements within it.

Generally, viewers with a higher sensitivity include:

- Residents who have existing attractive views that would be affected by the proposal.
- Users of public open space where their attention is focused on the visual landscape, for example, lookouts or other scenic natural areas.
- Communities that place high cultural and historical significance on the visual landscape.

Viewers with a lower sensitivity are most likely to be:

- Employees focused on their work.
- Motorists whose attention is focused on driving. Although low speed vehicles and those with passengers would have a slightly higher sensitivity.

### Impact

Impact is the combination of the magnitude and sensitivity rating in accordance with the Impact Assessment Grading Matrix (refer to Table 7.1).

On the following pages is a quantified assessment of the visual impact at each viewpoint. The grading are measured on their impact relative to each other within the scope of the proposal rather than to an absolute scale covering all potential forms of impact.

### KEY VIEWPOINTS

A total of 12 viewpoints have been identified on the basis of the criteria outlined above, as indicated in Figures 7.2 and 7.3 and are listed from north to south. . Each viewpoint is comprised of the following summary information:

- Location.
- Existing site description.
- Viewpoint selection rationale.
- Visual impact based on assessment of magnitude of change and sensitivity.

The list of mitigation measures that could be incorporated into the engineering design to potentially reduce the visual impact level are included in Chapter 8.



Figure 7.2: Visual Envelope Map (VEM) and location of viewpoints at local scale

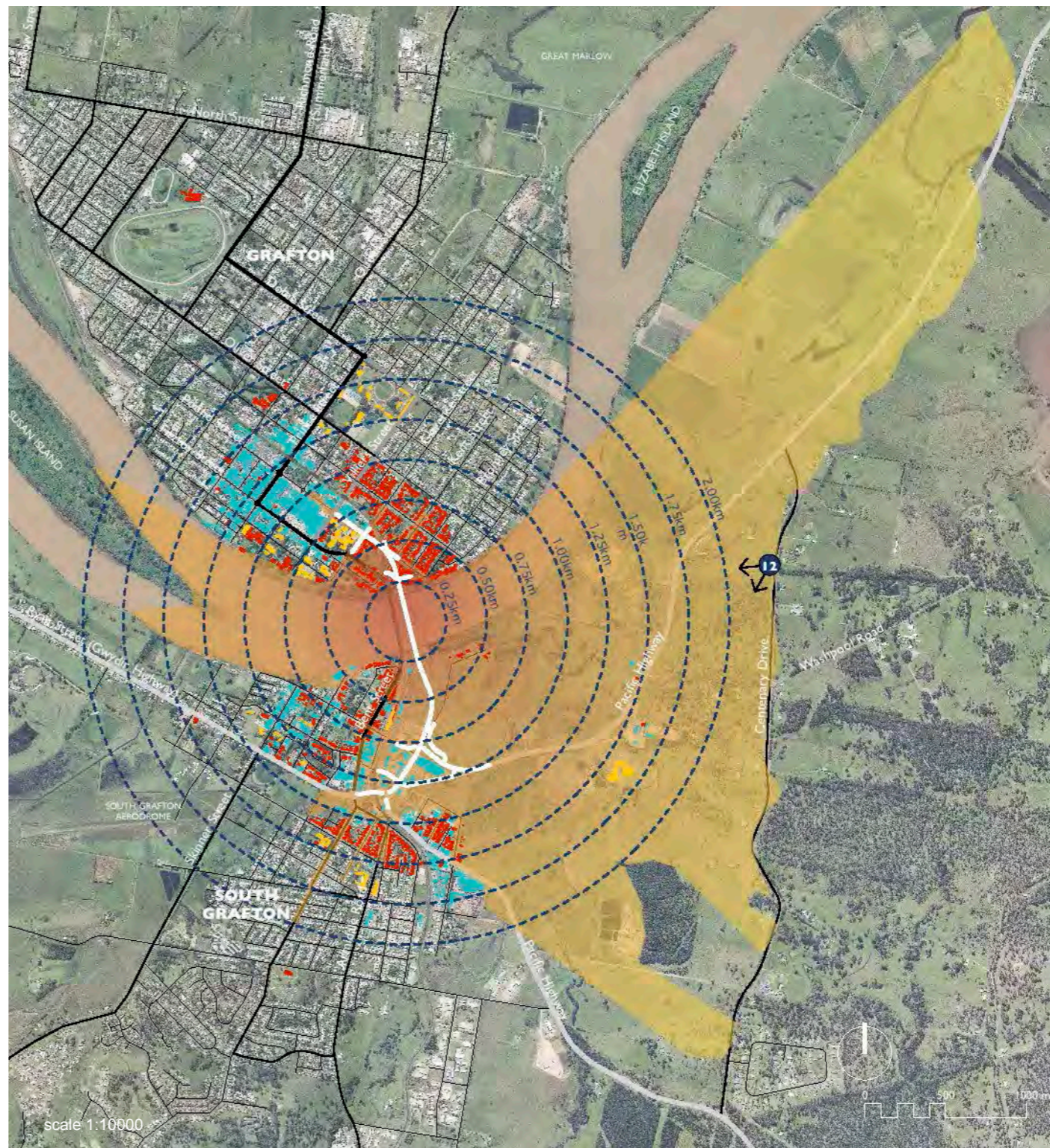


Figure 7.3: Visual Envelope Map (VEM) and location of viewpoints at sub-regional scale

- LEGEND**
- ACTUAL VISUAL CATCHMENT
  - VIEWPOINTS
  - RESIDENCES
  - COMMERCIAL / RETAIL
  - PUBLIC / INSTITUTIONAL
  - DISTANCE FROM WORKS



**VIEWPOINT 1**

The roundabout at the intersection of Pound Street and Villiers Street, looking east.

**Site description**

This location is in the eastern portion of Grafton town centre and focuses on the heavily vegetated roundabout. Grafton TAFE and a locally listed heritage house are located through and to the right of the viewpoint and a number of commercial and service businesses are located to the left. Grafton Shopping World and other small business are behind this viewpoint.

