ADDITIONAL CROSSING OF THE CLARENCE RIVER AT GRAFTON

Appendix J – Technical Paper: Urban design and landscape concept report (including landscape character and visual impact assessment)

AUGUST 2014

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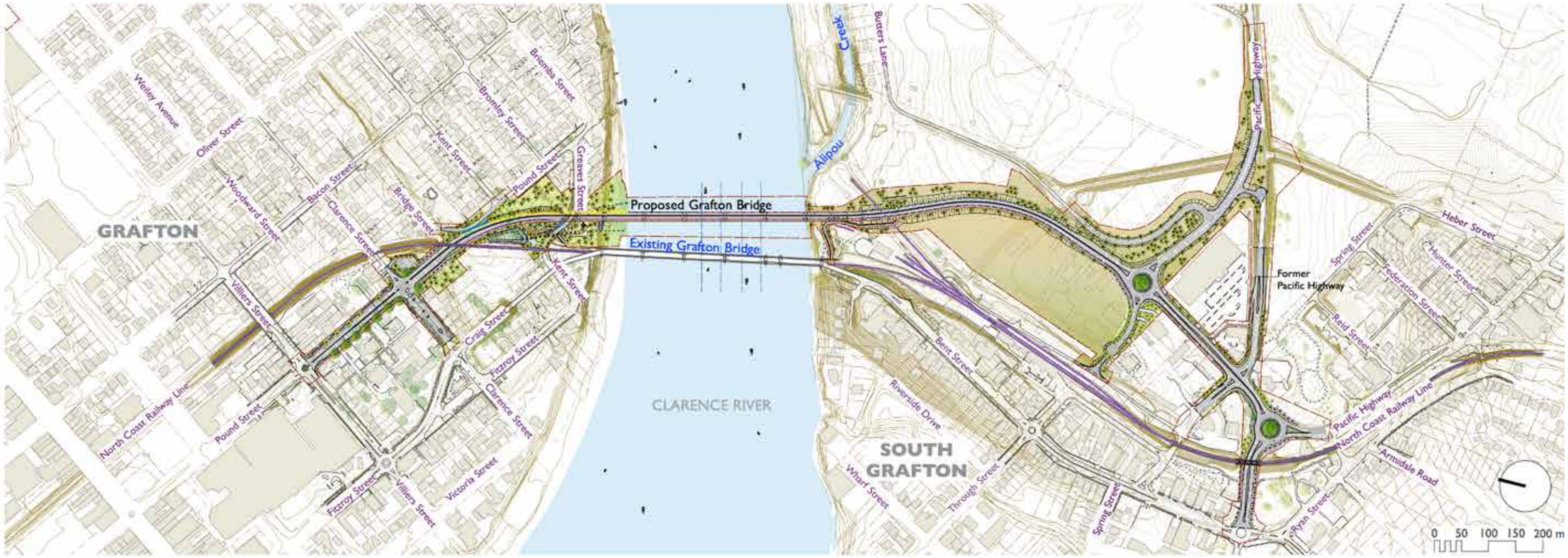


Figure 0.1: Landscape and Urban Design Concept . Refer to Section 6 for further detail.

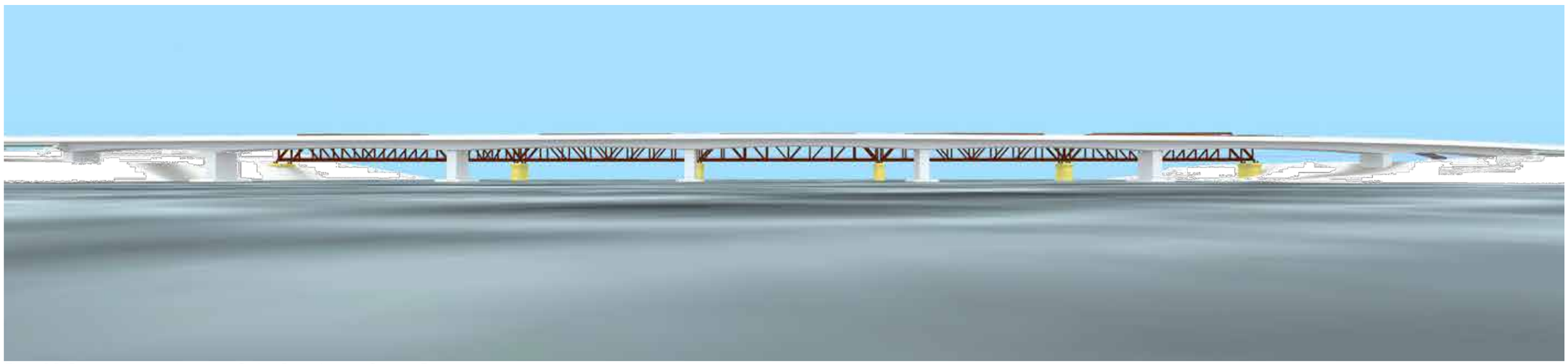


Figure 0.2: Downstream view of proposed Grafton Bridge from the Clarence River

EXECUTIVE SUMMARY

Purpose

Roads and Maritime Services is seeking approval to construct an additional bridge across the Clarence River at Grafton (the proposal). The proposal would include the construction of a new bridge with viaducts, a pedestrian and cycle path, and upgrades to the road network in Grafton and South Grafton to connect the new bridge to the existing road network. This technical paper has been prepared by Spackman Mossop Michaels (SMM) on behalf of Roads and Maritime Services (Roads and Maritime) as part of the Environmental Impact Statement (EIS) for the project and addresses the Director-General's Environmental Assessment Requirements for visual amenity, bridge form and elements, and landscape aspects of the project that make up its 'urban design'.

Context

Grafton is a major regional centre situated on the Clarence River in the north coast of New South Wales. The existing landscape character of the area is topographically dominated by the Clarence River and its flat river floodplain. 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.

Urban design approach

Understanding the built, natural and community character of Grafton, analysing the impacts that a new crossing of the Clarence River and associated road upgrades can make, identifying opportunities, and articulating urban design objectives and principles has been an integral part of designing the project. An iterative engineering and urban design process has been adopted to produce an integrated design that fits in with its context, complements the existing historic bridge, minimises the impacts and mitigates the impacts that are unavoidable. This follows Roads and Maritime urban design policy document Beyond the Pavement (2009), the Bridge Aesthetics design guideline (2012), the EIS Landscape Character and Visual Impact Assessment guideline (2012) and the Landscape Guideline (2008).

Urban design and landscape concept

The proposed concept plan, in Fig. 1, shows how the project fits into Grafton, South Grafton and the river setting and with the existing historic bridge, and the future public domain that will be created. The form of the proposed new bridge relative to the existing bridge is shown in elevation in Figure 2. The concept is documented in greater detail in Chapter 6. This includes the proposed new bridge, viaducts and abutments, retaining walls, noise barriers, cuttings, fill embankments, planting to integrate the proposed works with the existing character of the local area, feature planting to define the township entries and other cultural areas, creation of new landscaped public open space, integration of the pedestrian and bicycle network, and retrofitting of local streets affected by road widening.

Proposed new bridge: the river crossing

The proposed new bridge is designed to complement the existing historic bridge:

- It has been designed, within site constraints, to be as parallel as possible to the existing historic bridge
- Its straight horizontal alignment references the straight alignment of the existing bridge
- The piers have been positioned to align as closely as possible with the piers of the existing bridge and match the spans over the Clarence River
- It has been kept as low as possible over the Clarence River to allow the existing bridge to take visual precedence and minimise the loss of views to the existing bridge.

Key design features of the proposed new bridge are:

- The superstructure would be concrete allowing for a simple, clean, contemporary character, and would have long, smoothly tapering haunches that help reduce its visual bulk and create a slender, graceful appearance when viewed in elevation
- The proposed 16.9 metre wide deck, over and above two vehicle lanes, shoulders and a median, includes a pedestrian and cycle path on the western, upstream, side to facilitate connections to existing path systems in Grafton and South Grafton
- Both sides of the bridge would be cantilevered over a box girder to cast a shadow on the vertical face of the girder, helping it to visually recede and minimise its visual bulk. In contrast, the precast concrete parapets would be angled slightly out to catch the sunlight
- The parapets are designed to appear as crisp, uninterrupted linear elements extending the full length of the bridge to beyond the abutments.
- Balustrades are designed to allow views for users.

Proposed urban design and landscape concept in Grafton

To mitigate loss of trees, demolition of houses and noise impacts, the proposed concept includes street tree planting, planting of fig trees within Grafton TAFE (subject to agreement with the TAFE), Jacaranda and formal garden beds at strategic locations, landscaped car park areas, transparent noise barriers on northern bridge approach road and landscaped public open space either side of the Pound Street approach.

Proposed urban design and landscape concept in South Grafton

Key design characteristics are pasture grasses on southern bridge approach embankments, retention of rural views, street tree planting, and feature planting, such as Jacaranda, at major entry points and roundabouts. Native street trees and revegetation would be undertaken to the former Pacific Highway and the Butters Lane extension.

Landscape character impacts

Landscape character impact assessments are provided in Chapter 7. Landscape character assessment determines the impact of the proposal on the aggregate of the built, natural and cultural aspects that make up an area and provide its unique sense of place. The landscape character analysis identifies five landscape character zones in the study area, representing the range of different settings through which the proposal passes.

The landscape character impact assessment identifies that the proposal would have a moderate to high character impact with areas of highest impact concentrated at:

- Pound Street
- The Grafton established residential area in the vicinity of Pound Street, Kent Street, Bridge Street and Greaves Street
- Parts of the Clarence River and foreshore.

Visual impact assessment

Visual impact assessment is provided in Chapter 7, defining the day to day visual effects of a proposal on people's views. It is based on the assessment of a number of selected key viewpoints that are rated according to the sensitivity of the view and the magnitude of the proposal within that view. The locations and directions of the chosen viewpoints are generally representative of the range of viewpoints both within and beyond the study area.