**Viewpoint selection**

This viewpoint is from the perspective of motorists travelling east on Pound Street and pedestrians crossing Pound Street. This viewpoint addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
1 Foreground view	High Vegetation in the roundabout would be cleared to provide for the new four lane road on Pound Street. Formalised angle parking to the left of the viewpoint, and parallel parking on the right, increases the extent of road pavement by about eight metres. A pedestrian and cycle path next to the TAFE boundary would encroach slightly into the TAFE. The majority of trees in the middle-ground and background of this view, including the five large Fig trees, would be removed. New tree planting would mitigate the magnitude of the works as they mature over time. However, the works would greatly alter the existing view, causing a high rating.	High Pedestrians, TAFE staff and students, residents and vehicle passengers would be affected by the changes and have been assessed to have high sensitivity. This is due to the majority of viewers being local residents who would see the view often and because of the perceived cultural and heritage importance of the TAFE campus and the Fig and Jacaranda trees that would be removed..	High



**VIEWPOINT 2**

Pound Street, at the corner of Clarence Street, looking west.

**Site description**

Pound Street is a well vegetated street, providing a direct connection to Grafton town centre. Grafton TAFE is situated to the left of the viewpoint with a number of commercial and service businesses on the right. Local residents and the Pound Street viaduct are directly behind this viewpoint

**Viewpoint selection**

This viewpoint is from the perspective of motorists and pedestrians travelling west along Pound Street. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
2 Foreground view	High The existing intersection would be replaced by a signalised intersection, including pedestrian refuges to accommodate the long crossing lengths. Two lanes would be provided in each direction, with formalised angle parking to the right of the viewpoint, increasing the extent of road pavement by about eight metres. A pedestrian and cycle path would be provided next to the TAFE boundary. The majority of trees in this view, including some located on the TAFE property, would be removed. New tree planting would mitigate the magnitude of the works as they mature over time, although they would open the view to Grafton Shopping World in the short to medium term, causing a high rating.	High Pedestrians, TAFE staff and students, residents and vehicle passengers would be affected by the changes and have been assessed to have high sensitivity. This is due to the majority of viewers being local residents who would see the view often and because of the perceived cultural and heritage importance of the TAFE campus and the Fig and Jacaranda trees that would be removed.	High





**VIEWPOINT 3**

Clarence Street at the corner of Pound Street, looking south.

**Site description**

Grafton TAFE is located to the right of the viewpoint. Clarence Street has a wide reservation with generous grassed verges. These verges provide informal on street parking for students.

**Viewpoint selection**

This viewpoint is from the perspective of motorists travelling south on Clarence Street and pedestrians walking along Pound Street. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
3 Foreground view	High The existing intersection would be replaced by a signalised intersection. This would include a four metre wide traffic island to be constructed in the centre of the Clarence Street to provide 90° parking, which would dominate the centre of the street. The grass swales would be replaced with parallel and angled parking with formalised kerb and gutter. All existing street trees would be removed, and the house to the left of the viewpoint would be demolished, opening the view down the street. Mitigation would include new tree planting on the western side of Clarence Street and feature planting at the intersection.	High TAFE staff and students, residents, pedestrians, cyclists and passengers in cars would be affected by the changes and have been assessed to have high sensitivity. There is likely to be an increase in local vehicle traffic turning right at this intersection. These local passengers and drivers waiting for a signal change would also be affected and sensitive to the change.	High



**VIEWPOINT 4**

Kent Street, 40 metres from the intersection with Pound Street, looking south west.

**Site description**

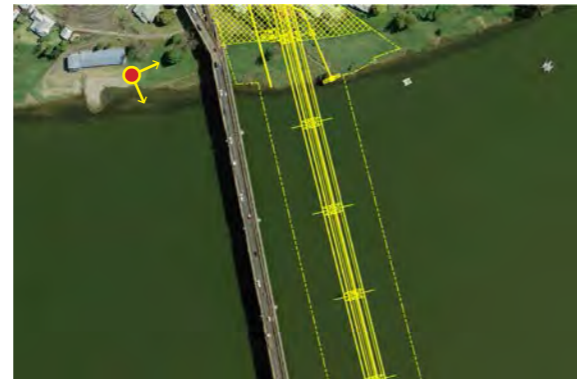
Kent Street is a two lane residential street and designed regional cycleway with wide, tree lined grass verges, typical of the older residential areas of Grafton. The view south west is of a Jacaranda lined street and the existing railway viaduct with the road viaduct in the background.

**Viewpoint selection**

This viewpoint is from the perspective of residents, cyclists, tourists (Jacaranda Festival) and motorist along Kent Street in the half block north east of Pound Street. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
4 Foreground view	Moderate The embankment, traffic barriers and noise wall for the new approach road would be the major visible elements of the proposal, about 2.5 metres above the existing ground level. The embankment would be planted with native shrubs and trees. The works would require the removal of all houses south-east of Pound Street and six (6) locally heritage listed Jacaranda trees south-west of Pound Street. This would result in the long view along Kent Street being obstructed by the planted embankment, traffic barriers and noise wall for the new approach road. However, Existing vegetation on Kent Street, to the left, obscures much of the works.	High The local residents, cyclists, tourists (particularly visiting during the Jacaranda Festival) would have high sensitivity due to the works altering the attractive view along the Jacaranda tree lined street with grassed shoulders and verges, by revealing the new approach road embankment and infrastructure.	High to Moderate





**VIEWPOINT 5**

Clarence River Sailing Club grounds, looking south east (downstream)

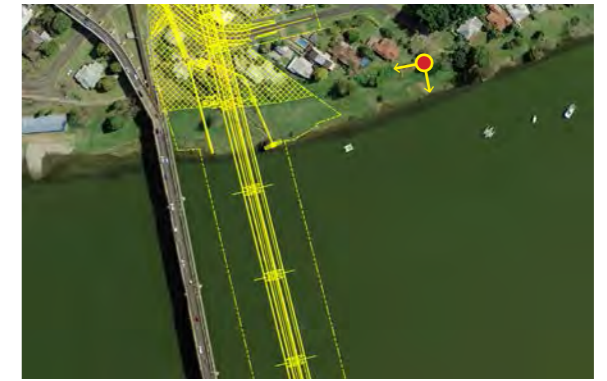
**Site description**

Clarence River Sailing Club is located on the northern foreshore, just upstream of the existing bridge. A wide, open and generally flat grassed area flows to the river in front of the one storey brick building that sits below Kent and Fitzroy Streets.