A total of 12 key viewpoints form the basis of the visual impact assessment and the following visual impact ratings were determined:

- 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.

Mitigation strategy

A mitigation strategy is provided in Chapter 7. It has been developed during the project concept design to mitigate landscape character and visual impacts. It is reflected in the Urban design and landscape concept and should be refined in the ongoing development of the design. The strategy also includes a summary of further mitigation measures to be investigated during the subsequent detailed design phase of the project, and measures to be considered during construction.

Conclusions

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.

1 INTRODUCTION

Roads and Maritime Services (Roads and Maritime) is proposing to construct an additional bridge across the Clarence River at Grafton to supplement the existing bridge. In seeking project approval of the additional crossing of the Clarence River at Grafton, Roads and Maritime is preparing an Environmental Impact Statement (EIS) under Part 5.1 of the Environmental Planning and Assessment Act 1979.

This Urban Design and Landscape Concept Report was prepared by Spackman Mossop Michaels (SMM) on behalf of Roads and Maritime and is a Technical Paper that supports the environmental impact Statement (EIS) being prepared by Arup. SMM has worked on this project in conjunction with the Roads and Maritime Centre for Urban Design, other Roads and Maritime specialist advisors, and road and bridge designers from Arup.

1.1 BACKGROUND

In 2002 the NSW Government began formal investigations into an additional crossing of the Clarence River in Grafton. The investigations were deferred in September 2005 and restarted in 2009.

In December 2010 Roads and Maritime announced a revised approach to engage more effectively with the community and stakeholders in identifying a preferred route for an additional crossing. A community update issued in December 2010 identified 13 preliminary route options and invited community comment via a postal survey. Subsequent phone and business surveys were also carried out.

In June 2011 RMS published the Feasibility Assessment Report which described the assessment undertaken of the 41 suggestions identified after the December 2010 to March 2011 community consultation period. Twenty-five preliminary route options in five corridors were identified for engineering and environmental investigation.

In January 2012 six route options were announced for further investigation. The short-listed options and short-listing process are documented in the Preliminary Route Options Report – Final (RMS, January 2012).

Design refinements and further field and technical investigations were undertaken on the six route options. These were documented in the Route Options Development Report (RMS, September 2012).

The six route options were subject to consultation and assessment process in September, October and November 2012 to identify the preferred location for the additional crossing. Based on community feedback, technical investigations and value management workshops Option C was selected as the preferred option which connects the Pacific Highway near the junction with Gwydir Highway in South Grafton to Pound Street in Grafton.

The Recommended Preferred Option Report (RMS, December 2012) documents the process followed for the assessment of the six short-listed route options and the identification of a recommended preferred option. It also provides information on community involvement and feedback received after the display of the Route Options Development Report (RMS, September 2012).

The Recommended Preferred Option Report (RMS, December 2012) was placed on exhibition from 19 December 2012 to 4 March 2013. A number of supporting consultation activities were undertaken to ensure that information was received by the wider community and opportunities were available for comment and questions. The exhibition period, during which comments on the report were invited, was initially due to finish on 18 February 2013, but was extended until 4 March 2013 to allow members of the community impacted by floods in Grafton additional time to comment.

In April 2013, Option C was confirmed as the preferred option for an additional crossing of the Clarence River at Grafton. Refinements were made to the recommended preferred option after Roads and Maritime review of the preliminary design, stakeholder consultation and feedback received during the public display of the Recommended Preferred Option Report (Roads and Maritime, December 2012).

The concept design for the project has been further refined to define those elements of the preferred option that are required to provide acceptable traffic performance at least to year 2039 and to take into consideration issues raised during consultation of general community and stakeholders.

1.2 DESCRIPTION OF THE PROJECT

A description of the project is provided in Chapter 5 and Chapter 6 of the EIS. This section provides a summary of the project.

The main components of the Grafton Bridge project include:

- 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, including:
  - ¬ Widening Iolanthe Street to four lanes
  - ¬ Widening the Gwydir Highway to four lanes between Bent Street and the Pacific Highway
  - ¬ Realigning the existing Pacific Highway to join Iolanthe Street near Through Street
  - ¬ Providing a new roundabout at the intersection of the Pacific Highway and Gwydir Highway
  - ¬ Providing a new roundabout at the intersection of Through Street and Iolanthe Street
  - ¬ Limiting Spring Street and the Old Pacific Highway to left in and left out only where they meet Iolanthe Street
  - ¬ Realigning Butters Lane
- Upgrades to the road network in Grafton to connect the new bridge to the existing road network, including:
  - ¬ Widening Pound Street to four lanes between Villiers Street and the approach to the new bridge
  - ¬ Providing traffic signals at the intersection at Pound Street and Clarence Street
  - ¬ Closing Kent Street where it is crossed by the bridge approach road

- ¬ Realigning and lowering Greaves Street beneath the new bridge
- ¬ Realigning Bridge Street to join directly to the southern part of Pound Street (east of the new bridge approach). There would be no direct connection between Pound Street south and the new bridge approach
- ¬ Widening Clarence Street to provide formal car park spaces
- ¬ Minor modifications to the existing Dobie Street and Villiers Street roundabout..
- 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.

These project elements are described in more detail in Chapter 4 of this report.

1.3 SCOPE OF THIS REPORT

This Urban Design & Landscape Concept Report (Including Landscape Character and Visual Impact Assessment) has been prepared for Roads and Maritime by Spackman Mossop Michaels as part of the EIS for the proposed additional crossing of the Clarence River at Grafton (the project) in Clarence Valley Council local government area. This document is a technical paper that supports the EIS being prepared by Arup. Spackman Mossop Michaels has worked on this project in conjunction with, Roads and Maritime Centre for Urban Design, other Roads and Maritime specialist advisors, and road and bridge designers from Arup.

The report documents the landscape character and visual impacts of the project and has been prepared as part of the planning approval process. It aims to facilitate an integrated urban design and engineering design outcome for the proposal, through the utilisation of visual impact assessment to identify and summarise the visual and landscape character opportunities and issues within the study area. This, in turn, would guide the development of the road and bridge concept design process by avoiding or mitigating potential impacts wherever possible.

1.4 CONCEPT DESIGN STUDY METHOD

The preparation of this study follows Roads and Maritime guidelines (refer to Section 1.9) and includes an integrated team design and assessment process which has included consultation with agencies and the local community. The undertaking of the impact assessment and the finalisation of the concept design has been an iterative process which has enabled the concepts to be refined as they were developed, thereby reducing and mitigating the potential impacts wherever possible.

This study has involved the following:

- Site visits and field investigations, reviewing relevant literature, analysing aerial photographs, topographic maps to understand the study area.
- Reviewing the initial engineering concept design and supporting material to gain an appreciation of the project.
- Defining urban and landscape character through a contextual analysis.
- Identifying and describing landscape character zones and evaluating the project's impact on them.
- Identifying the visual catchment of the project.
- Selecting viewpoints within the visual catchment representing a range of different land uses.
- Evaluating the project's visual impact by comparing the sensitivity of viewpoints and the magnitude of the impact of the upgrade upon them.
- Identifying urban design and landscape strategies to mitigate adverse impacts.
- Development of the urban design, bridge and landscape concept for the project.
- Summary recommendations and conclusions for further consideration in the future detailed design phase of the project.

1.5 DIRECTOR GENERAL'S REQUIREMENTS

The Director General's Environmental Assessment Requirements (DGRs) for the visual amenity, bridge form, urban design and landscape aspects of this project are as follows:

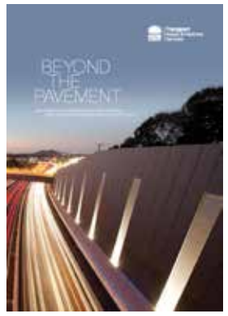
Table 1.1: DIRECTOR GENERAL'S REQUIREMENTS.

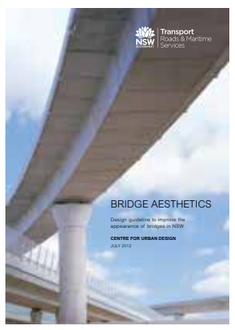
KEY ISSUE	REPORT REFERENCE
An assessment of the visual and amenity impacts of the project (height, scale and lighting) on the local and regional area, particularly on: ¬ The existing State Heritage listed Grafton Bridge (SHR 01036) and local heritage items, ¬ Any adjoining land owners and land owners along the foreshore of the Clarence River, ¬ Existing and future residential properties in Grafton and South Grafton, ¬ The southern 'town entry', ¬ Use of the Clarence River, and ¬ Significant vantage points in the public domain	7.2 & 7.3
Overshadowing impacts of the bridge structure, embankments and ramps on existing and proposed public domain, open space, foreshore areas and residential uses	7.4
Integration of the bridge with existing and future pedestrian and cycle network in the local, regional and metropolitan context	6.2, 6.3, 6.4, 6.5
Consideration of design, and safety measures for pedestrian and cycle access on the bridge	6.3
Development of urban design objectives for the new bridge, approaches and local road network treatments	5.0
Rationale for the overall design (length, height, width and appearance) and an assessment of the built form (materials and finishes) and urban design (bulk and scale) of the bridge, including: ¬ Justification for the proposed width of the bridge based on shared use by pedestrians, cyclists and public transport, ¬ Details of pedestrian and cyclist access (dedicated or shared-use), and public transport and emergency vehicle access, ¬ Design details such as lighting, balustrades, street furniture and their integration generally, ¬ Design relationship to the existing Grafton and South Grafton built forms and streetscapes, including the existing State Heritage listed Grafton Bridge, ¬ Views to and from the bridge	6.2, 6.3, 6.4, 6.5, 7.2, 7.3

1.6 ROADS AND MARITIME GUIDELINES

Roads and Maritime have produced a comprehensive list of design guideline documents aimed at achieving good urban design outcomes. This report has been undertaken with reference to the following published documents:

- Beyond the Pavement (Roads and Maritime, 2009).
- Landscape Guideline (Roads and Maritime, 2008).
- Bridge Aesthetics Design Guidelines (Roads and Maritime, 2012).
- Environmental Impact Assessment Guidance Note, Guidelines for Landscape Character and Visual Impact Assessment (Roads and Maritime, 2013).