**Viewpoint selection**

This viewpoint is from the perspective of sailing club members and pedestrians using the river foreshore. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
5 Foreground view	Moderate The new bridge would be constructed on the downstream side of the existing bridge. The proposed bridge superstructure and barriers would be partially obscured by the existing bridge from this location. The elements of the bridge that would be visible include the piers and pile caps, and part of the abutment on the southern foreshore. However, vehicles, in particular trucks, would be visible through the existing bridge as they cross over the proposed bridge.	High Sailing club members and pedestrians have been assessed to have high sensitivity as their attention is generally focussed on the river and its surrounds for reasonably long periods of time in the direction of the proposed and existing bridges. They are also engaged in recreational activities of boating and walking along the river foreshore.	High to Moderate



**VIEWPOINT 6**

Girl Guide Park and the rear of private residences on Greaves Street, looking south west (upstream).

**Site description**

Girl Guide Park is a public park, located at the eastern end of Pound Street. It consists of a sloping grassed area and a number of trees and sits about five metres above the river. The park, and the rear yards of the properties are located on top of the levee and offer attractive and panoramic views of the river and the existing bridge.

**Viewpoint selection**

This viewpoint is from the perspective of people using the public open space at Girl Guide Park and the residents whose houses overlook the river. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
6 Foreground view	High The new bridge would be constructed in front of the existing bridge and would be highly visible from this location. All components of the bridge would be visible and would block the view to a large portion of the existing historic bridge. This would also result in the loss of a number of trees including the Jacarandas and She-Oak, to the left of the photo, on the southern bank of the Clarence River, however, these would be replaced with similar species adjacent to the proposed bridge.	High Local pedestrians and tourists visit this public park to observe the panoramic views over the river and in particular the iconic view of the Grafton Bridge. They can also gain access to the river foreshore from this park. These viewers and the local residents have been assessed as having a high sensitivity since this view has a high cultural and historical significance. Their view of the existing bridge would almost be entirely obstructed by the new bridge.	High





**VIEWPOINT 7**

Pedestrian path on the downstream side of the existing bridge, looking north and south.

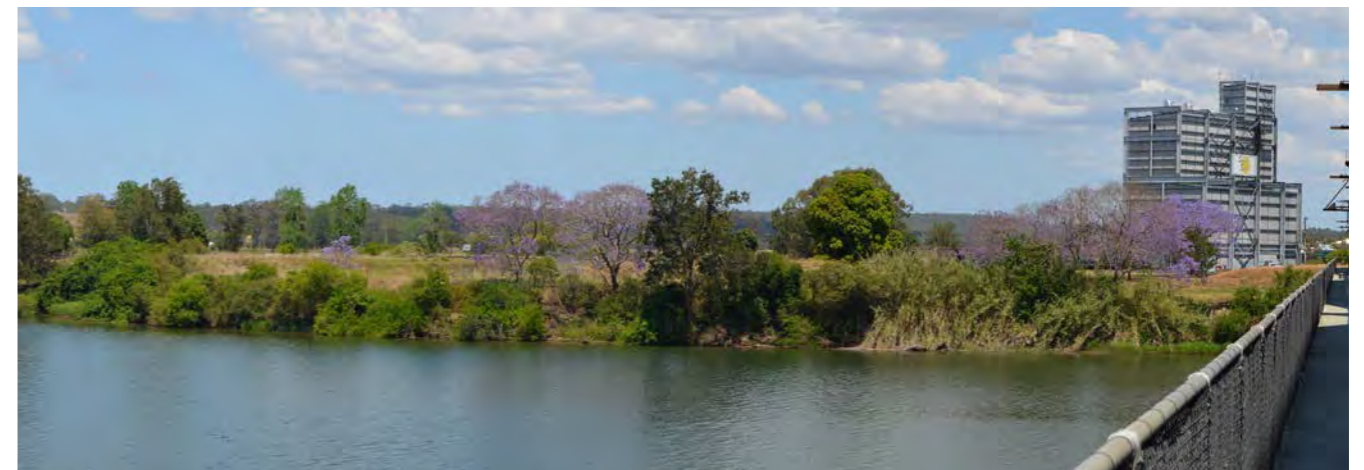
**Site description**

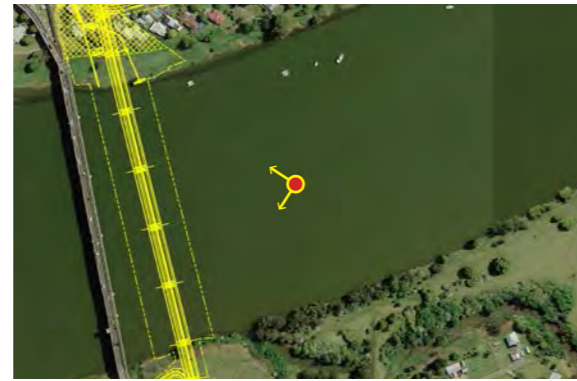
The existing pedestrian path on the bridge structure is located on the downstream side of the railway track on the lower level. It consists of a 1.2 metre concrete path with a 1.5 metre high chainmesh fence on both sides of the path. The path location offers panoramic views over the Clarence River, the foreshore areas and the rural hinterland as far as Clarenza.

**Viewpoint selection**

This viewpoint is from the perspective of pedestrians walking north on the bridge path and train passengers. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
7 Foreground view	High The new bridge would be located downstream of the existing bridge. All elements of the new bridge would be highly visible from this location. Three houses and a number of native trees would be removed for the construction of the bridge and pump station on the northern side. A number of mature trees including the Jacarandas and She-Oak on the foreshore and the large Fig trees beyond, would be removed on the southern side. The proposed bridge would also obscure the downstream views of the river and rural hinterland beyond. Mitigation measures would include new native tree planting behind the existing levee and adjacent to the approach roads.	High Pedestrians walking crossing the bridge and train passengers would have high sensitivity to change due to the existing attractive views along the river and foreshore and the relatively long time they have to focus on these views. Although the sugar loading facility is a prominent element in the view to the south, the river and its landscape still dominate the view	High





**VIEWPOINT 8**

Clarence River, about 250 metres east of the existing bridge, looking west (upstream).

**Site description**

The centre of the Clarence River affords expansive views along the river, the existing bridge, the foreshore areas and floodplain, and longer distance views to the surrounding mountains, particularly in the west. The river is an important recreational resource for the residents of Grafton and surrounding areas.

**Viewpoint selection**

This viewpoint is from the perspective of people recreating on the Clarence River, be they rowing, sailing, power boating or fishing. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
8 Foreground view	High The new bridge would be constructed in front of the existing bridge and would be highly visible from this location. All components of the bridge would be visible and would block the view to a large portion of the existing bridge. The foreshore areas would also be visually impacted where the bridge approaches the abutments, requiring the removal of houses and trees.	High People recreating on the river would have high sensitivity to change due to the current attractive views the setting affords of the existing bridge, which has high cultural and historical significance. Also, the relatively long time they have to focus on these altered views contributes to the overall sensitivity.	High



**VIEWPOINT 9**

Corner of Butters Lane and Iolanthe Street, looking south west.

**Site description**

There are a small group of residences along Butters Lane that back onto Alipou Creek, only serviced by Iolanthe Street. The houses are located on the wide and flat Clarence River floodplain which consists of open grazing paddocks with a scattering of individual and clumps of trees. The sugar loading facility and communications tower can be seen to the west.

**Viewpoint selection**

This viewpoint addresses foreground views from the perspective of the small group of residents on Butters Lane.

Viewpoint	Magnitude	Sensitivity	Impact
9 Foreground view	Moderate The embankment for the new bridge approach road would be highly visible from this location. It would require the removal of the vegetation, including the large Fig tree in the middle-ground of the view. The embankment would be about six metres above the existing ground level and would be seeded with native grasses with pockets of native tree planting. Vehicles travelling on the approach road would be clearly visible and trucks would potentially break through the skyline in some locations.	Moderate Local residents in Butters Lane would primarily be affected by the proposal when travelling to and from their properties. They have been assessed to have moderate sensitivity due to their distance from the works and the existing view comprising a combination of rural landscape in the foreground, with industrial infrastructure including the sugar loading facility and communications tower in the background. Residents would see this view often as travel to and from their properties.	Moderate







**VIEWPOINT 10**

Platform of Grafton Railway Station, looking east.

**Site description**

Grafton Railway Station consists of a single platform next to a single storey brick building, on the western side of three railway tracks. The station services about six passenger trains daily, including two during daylight hours. There are reasonably attractive mid distance views, beyond the post industrial paddocks in the foreground, to the Clarenza hills.

**Viewpoint selection**

This viewpoint is from the perspective of passengers waiting on the platform, as well as those passengers travelling on the train. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
10 Foreground and mid distance view	Low Although the foreground trees partially obscure the view, the approach road would be visible across the full width of this view. The large Through Street roundabout would be visible in the right of the view in front of Bunnings. The embankment of the approach road would steadily increase in height from right to left across the view. Vehicles travelling on the proposed approach road would also be visible from the platform. The embankment would be seeded with native grasses and planted with native trees evenly spaced along the road. During construction, land in the foreground would be used for activities such as concrete casting for the new bridge.	Moderate The Grafton Railway Station is a State Listed Heritage site and the location is a key arrival point for locals and tourists. The length of time viewers are waiting on the platform increases their sensitivity.	Moderate to Low



**VIEWPOINT 11**

Next to the Truck Driver's Memorial, Pacific Highway, looking south.

**Site description**

Truck Driver's Memorial Park is located at the intersection of the Pacific Highway and Gwydir Highway. It is a flat, generally open park, bordered by street trees. A service station and the Clarence River Visitor Information Centre are the main buildings around the intersection. The railway viaduct and the associated embankment form a visually strong western edge to the viewpoint.

**Viewpoint selection**

This viewpoint is from the perspective of people viewing the Truck Driver's Memorial and the park. It addresses foreground views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
11 Foreground view	Moderate The new large two lane roundabout and approach roads would be the dominant element of the proposal visible from this location and would almost double the extent of visible road pavement. The ability to include feature tree planting around the outside of the intersection as well as a Fig tree and ground cover planting in the centre of the roundabout results in moderate rating.	Moderate People viewing the memorial would generally have moderate sensitivity as their attention would be more focussed on the memorial and a smaller intersection already exists in this location.	Moderate





**VIEWPOINT 12**

Centenary Drive, Clarenza, looking west.

**Site description**

Centenary Drive traverses the undulating ridgeline that rises up from the Clarence River floodplain, east of Grafton. The land has been generally cleared and consists of rolling grazing land dotted with stands of native vegetation. A number of rural properties sit on either side of Centenary Drive. The roadside vegetation, which includes groups of native trees, provides occasional glimpses west over the Clarence River and floodplain to the mountains beyond.

**Viewpoint selection**

This viewpoint is from the perspective of motorists travelling along Centenary Drive and the small group of residences. It addresses long distance views to the proposal.

Viewpoint	Magnitude	Sensitivity	Impact
14 Long distance view	Low The new bridge would be the main element of the proposal visible from this location. It would obscure the lower section of the existing bridge, and the removal of vegetation on both foreshores would potentially be noticeable. However, this vegetation would be replaced by similar species.	Low Due to their distance from the proposal, the sensitivity of the residents and motorists has been assessed as low. While the number of residents would be viewing the proposed bridge from stationary positions, motorists would be moving in a north east direction, parallel to the view.	Low



## VISUAL IMPACT SUMMARY

A total of 12 viewpoints form the basis of the visual impact assessment. The viewpoints are generally focused on locations that will be commonly viewed by the Grafton community. It also included views in destination areas that will be sought out by local residents, students and tourists. It is generally anticipated that the viewpoints selected will provide for an even range of magnitude and sensitivity impact ratings.