1.7 REPORT STRUCTURE

This report is structured as follows:

- Chapter 1: Introduction - introduces the project and outlines the scope and study team.
- Chapter 2: Existing Context - a description and illustration of the environmental and cultural factors of the local area.
- Chapter 3: Project Description - a summary of the key concept design works.
- Chapter 4: Project Context - a description of the project in the context of the area it will be located, to assist in the development of the objectives and principles for the project.
- Chapter 5: Objectives and Principles - a description the urban design, bridge and landscape objectives and principles.
- Chapter 6: Urban Design, Bridge and Landscape Concept - illustration of the concept design in graphic format including plans, cross sections and details.
- Chapter 7: Impact Assessment - landscape character, visual impact and overshadowing assessment of the project.
- Chapter 8: Mitigation Measures and Conclusions - provides a list mitigation measures to be considered as part of the detailed design process. It also includes a summary of the conclusions and next steps.

2 EXISTING CONTEXT

This chapter provides an overview of the Grafton area. This existing context broadly describes the range of urban and rural elements that make up the Grafton area and contributes to its unique identity and character.

2.1 LOCATION

REGIONAL CONTEXT

The City of Grafton is situated on the northern New South Wales coastal plain, within the Clarence Valley local government area. It is located on the banks of the Clarence River, approximately 36.5km inland from the coast and 65.5km from the river's mouth at Yamba. Grafton is the major urban centre for the region, being the primary focus of commercial, industrial, institutional and administrative activities in a predominantly rural part of the north coast.

LOCAL CONTEXT

The Clarence River passes through the centre of the city, dividing Grafton into two separate urban areas that are linked by a single bridge crossing. Grafton Bridge currently provides the only rail, motor vehicle, pedestrian and cyclist connection between Grafton (north of the river) and South Grafton. The existing bridge has limited capacity to meet the demands of the large volumes of road traffic that cross it during peak times. It is likely that this demand will increase over time due to the future urban growth that is envisaged for Grafton as part of the Clarence Valley Council's (CVC) regional urban planning strategies. As such, Roads and Maritime has identified a need to provide an additional bridge crossing in Grafton.

Figure 2.1: Regional context of Grafton on the Clarence River.

Figure 2.2: The local context of Grafton and South Grafton.

2.2 TRANSPORT

Being a regional centre, Grafton is well serviced by transport infrastructure. It is situated at the junction of the Pacific Highway and the Gwydir Highway, both of which are National Highway routes. The approved upgrade route for the Pacific Highway between Woolgoolga to Ballina will run from the Glenugie State Forest north to Tyndale, completely bypassing Grafton.

The Summerland Way, a State Route, runs north from the Gwydir Highway and Pacific Highway, across the Grafton Bridge, through Grafton and onward to join Mt Lindesay Highway near the Queensland border. The Summerland Way is promoted as a tourist drive that provides a 'quieter, scenic alternative' to the Pacific Highway route between Brisbane and Grafton.

Due to the relationship of the railway bridges to the local road network, heavy vehicles do not utilise the Prince Street section of the Summerland Way in Grafton. Instead, there is a heavy vehicle diversion route along Villiers Street to connect with the Dobie Street section of the State Route.

Grafton is also located on the North Coast railway line, the main passenger and freight rail connection between NSW and Queensland. Grafton Bridge currently provides the only major crossing of the Clarence River for both the railway line and the Summerland Way.

Figure 2.3: Regional road network around Grafton

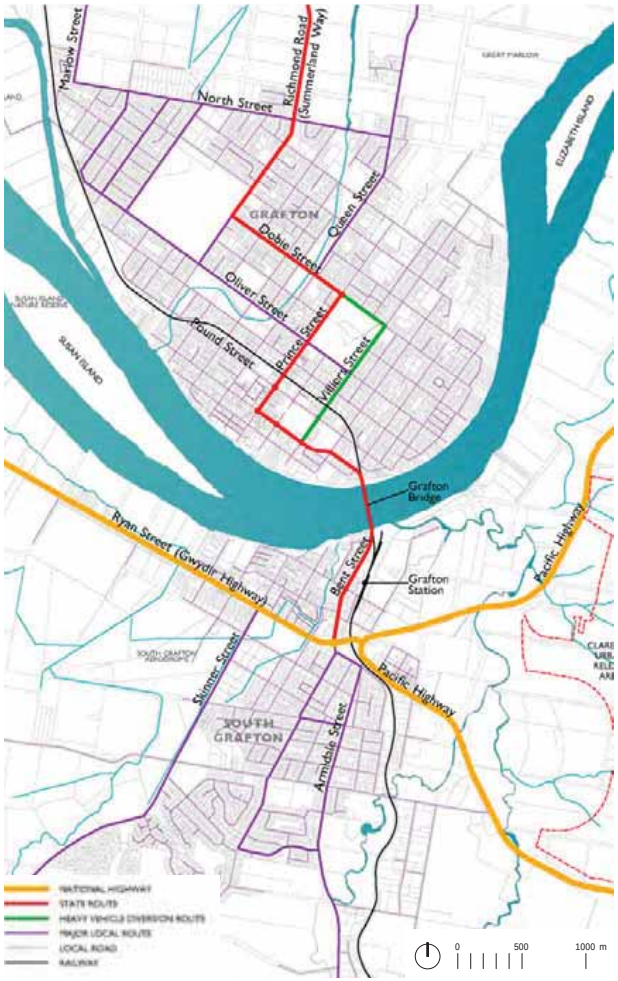


Figure 2.4: Local road network in Grafton and South Grafton

2.3 HYDROLOGY

Grafton is located in the lower reaches of the Clarence River catchment, within the Clarence Valley - one of the largest coastal floodplains in the country. Most of the city is situated within Council's flood planning area (Clarence Valley Local Environmental Plan 2011, CVLEP 2011) and the only part of the township that is not part of the floodplain is the southern approach to Grafton Bridge, along Bent Street. Due to the large size of the river catchment upstream of Grafton (approximately 19,800m2), flooding is a major concern for the city.

A series of levee banks has been constructed over time to protect both Grafton and South Grafton from the regular flooding of the Clarence River. These levee banks are a distinctive characteristic of the Clarence riverfront in Grafton and South Grafton.

The proposed bridge would need to address both maritime navigational requirements and provide immunity from 1 in 100 year flood levels. As such, the soffit (underside) level of any new bridge is to be above the 1 in 100 year ARI flood event to ensure that it would be trafficable during major flood events. The most recent major flood was in 2013, when the river reached levels of 8.09 AHD at the Prince Street gauge in Grafton.

The generally low-lying topography on either side of the river means that any new river crossing would need to include some level of levee upgrade works. The nature and degree of these levee upgrade works will be determined by the design of the proposed bridge and approach roads.