Out of the 12 selected viewpoints, the range of visual impact ratings were determined to be the following:

- Six viewpoints would have High visual impact
- Two viewpoints would have High to Moderate visual impact
- Two viewpoints would have Moderate visual impact
- One viewpoint would have Moderate to Low visual impact
- One viewpoint would have Low visual impact.

Ratings of high and high to moderate impacts occur in the town centre, residential areas, heritage areas, educational precincts, open space areas and the picturesque river setting, where the sensitivity to change is the highest and the magnitude of the works are greatest. The moderate and low ratings occur in areas where distance from the works is greater and in areas of lower sensitivity, for example the South Grafton industrial area.

To better illustrate these findings, four photomontage impressions of the changes that will result from the bridge and approach road proposal. These four photomontage impressions are shown the following page. The locations for these impressions were selected to show how the proposed bridge would fit in the existing setting. This also provides a better understanding of how the description of the magnitude and sensitivity are determined in the viewpoint assessment.

Based on this assessment a series of landscape and urban design mitigation measures and strategies have been developed, in order to assist in the mitigation of the proposed bridge and approach road impacts. These are discussed in the Chapter 8.

Viewpoint and View Type	Magnitude	Sensitivity	Visual Impact
VP 1 - Foreground view	High	High	<b>High</b>
VP 2 - Foreground view	High	High	<b>High</b>
VP 3 - Foreground view	High	High	<b>High</b>
VP 4 - Foreground view	Moderate	High	<b>High to Moderate</b>
VP 5 - Foreground view	Moderate	High	<b>High to Moderate</b>
VP 6 - Foreground view	High	High	<b>High</b>
VP 7 - Foreground view	High	High	<b>High</b>
VP 8 - Foreground view	High	High	<b>High</b>
VP 9 - Foreground view	Moderate	Moderate	<b>Moderate</b>
VP 10 - Foreground and mid distance view	Low	Moderate	<b>Moderate to Low</b>
VP 11 - Foreground view	Moderate	Moderate	<b>Moderate</b>
VP 12 - Long distance view	Low	Low	<b>Low</b>



Plate 7.23: Before and after artist impressions of Viewpoint 2. Artist impression represents anticipated view during opening year.



Plate 7.24: Before and after artist impressions of Viewpoint 5. Artist impression represents anticipated view during opening year.



Plate 7.25: Before and after artist impressions of Viewpoint 7. Artist impression represents anticipated view during opening year.



Plate 7.26: Before and after artist impressions of Viewpoint 8. Artist impression represents anticipated view during opening year.

## 7.4 PROPOSED BRIDGE AND APPROACH ROADS OVERSHADOWING

This section considers the potential overshadowing impacts of the proposed bridge on the Clarence River waterway, and the public domain and private areas on the northern and southern foreshores.

### BACKGROUND

The shadow cast by the existing bridge and the approach viaducts is located on the water directly under the bridge and the areas next to the road and rail viaducts on the northern side of the river. Early morning and late afternoon shadows extend beyond the footprint of the bridge over the river and adjoining foreshore lands. In winter, the road and rail decks of the existing bridge cast two distinct shadows, with the diffused shadow of the bridge truss in between, particularly in the early morning and late afternoon. The proposed bridge would cast a similar sized, although, single, distinct shadow across the water and the foreshore areas around the abutments due largely to the increased width of the new structure.

The potential overshadowing impacts have been analysed using the accompanying shadow diagrams which were prepared by Arup using a computer model of the study area and the proposed bridge. The two sets of following diagrams depict the shadows cast by the proposed bridge during the winter solstice (21 June) and the summer solstice (21 December) at three times of day; 9am, 12pm and 3pm.

For the purposes of the analysis the existing vegetation and the proposed replacement tree planting have been excluded from the model. The absence of vegetation portrays a clearer depiction of the extent of overshadowing caused by the proposed bridge.

- Area of overshadowing
- Fill embankments



Figure 7.4: Shadow at 9am in December (source: Arup)



Figure 7.5: Shadow at 9am in June (source: Arup)



Figure 7.6: Shadow at 12pm in December (source: Arup)



Figure 7.7: Shadow at 12pm in June (source: Arup)



Figure 7.8: Shadow at 3pm in December (source: Arup)



Figure 7.9: Shadow at 3pm in June (source: Arup)



### **The northern foreshore**

The current northern foreshore area, in the vicinity of the approach road to the proposed bridge, is predominately cleared of trees. The proposed construction works for the bridge would require the removal of a small number of trees and a number of residential dwellings around the abutment and in the adjoining areas where earthworks and construction zones are required.

The overshadowing caused by these small number of trees and houses would be replaced by larger and more solid overshadowing caused by the proposed bridge and adjoining earthworks associated with the abutment as well as replacement plantings of trees proposed in this area which would gradually increase the levels of overshadowing throughout the day, as these trees mature.

Overshadowing of the northern foreshore would be mainly restricted to the undercroft of the bridge and an area either side. The longest shadows would occur in Winter during the early morning when the area to the west of the abutment would be in shadow, and the late afternoon when the area to the east of the abutment would be in shadow.

### **The river**

The bridge deck would cast a distinct shadow over the river moving from west to east throughout the whole day. The shadow would appear over the water on the western side of the proposed bridge in the morning and whilst being of a substantial width it would be diffuse in appearance. As the sun rose into the sky, the shadow would migrate closer to the proposed bridge in an easterly direction, and increase in intensity until it was aligned directly under the bridge deck. As the sun tracked to the west, the shadow would continue moving to the east and become increasingly diffuse until the sun set.

In conjunction with the shadow cast by the existing bridge, overshadowing on the river would double in size. However, boating is unlikely to be affected by the overshadowing.

### **The southern foreshore**

The overshadowing effects of the proposed bridge occur on a small portion of land on the southern foreshore, extending to the bridge abutment where the road then travels on an elevated fill embankment. The proposed pedestrian and cycle path deviates off the approach road, veers slightly under the bridge deck, then heads west to link with the

existing path system exiting the existing bridge, about 30 metres south of the shoreline.

Trees currently growing along the foreshore, between the existing bridge and Alipou Creek, create a dappled overshadowing effect in this area, however a number of these trees within the project area would be removed during the construction of the proposed bridge. Therefore current patterns of overshadowing in this area would change when the bridge is constructed, however replacement plantings of trees proposed in this area would gradually increase the levels of overshadowing throughout the day, as these trees mature.

Overshadowing of the southern foreshore and would be mainly restricted to the undercroft of the bridge and an area on either side of the bridge. The longest shadows would occur in winter during the early morning when the area to the west of the abutment would be in shadow, and the late afternoon when the area to the east of the abutment would be in shadow. This would occur over the eastern section of the proposed pedestrian and cycle path, impacting on path users, however, this would be for a relatively short time as they would generally be in transit.

### **CONCLUSION**

The greatest overshadowing impacts would be most likely experienced on the Clarence River due to the height, width and length of the proposed bridge deck over the river. The overshadowing of the river is unlikely to impact any activities occurring on the water.

The size of the overshadowing decreases on the northern and southern foreshores due to the reduced height of the bridge above the land in these locations. These effects are likely to be relatively temporary as people would be mostly moving through the area. There is potential for the southern foreshore to have increased pedestrian and cycle activity which would be subjected to the increased overshadowing during the morning in winter.

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## 8 MITIGATION MEASURES AND CONCLUSION

This chapter discusses the range of mitigation measures which have been incorporated into the concept design, as well as other measures that could be considered for further investigation and design, subject to consultation with Clarence Valley Council, relevant State government agencies and the community. This section also presents a brief conclusion.

## 8.1 PROJECT MITIGATION STRATEGIES

### INTRODUCTION

This section describes the mitigation measures that have been included as part of the proposal, described in Chapter 6 of this report and a summary of further mitigation measures to be considered during the detailed design and construction phases of the project. They have been developed in accordance with the urban design and landscape objectives and principles, outlined in Chapter 5.

### MITIGATION INCORPORATED IN THE CONCEPT DESIGN

The integration of the engineering and performance objectives with urban and landscape design objectives for the additional crossing of the Clarence River at Grafton project aims to produce a design outcome that fits sensitively with the existing qualities and characteristics of the area. In order to achieve this, a range of mitigation measures have been incorporated into the project as the concept has developed. These measures combine to develop a solution that seeks to protect and enhance the existing visual character of the Grafton area, the Clarence River and floodplain, where possible.

The mitigation measures that have been undertaken during the development of the urban and landscape design concept are summarised below.

#### Grafton

- New 'gateway' planting at the intersections of Pound Street and Clarence Street, and Pound Street and Villiers Street would be provided as visual landmarks and to enhance visual identity.
- New tree planting would be provided along the Grafton TAFE grounds next to Pound Street to compensate for tree loss due to the road widening works.
- Small exotic tree planting would be provided along Pound Street, between Clarence Street and Villiers Street to help reduce the visual scale of the street. The planting would consider vehicle sightlines, parking requirements and utilities.
- Native tree planting would be provided to the edge of the proposed carpark at the corner of Pound Street and Clarence Street to reduce the visual dominance of the large expanse of asphalt at the eastern gateway into Grafton town centre.
- Native tree and shrub planting would be provided to the eastern embankment of Summerland Way to reduce the visual dominance

of the road infrastructure and noise wall to the residents of Pound Street, Kent Street and Bromley Street.

- The proposed retaining wall would have a site specific finish to relate to the character of the surrounding landscape.
- Areas where houses are to be removed would be grassed and stands of native trees planted to provide a park like character to these areas.

#### River foreshore

- Revegetation of the foreshores would assist in integrating the scour protection works on the foreshore.
- The foreshore area would be rehabilitated with suitable riparian vegetation once the scour protection works have been completed.

#### The proposed bridge

- The following design measures have been undertaken to ensure that the existing Grafton Bridge retains its visual precedence:
  - The proposed bridge has been kept as low as possible over the Clarence River while still allowing for the required navigation clearances.
  - The road level of the proposed bridge sits below the road level on the existing bridge, approximately halfway between the road deck and railway deck on the existing bridge. This allows the existing bridge truss structure to be visible both above and below the proposed bridge.
  - The concrete box girder design for the proposed bridge allows for a simple, streamlined and contemporary appearance that respects and retains the visual integrity of the existing bridge.
  - The visual bulk of the proposed bridge has been minimised by adopting a haunched superstructure.
- The following design measures have been undertaken to create a visually complementary relationship between the proposed bridge and the existing bridge:
  - The piers on the proposed bridge are aligned with the piers on the existing bridge as much as possible, particularly those piers that are located in the river.
  - The exposed pile caps on the piers in the river have rounded ends in keeping the pile cap detailing on the existing bridge.

#### South Grafton

- New tree planting would be undertaken in the area surrounding the roundabout works, and within the roundabouts, reducing the scale of the works over time as the tree planting matures. The planting would consider motorists sightlines, and, in the case of Spring Street, would allow views to the Clarence River Tourist Information Centre.
- Exotic avenue tree planting would be provided along the new section of Butters Lane to maintain the existing country lane character of the street.
- Native avenue planting would be provided along the western side of Summerland Way to provide visual identity to the upcoming bridge or entry to South Grafton, and to provide shade for pedestrians and cyclists using the shared path. Occasional stands of native trees have been planted on the eastern embankment to provide some reduction to the visual scale of the works, whilst maintaining pleasant rural views over the Clarence River floodplain.

#### General

- Improvements to pedestrian access has been achieved with the provision of new and upgraded footpaths and shared paths.
- Investigate alternative types and colours of paved surfaces to minimise visual impact.