Plate 2.1: Flood sign, South Grafton

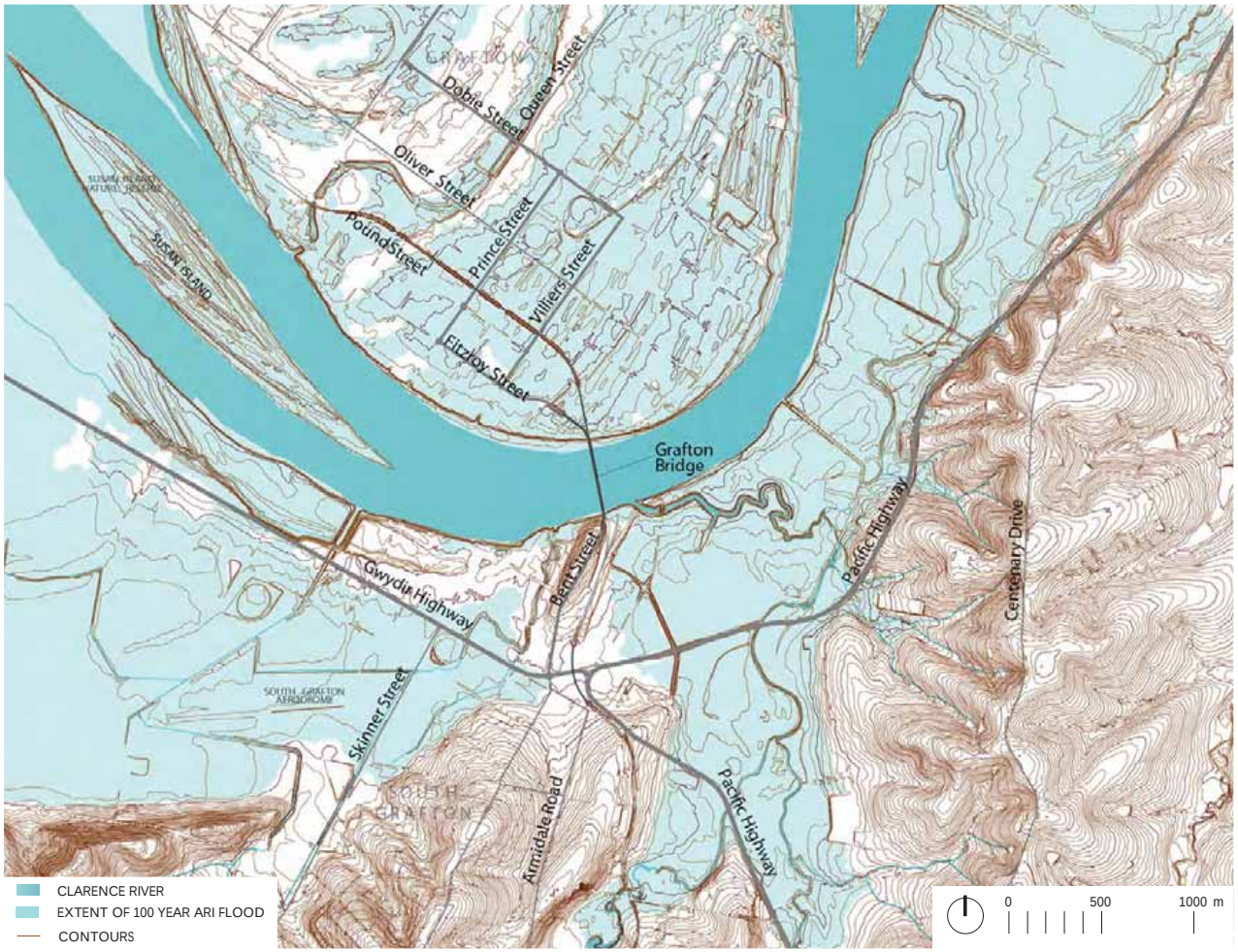


Figure 2.5: Flood affected areas

Plate 2.2: 2001 flood in Grafton

Plate 2.3: Grafton levee

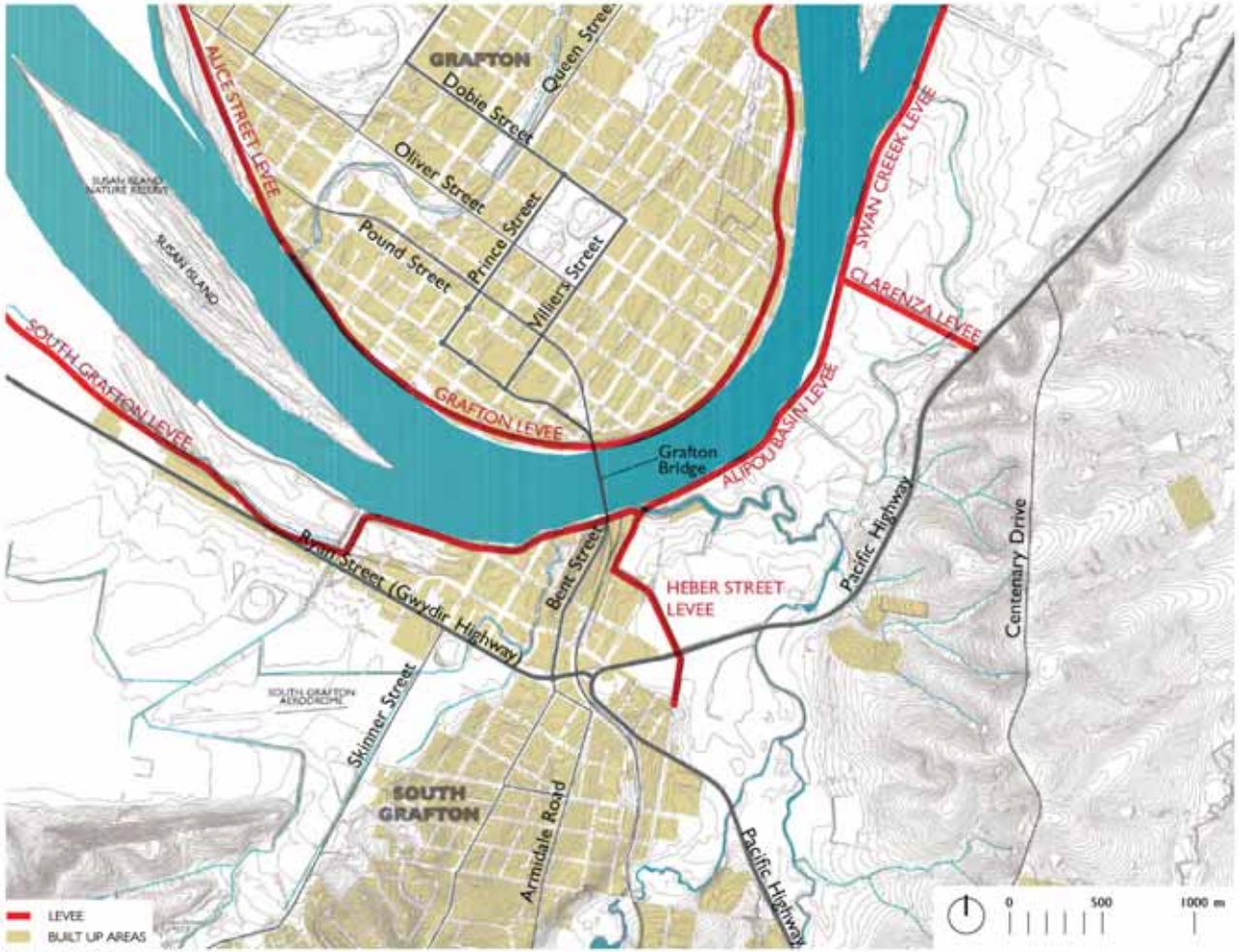


Figure 2.6: Grafton levee system

2.4 HISTORICAL CONTEXT

European settlement of the Grafton area dates from the 1830s, with the arrival of timber-getters attracted by the plenitude of valuable timber, particularly cedar, in the region. Subsequently, the land was used for predominantly agricultural and pastoral purposes, including farming (particularly sugarcane), dairying and grazing.

The establishment of a village in Grafton in the 1850s was initially facilitated by the development of wharves in the area to transport goods from the rural hinterland to the coast. Wharves and a shipyard had been established in what is now the Grafton riverfront by the early 1840s. Shipbuilding continued to be the major local industry until the end of the century, when the railways became the primary means of internal goods transport.

Grafton expanded rapidly in the 1860s and 1870s, aided by its strategic location on the main coastal road, the break-up of large pastoral properties and the discovery of gold nearby. The town soon became the major urban settlement on the Clarence River and the commercial focus for an extensive agricultural and pastoral district. Grafton was proclaimed a city in 1885, and in 1897 South Grafton became a separate municipality. The two towns were not amalgamated until 1957.

The existing Grafton Bridge was completed and opened to traffic in 1932. Prior to this, Grafton and South Grafton were connected by a punt service across the Clarence River.


(Photo: John Henry Harvey; image held at State Library of Victoria)

Plate 2.5: Punt service on the Clarence River at Grafton

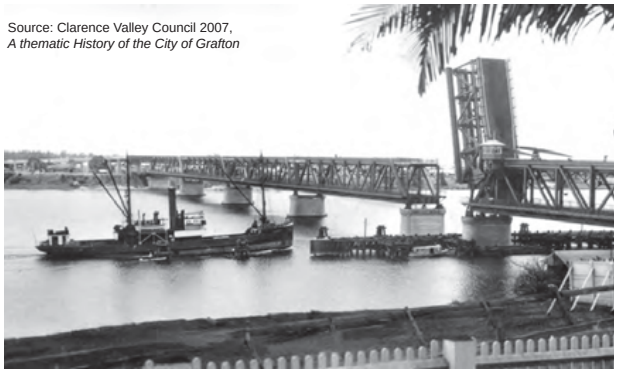

Source: Clarence Valley Council 2007, *A thematic History of the City of Grafton*

Plate 2.6: View of Grafton Bridge with the bascule span open


(Source: National Archives of Australia: A1200, L6168)

Plate 2.8: Aerial view of Grafton, 1946


Source: Clarence Valley Council 2007, *A thematic History of the City of Grafton*

Plate 2.7: View along Prince Street to the Clarence River, c.1940


Source: NSW Land & Property Information,

Plate 2.4: Grafton and South Grafton 1954

2.5 HERITAGE LISTED ITEMS

The former Grafton Local Environment Plan 1988 lists a number of heritage items within Grafton and South Grafton, including all heritage items listed on the State Heritage Register, (SHR) a number of items that are listed on the North Coast Regional Environmental Plan (REP), and the majority of items proposed for listing by the Community Based Heritage Study (Gardiner 2010). On the recommendation of the Community Based Heritage Study, the heritage conservation area listed in the LEP (1988) was substantially modified in June 2011. It is now divided into the Grafton and South Grafton Urban Conservation Areas, and its boundaries have been considerably expanded in Grafton and less so in South Grafton. This has been updated based on the adopted CVLEP 2011.

The adjacent map shows the heritage items and heritage conservation areas listed under the current Grafton Local Environment Plan 2011, including those listed on the State Heritage Register. Grafton Bridge is one of the items listed on the SHR. Detailed discussion of the heritage issues is provided in Appendix G Technical Paper: Non-Aboriginal Heritage Assessment (Biosis 2014) of the Environmental Impact Assessment for this project.

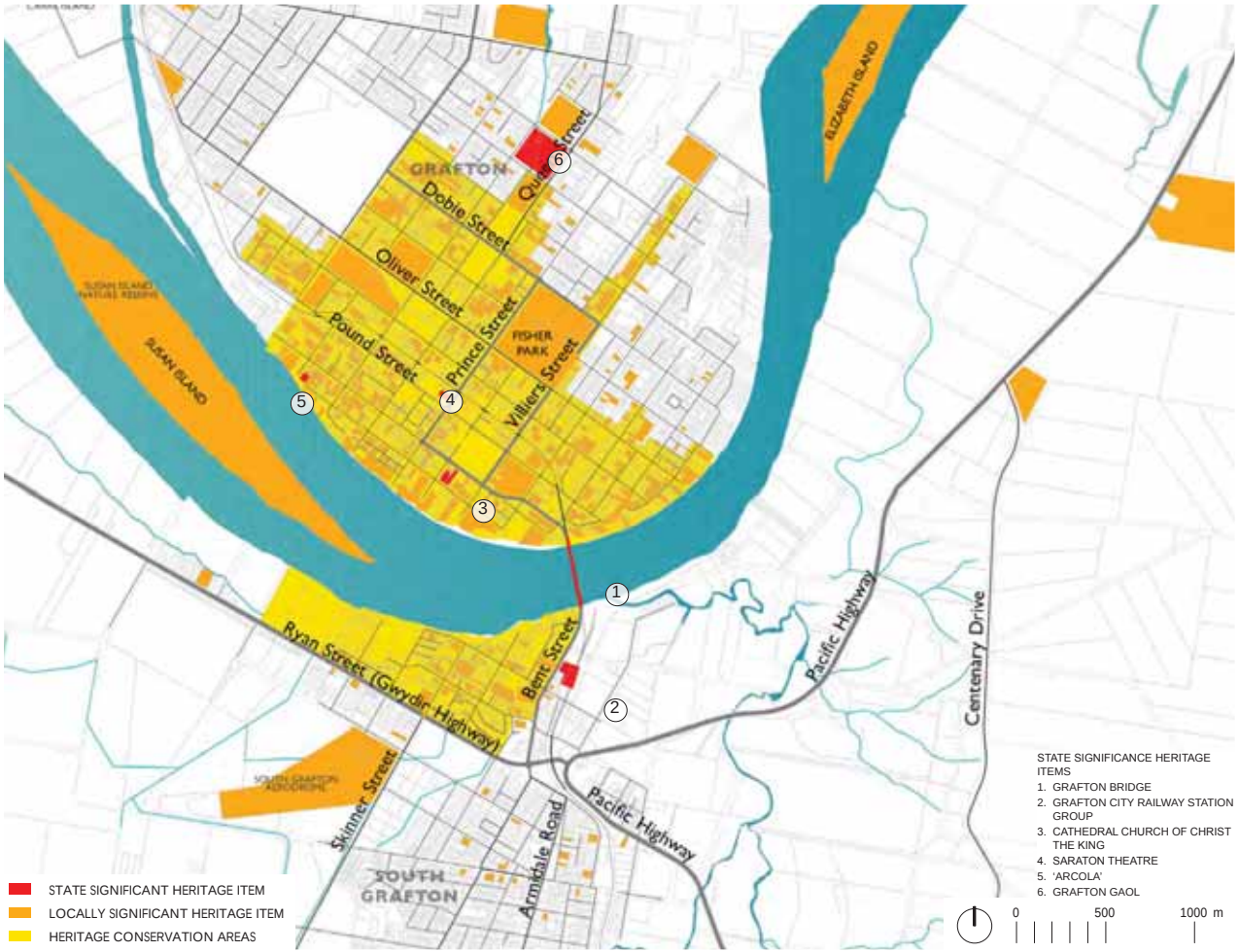


Figure 2.7: Heritage listed items

2.6 THE CLARENCE RIVER

The Clarence River is the defining landscape feature for the city and it was the fundamental reason for the establishment of the city in this location.

The river is the dominant visual element in the local landscape. It has a distinctive character that is defined by its wide sweeping form as it winds across the flat river plain. The flat, open, topography of the local area reinforces the visual prominence of the river and its important role as the visual focus and landscape point of reference for the locality. As the only structure that crosses the river in the locality, the landmark quality of Grafton Bridge is accentuated by the exposed visual character of the river and its setting.

The river's edge is defined by the high levee banks that protect Grafton and South Grafton from periodic flooding of the river. The character of the river's edge varies throughout the study area. Between Grafton Bridge and Susan Island, boat sheds, launches, wharves and pontoons have been developed along the riverfront at both Grafton and South Grafton, which support the public recreation focus along this stretch of the river. Future implementation of Council's Grafton Waterfront Precinct Masterplan (March 2011) would see further development of this riverfront area for public recreation. East of Grafton Bridge, the riverfront has two distinct characters. The southern riverfront is defined by the open character of the agricultural floodplain, which consists of fields and scattered trees. The northern riverfront has a more developed character, with houses and gardens extending up to, and in a few cases, over the levee bank, as well as private moorings on the river. The concept plan for the Waterfront Precinct Masterplan is included in Appendix A.

Plate 2.9: The public riverfront at Grafton, west of Grafton Bridge.

Plate 2.10: The public riverfront at South Grafton, west of Grafton Bridge.

Plate 2.11: Agricultural floodplain along the southern riverfront east of Grafton Bridge

2.7 GRAFTON BRIDGE

Grafton Bridge is an iconic structure that is central to the image of Grafton as a river city. Completed in 1932, the bridge remains the only road and rail connection between Grafton and South Grafton. The bridge is the only one of its type in NSW and is listed on the State Heritage Register.

The distinguishing feature of the bridge is its double deck steel trusses, including a bascule span that would lift to allow ships to continue along the Clarence River. The bascule span is no longer in use. The upper deck of the bridge carries the road, while the lower deck carries the North Coast Railway Line. Two shared paths for pedestrians and cyclists are cantilevered from the trusses at the railway deck level.

The bridge consists of five truss spans about 74 metres long, and a bascule span of 23.2 metres. The steel trusses are supported by seven concrete piers that feature simple and robust detailing. The piers have distinctive rounded ends, a detail that has been carried through to the pier capitals and pile caps.

Grafton Bridge is 457 metres long (including two approach spans) and spans 396 metres of water. It is visually prominent in the local area not only due its size, but also because it is the only structure over the Clarence River. The bridge is located immediately east of Grafton and South Grafton and is their foremost built landmark, physically and visually connecting the two town centres.

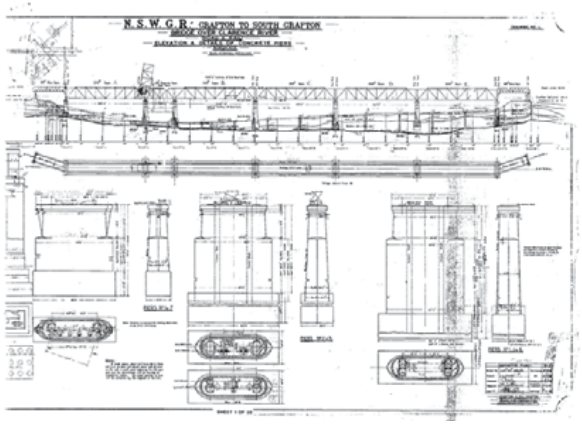


Plate 2.12: Construction drawings for Grafton Bridge, dated 1926. (Source: Roads and Maritime)

Plate 2.13: Shared path on downstream side of Grafton Bridge

Plate 2.14: Double deck bascule span

Plate 2.15: Grafton Bridge

2.8 URBAN FORM

The two original urban settlements of Grafton and South Grafton are located on either side of the Clarence River, on the floodplain immediately adjacent to the river. The two towns were laid out with a regular square grid pattern of streets. However, although the proportions of the Grafton and South Grafton grids are essentially identical, their orientations differ slightly.

North of the river, the grid is a defining characteristic of the urban experience. With few exceptions, the urban area of Grafton conforms to the historical grid. Where the geometry of the grid is interrupted, for example at the road and rail viaduct approaches to the bridge, the effect is immediately apparent and is perceived in dramatic contrast to the uniform regularity of the grid.

South of the river, the historical grid is much less prevalent. Only the older parts of South Grafton, those areas closest to the river, are laid out on the original grid. The historical grid terminates at Cambridge Street, which cuts across the old grid and establishes a new, less regular, street grid to its south. South of Tyson Street, the grid geometry disappears altogether as the newer areas of South Grafton extend onto higher ground and an irregular street pattern of looping roads and cul-de-sacs prevails. While the Gwydir Highway conforms to the local urban patterns, being aligned with the historical grid, the other regional infrastructural elements in south Grafton - the railway line, the Pacific Highway and Bent Street (Summerland Way) - have their own individual geometries that cut across the local grain.