### MITIGATION TO BE INCORPORATED INTO DETAILED DESIGN

Subject to the environmental approval of the project being granted, it is recognised that further work will be required to develop the final urban design and landscape plan for the project.

Whilst development of the concept design has attempted to mitigate the overall impact of the proposal, focussing on the major project components, their design and integration within the Clarence River and Grafton setting, opportunities will arise during detail design to further refine the design of the project to produce enhanced urban design outcomes.

The urban design and bridge design objectives and principles outlined in Chapter 5, together with the urban design, landscape and bridge design concept included in Chapter 6, would be used to further guide the detailed design of key project elements of the new bridge, approach roads and public domain areas.

Below is a summary of the key mitigation and management strategies that would be considered during the detail design phase of the project.

### **Grafton**

- Refine car parking arrangements on the southern side of Pound Street.
- Adjust the kerblines along Pound Street between Clarence Street and Villiers Street. This would enable extra tree planting on both sides of the street and the removal of proposed parallel parking on the southern side. This would improve the visual and pedestrian amenity, reduce the scale of the street and reduce the encroachment of works in TAFE land.
- Consider reducing the batter steepness around the water detention basin to avoid the need for fencing.
- Consider reducing the construction boundary to reduce impacts on Pound Street and Greaves Street.
- Consider refining the Grafton drainage detention basin design to minimise its visual impact.
- Further investigate opportunities to reduce the project footprint throughout detailed design.

### **The proposed bridge**

- Develop the pier designs to further reinforce the complementary relationship between the proposed bridge piers and the piers on the existing bridge. In particular, consider tapering the piers at their long elevation.
- Consider opportunities to further streamline the appearance of the bridge, including:
  - Aligning the edges of the piers with the outside faces of the girder.
  - Investigate monolithic construction as an alternative to the current pier design.
- The detailed design should ensure that the bridge soffit appears as a series of continuous curves. A segmented appearance is to be avoided.

### **South Grafton**

- Consider flattening the fill embankments to the bridge approach road to better integrate with the surrounding flat rural landscape.
- Further investigate opportunities to enhance the locations' role as the southern arrival point to South Grafton and Grafton.
- Consider further design work to better integrate cycle access on the Iolanthe Street / Pacific Highway / Through Street roundabout and the Gwydir Highway / Pacific Highway roundabout in order to maintain

safe and efficient connections to the regional Coastline Cycleway route on the Pacific Highway.

### **MITIGATION DURING CONSTRUCTION**

The following mitigation measures would be implemented during construction:

- Detail design and documentation drawings would define the extent of all construction activity including temporary works in order to protect the area during construction.
- Construction facilities should be contained within the construction works zone boundary and occupy the minimum area practicable for their intended use.
- Provide suitable barriers to screen views from adjacent areas during construction.
- Once construction is complete, or progressively throughout the works where possible, return these sites to at least their pre-construction state.
- Keep pollution and dust emissions to a minimum and monitor throughout the project construction period.
- Divert or re-route footpaths that would be affected by construction activities.
- Existing trees to be retained within construction facilities areas would be identified, protected and maintained.
- Temporary lighting should be screened or diverted to reduce unnecessary light spill.
- Heritage items should be protected, as identified in the non-Aboriginal heritage working paper prepared for the EIS.
- Material used for temporary land reclamation would be removed once the works are complete.

## 8.2 CONCLUSION

The study area for the Additional Crossing of the Clarence River at Grafton is topographically dominated by the Clarence River and its flat river plain. Either side of the river sit the town centres of Grafton and South Grafton which consist of wide gracious streets laid out on a square grid. The town centres are connected across the river by an historic bridge which is part of the identity of Grafton. Outside of the town centres are established and newly developing residential areas, and industrial areas, generally concentrated around the regional road and rail corridors and surrounded by the agricultural areas that comprise the city's rural hinterland.

Understanding the built, natural and community character of Grafton and characteristics of the existing historic Grafton Bridge, analysing the impacts that a new crossing of the Clarence River in this location and associated road upgrades can make, identifying opportunities for mitigation and public space improvements, and articulating urban design objectives and principles has been an integral part of designing the project. An iterative, inter-disciplinary, process has been adopted to produce:

- An integrated design that best fits in with its context, complements the existing historic Grafton Bridge, minimises the impacts and mitigates the impacts that are unavoidable.
- A proposed bridge design that is elegant and well considered in the whole, parts and detailed elements.
- A new pedestrian and cycle path crossing of the river well connected into the pedestrian and bicycle network of the town.

The project aims to supplement the existing bridge and, in doing this, would introduce a number of elements into the environment, as described in Section 3 of this Report, including:

- Construction of a new bridge over the Clarence River about 70 metres downstream (east) of the existing road and rail bridge, comprising two traffic lanes
- Construction of a new road to link the new bridge with Iolanthe Street in South Grafton
- Construction of a new road to link the new bridge with Pound Street in Grafton
- An approach viaduct, about 58 metres long, on the South Grafton side of the Clarence River and 29 metres long on the Grafton side
- Upgrades to the road network in South Grafton to connect the new bridge to the existing road network

- Upgrades to the road network in Grafton to connect the new bridge to the existing road network
- Replacement of the existing three span concrete arch rail viaduct which crosses Pound Street in Grafton with a single span steel truss bridge
- Construction of a pedestrian and cycle path to provide connectivity between Grafton, South Grafton and the new bridge
- Provision of two pedestrian crossings with lights in South Grafton to improve safety for pedestrians crossing Iolanthe Street and Gwydir Highway
- Construction of new pedestrian links to connect the new bridge with the existing bridge
- Provision of designated car park spaces in Pound Street and Clarence Street, including some off street parking, to maintain a similar number of existing car park spaces currently available in those two streets
- Flood mitigation works, which include raising the height of sections of the existing levee upstream from the new bridge in Grafton and South Grafton
- Construction of a stormwater detention basin and pump station in Grafton to manage local flooding
- Public utilities adjustment
- Ancillary facilities required for the construction of the project, including some or all of the following: site compounds, concrete batching plant, pre-cast facilities, and stockpile areas for materials and temporary storage of spoil and mulch.