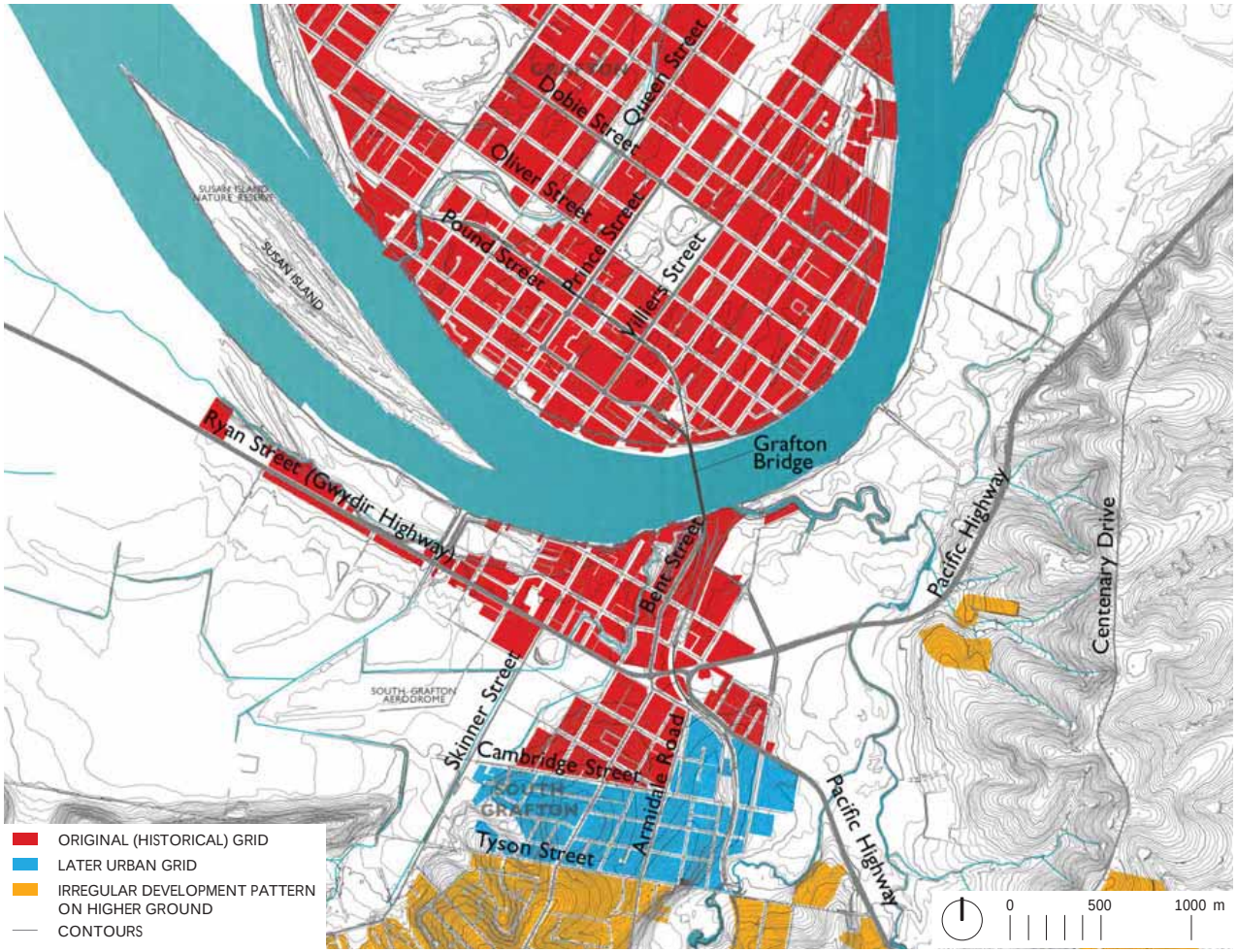


Figure 2.8: Urban settlement patterns

2.9 TWO TOWN CENTRES

North of the river, Grafton has a clearly defined urban core with the primary commercial activities centred along the traditional main street of Prince Street. Running perpendicular to Prince Street, Victoria Street is Grafton's civic street, where much of the town's administrative and institutional activities are concentrated. Highway-related businesses are located along Fitzroy Street, which also runs perpendicular to Prince Street to bring traffic off the bridge in to the main commercial street. While the recently redeveloped Grafton Shopping World, located on Fitzroy Street, has shifted some of the commercial and retail focus away from the 'main street' environment (Prince Street) to an internalised shopping mall, its close proximity to Prince Street and connecting arcade has helped to keep the town centre intact.

South of the river, Skinner Street is the historical main street of South Grafton. Like Prince Street north of the river, Skinner Street provides a strong, direct, connection to the river and public open spaces along the foreshore. However, in contrast to the cohesive town centre north of the river, South Grafton's town centre has been fractured by successive developments that have eroded the commercial—and hence to a certain extent, civic—relevance of the historical main street. The siting of the current bridge crossing outside of town had the effect of disconnecting South Grafton's main street from the regional transport network. This is likely to have contributed, at least in part, to the gradual decline of South Grafton's town centre. While Fitzroy Street brings traffic off the bridge directly into Prince Street in Grafton, its counterpart in South Grafton—Bent Street—parallels Skinner Street and allows potential passing trade to bypass the main street. The subsequent development of highway commercial and retail businesses—as well as light industrial activities—along Bent Street and the Pacific Highway has shifted South Grafton's commercial focus from the historical main street to the highway environment.

CHARACTER

A defining characteristic of the two town centres of Grafton and South Grafton is their physical separation by the Clarence River. As previously discussed, both town centres were originally laid out on a square grid, with strong connections between the main commercial streets and the river itself. The relationships between Clarence River, the urban form created by the grid and the transport infrastructure of highway and railway have established the key distinguishing features of the urban landscape character of the town centres. These are:

- The experience of infrastructure in the town centres.
- The wide gracious streets in the town centres.
- The town centres' connection to the Clarence River.

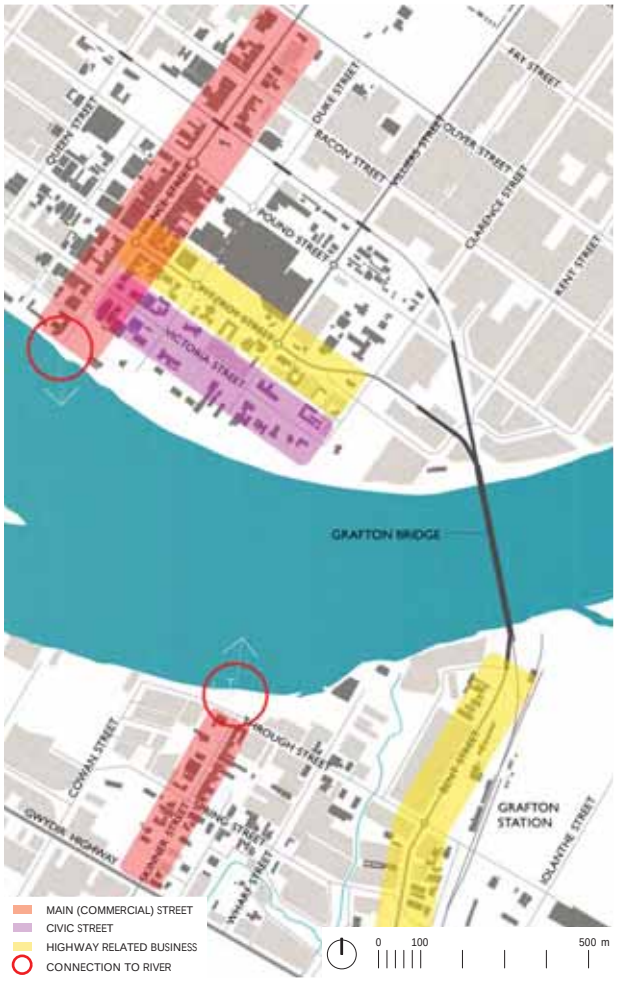


Figure 2.9: Two town centres

Plate 2.16: Representative streetscapes in Grafton and South Grafton town centres

THE EXPERIENCE OF INFRASTRUCTURE

The prevalence of transport infrastructure elements in the urban landscape is a defining aspect of the city's urban character. This is particularly the case north of the river in Grafton, where the low-lying land at the river's edge has necessitated the use of viaduct (bridge) structures to elevate both the road and railway approaches to Grafton Bridge. The long viaduct structures at the river's edge are a distinctive and memorable part of Grafton's urban landscape.

The corridor of elevated railway between Bacon Street and Pound Street is also a distinctive characteristic of Grafton's urban landscape. The railway line is elevated on a high embankment that parallels the street grid, forming a physical barrier that generally defines the extent of Grafton's commercial core. Where the railway embankment intersects the local street grid, railway bridges provide permeability for vehicular and pedestrian movement below. These railway bridges are a distinctive component of the experience of Grafton's local streets, creating memorable thresholds between the town centre and the outlying residential areas.

While the visual and physical presence of transport infrastructure is a dominant quality of Grafton's urban character north of the river, it is not a defining characteristic of South Grafton. This is because, unlike the area north of the river, the topography in South Grafton has enabled both Bent Street and the railway line to remain on natural ground as they approach the bridge crossing. The only piece of elevated infrastructure in South Grafton is the curving railway viaduct over the Gwydir Highway, which creates a memorable landmark at the highway entry to town.

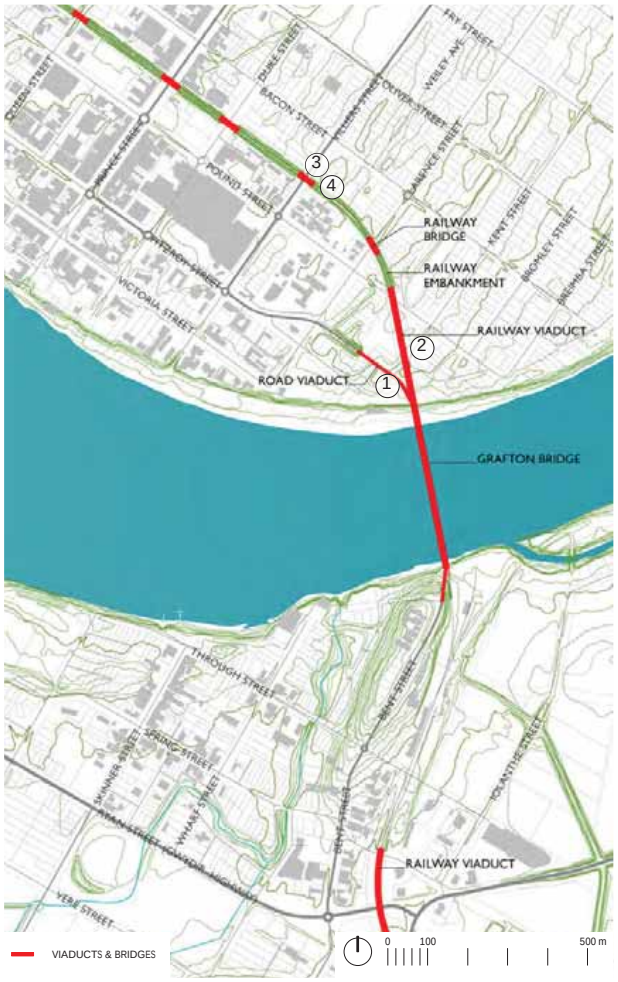


Figure 2.10: Infrastructure elements

Plate 2.17: Road viaduct, Grafton.

Plate 2.18: Railway viaduct, Grafton with road viaduct & Grafton Bridge beyond.

Plate 2.19: Railway bridge over local road, Grafton.

Plate 2.20: Railway embankment, Grafton.

2.10 ESTABLISHED RESIDENTIAL AREAS

The established urban residential areas of Grafton and South Grafton are directly connected to the two town centres. The urban and landscape character of these areas is defined by the pattern of the street layouts and the combination of building types, planting and road formation that make up the streetscapes.

As previously discussed in section 2.4 – Urban form, the residential areas of Grafton are laid out according to the historical grid, while the established residential areas of South Grafton were laid out in three clearly distinguishable patterns: the older areas closer to the town centre conform to the original grid, a second grid defines the area south of Cambridge Street, while the newer areas south of Tyson Street have an irregular street pattern of looping roads and cul-de sacs.

The housing stock in the established residential areas vary in age, with the older homes generally located closest to the town centres, and the post-war and later homes generally located further north and south of the two town centres. The established residential areas are also generally characterised by established gardens, with front gardens visible to the street. The streets themselves generally have sealed roads with unformed edges (no kerbs) and wide grassy verges. Many are lined with mature street trees.

The overriding character of this landscape type is that of informal streets with established houses and gardens, which is in keeping with the urban character of a genteel provincial town.

Plate 2.21: Representative streetscapes and residential buildings in established residential areas in Grafton and South Grafton

WIDE, GRACIOUS STREETS

The two town centres at Grafton and South Grafton have a distinctive character that has been directly influenced by the proportions of the historical urban grid. The historical grid has created the wide, generously scaled, light-filled streets and the long avenue vistas that characterise the urban experience of the town centres. Extensive avenue tree plantings enhance the landscape character of the streets and are highly valued aspects of the town centres' urban character.

Integral to Grafton's identity as a genteel provincial centre are its wide, gracious tree-lined streets. Grafton's Jacaranda Festival, held annually in late spring, centres on the visual spectacle provided by hundreds of jacaranda street trees (Jacaranda mimosifolia) in full bloom. Inaugurated in 1935, Grafton's festival is the country's longest-running floral festival, and is a source of great civic pride for the city. Grafton's streets are also lined with many other types of trees, predominantly tropical or sub-tropical species, that make a significant contribution to the stately character of the city's streets. Of particular note are the large fi g trees found in and around the civic centre (Victoria Street), and the fig avenue in Breimba Street.

While the character of South Grafton's streets does not figure as prominently in the popular perception of the city, the streets in the town centre nonetheless possess a genteel character, lined with trees and Victorian buildings that are similar to that of Grafton's streets.

Figure 2.11: Wide gracious street network

Plate 2.22: Victoria Street, Grafton

Plate 2.23: Skinner Street, South Grafton

Plate 2.24: Fig-lined avenue at Breimba Street, Grafton

2.11 INDUSTRIAL AREAS

The primary areas of industrial activity in Grafton and South Grafton are generally concentrated around the regional road and rail corridors. The character of these areas is distinguished by large industrial buildings, often surrounded by large open yards. The large scale of the buildings and their associated yards is in marked contrast to the surrounding smaller-scaled residential and commercial areas of Grafton and South Grafton.

The characters of the industrial buildings vary, with the newer industrial buildings typically being “big box” warehouse developments that are designed to be flexible and accommodate a range of different uses. As such, they tend to be visually homogeneous and somewhat anonymous. The older industrial buildings tend to be use-specific. As such, they tend to have a more distinctive architecture that in some cases, for example the sugar loading facility at South Grafton, have become prominent landmarks for the town.

Plate 2.25: Sugar loading facility in South Grafton and representative examples of industrial developments in Grafton and South Grafton.

2.12 RURAL HINTERLAND

The urban areas of Grafton and South Grafton are surrounded by agricultural areas that comprise the city's rural hinterland. This landscape type has two distinctive characters—the flat open country on the floodplain immediately south of the Clarence River, which is visually exposed and connected to the river; and rolling hills as the land rises further to the south, which have a more enclosed character with long-range views to the river and town.

The rural hinterland is distinguished by the geometric layout of the agricultural fields, which establishes a regular pattern across the landscape irrespective of topography. The geometry of the property boundaries is clearly visible in the landscape through the long straight roads, the fence lines and lines of trees that follow the patterns of land division.

Plate 2.26: View from elevated land along Centenary Drive, across the agricultural floodplain to the newly developing residential areas along Grafton's riverfront.

Plate 2.27: View from elevated land along Centenary Drive, across the agricultural floodplain to Grafton Bridge.

2.13 OPEN SPACE AND RECREATION

Both Grafton and South Grafton are well served by recreational public open spaces. In addition to their public parks, both town centres are directly connected to the Clarence River and the recreational opportunities it affords. The primary public riverfront spaces on both sides of the river are located between the existing bridge and Susan Island, and this section of the river is highly valued as the focus of water-based recreational activities and public events.

The public waterfront on the southern side of the river includes the wharf at Skinner Street, and the bowling club and Ex-Servicemen's Club at Wharf Street. The public waterfront on the northern side of the river incorporates a number of recreational facilities, including a jetty, boat ramp and rowing club at Prince Street and the sailing club at Fitzroy Street. This part of the riverfront also includes a substantial amount of privately-owned land, situated between residential and church properties along Victoria Street and the river. Council's Grafton Waterfront Precinct Masterplan (March 2011) aims to develop continuous public access along the foreshore between Clarence Street and Queen Street, to improve the public recreational amenity of this stretch of the river.

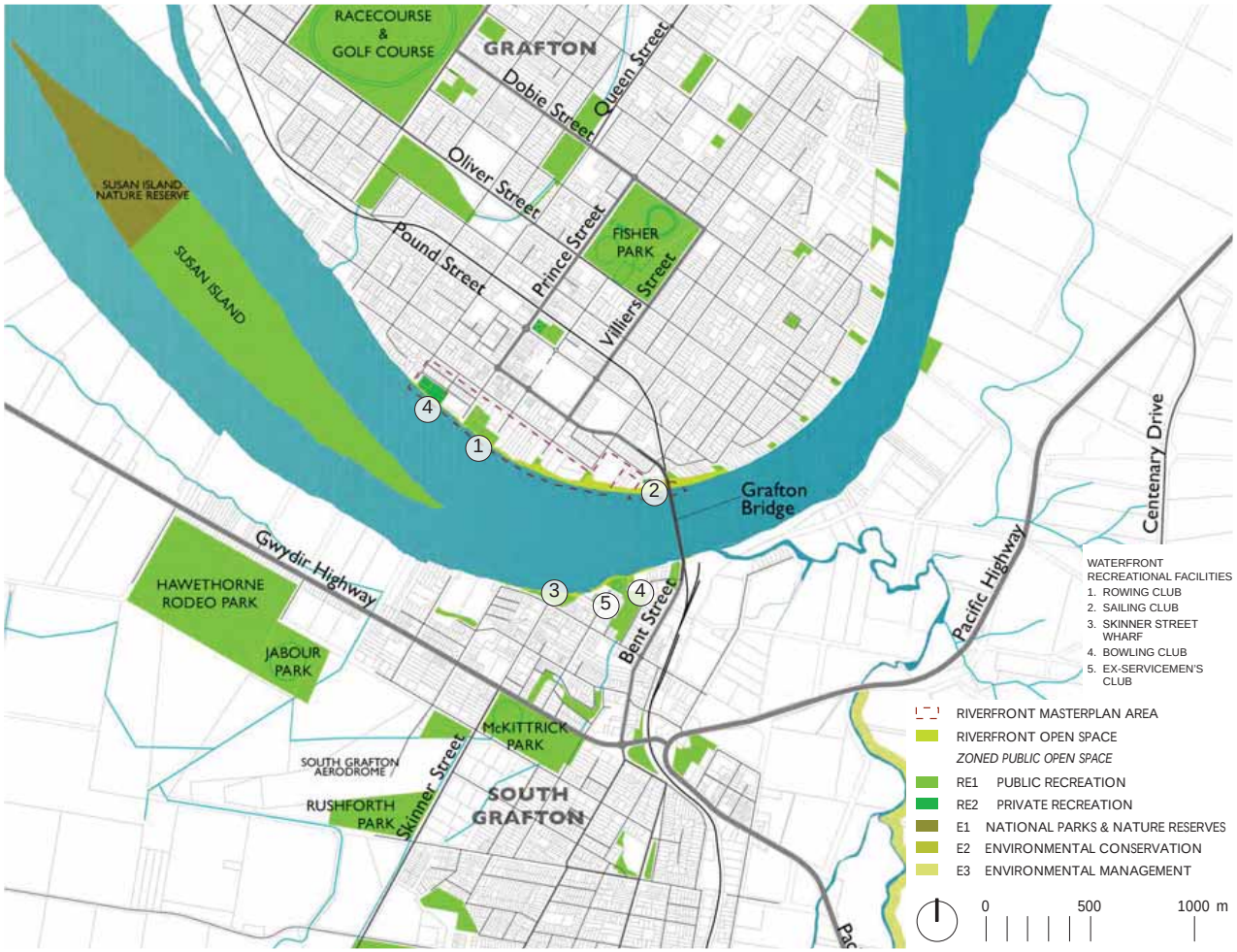


Figure 2.12: Recreation and Open Space areas

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3 PROJECT DESCRIPTION

This chapter provides an outline of the engineering components and design standards used in the development of the concept design of the project, as illustrated in Figure 3.1. A description of the project is provided in Chapter 5 and Chapter 6 of the Environmental Impact Statement. The main components of the Grafton Bridge project include:

- Bridge design, including pedestrian and cycle path.
- Road design.
- Levee upgrade works.

The main elements of the project are shown in Figure 3.1 and Figure 3.2 on the following pages. The description and assessment of the impacts of the levee upgrade works are provided separately in the Environmental Impact Statement.

3.1 PROPOSED BRIDGE AND APPROACH ROADS

BRIDGE DESIGN

The project has been designed in accordance with the Australian Standard for Bridge Design (AS 5100). The general bridge parameters and engineering criteria are summarised below:

- Construction of a new bridge over the Clarence River about 70 metres downstream (east) of the existing road and rail bridge.
- An approach viaduct, about 58 metres long, on the South Grafton side of the Clarence River and 29 metres long on the Grafton side.
- Construction of a single pedestrian and cycle path on the upstream (western) side of the proposed bridge, to provide connectivity between Grafton, South Grafton and the new bridge.
- Construction of new pedestrian links to connect the new bridge with the existing bridge.
- 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 temporary storage of materials.