The overall fabric of the historic town centres and streetscapes of Grafton and South Grafton are kept largely intact, however, there are unavoidable high visual and landscape character impacts concentrated at Pound Street, Clarence Street and the residential area associated with proposed northern bridge approach road, to a zone of the Clarence River and foreshore where the proposal is inserted, and affecting the ambience around Alipou Creek - which require mitigation. The urban design and landscape objectives and principles developed take into account urban design and visual character not only for the study area itself, but also reflect its relationship with the surrounding river floodplain and urban areas. The urban design, bridge and landscape concept has been developed to achieve an integrated outcome that helps fit the project as sensitively as possible into its context and to minimise the impacts of the

project on the future character of the area, through the incorporation of a number of mitigation measures. The urban design will:

- Ensure attractive views into the broader landscape are maintained by planting in appropriate locations.
- Incorporate materials and finishes for new road elements that are site appropriate
- Ensure that the existing Grafton Bridge retains its visual precedence
- Ensure there is a visually complementary relationship between the proposed bridge and the existing bridge
- Include a planting design intended to reduce the scale of the proposed road infrastructure by the provision of appropriate tree species in the streetscapes of the urban areas of Grafton and South Grafton
- Provide new landscaped open spaces at impacted urban development sites
- Provide distinctive town entry points
- Provide screening, through the use of native plant species, of the road infrastructure to residential areas
- Provide new pedestrian and bicycle connections for the community.

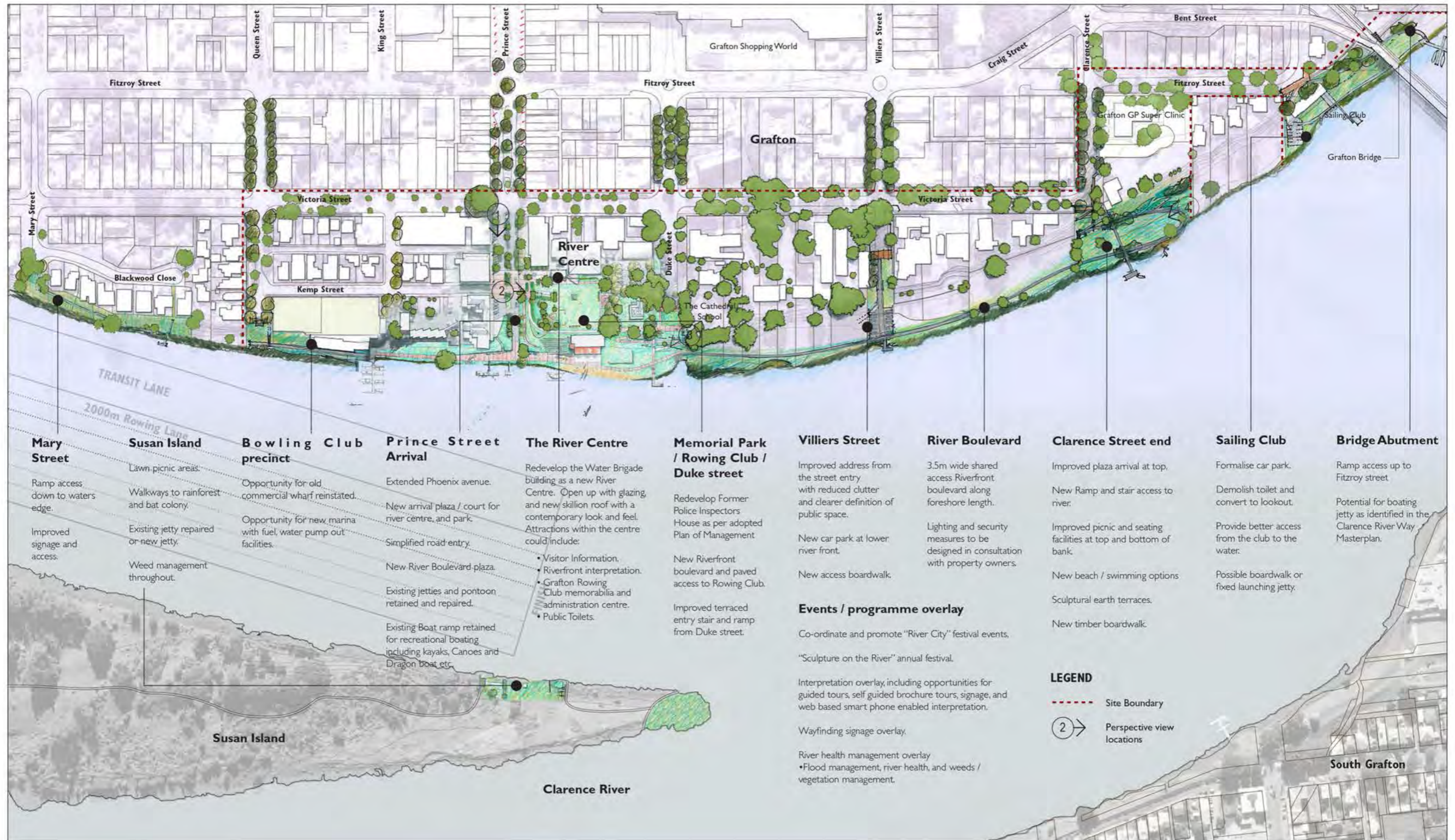
Development of the project during a future detail design phase should consider the further key mitigation strategies outlined in this report to further integrate this project into the townships of Grafton and South Grafton.

## 9 APPENDICES



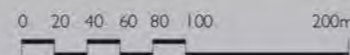


# 9.1 GRAFTON WATERFRONT PRECINCT CONCEPT MASTER PLAN



Clarence Valley Council

Scale 1:2000 @A1 1:4000 @A3



Grafton Waterfront Precinct • Masterplan

CONCEPT MASTERPLAN

NS 1122 SK 13

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