ROAD DESIGN

The road works component of the project has been designed in accordance with Austroads - Guide to Road Design. The proposed road works components are summarised below:

- 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.
- Upgrades to the road network in Grafton to connect the new bridge to the existing road network, including:
  - ¬ Widening Pound Street to four lanes between Villiers Street and the approach to the new bridge
  - ¬ Providing traffic signals at the intersection at Pound Street and Clarence Street
  - ¬ Closing Kent Street where it is crossed by the bridge approach road
  - ¬ Realigning and lowering Greaves Street beneath the new bridge
  - ¬ Realigning Bridge Street to join directly to the southern part of Pound Street (east of the new bridge approach). There would be no direct connection between Pound Street south and the new bridge approach
  - ¬ Widening Clarence Street to provide formal car park spaces
  - ¬ Minor modifications to the existing Dobie Street and Villiers Street roundabout.
- Upgrades to the road network in South Grafton to connect the new bridge to the existing road network, including:
  - ¬ Widening Iolanthe Street to four lanes
  - ¬ Widening the Gwydir Highway to four lanes between Bent Street and the Pacific Highway
  - ¬ Realigning the existing Pacific Highway to join Iolanthe Street near Through Street
  - ¬ Providing a new roundabout at the intersection of the Pacific Highway and Gwydir Highway
  - ¬ Providing a new roundabout at the intersection of Through Street and Iolanthe Street
  - ¬ Limiting Spring Street and the Old Pacific Highway to left in and left out only where they meet Iolanthe Street
  - ¬ Realigning Butters Lane.
- Replacement of the existing three span concrete arch rail viaduct which crosses Pound Street in Grafton with a single span steel truss bridge.
- Provision of two signalised pedestrian crossings in South Grafton to improve safety for pedestrians crossing Iolanthe Street and Gwydir Highway.
- 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.
- Construction of a permanent stormwater detention basin and pump station in Grafton to manage local flooding.
- Public utilities adjustment.
- Architectural treatments for noise mitigation, as required, where feasible and reasonable and in agreement with affected property owners.
- 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.

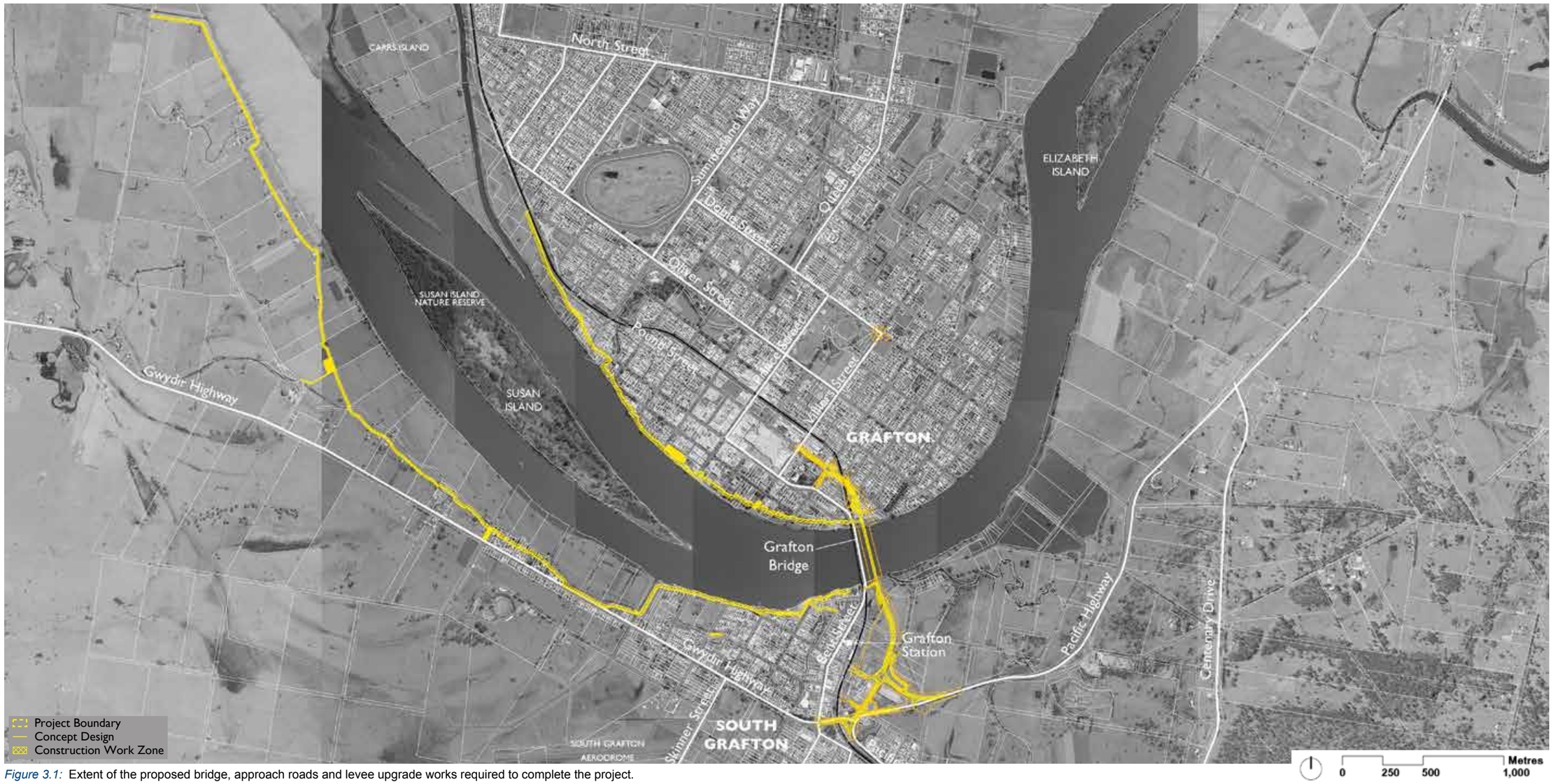

Figure 3.1: Extent of the proposed bridge, approach roads and levee upgrade works required to complete the project.

Figure 3.2: Proposed bridge and road design plan, sheet 1 of 5.

Figure 3.3: Proposed bridge and road design plan, sheet 2 of 5.

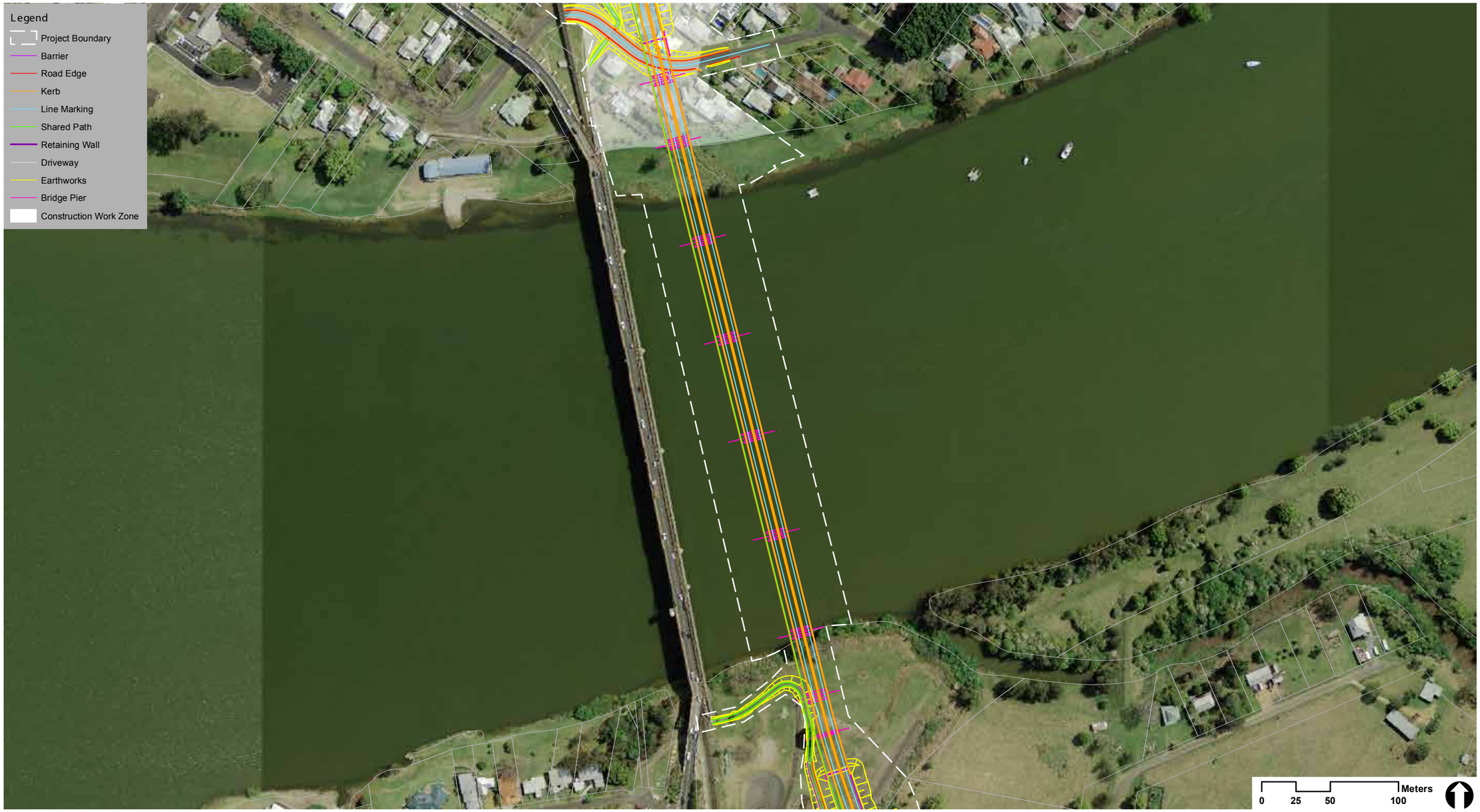

Figure 3.4: Proposed bridge and road design plan, sheet 3 of 5.

Figure 3.5: Proposed bridge and road design plan, sheet 4 of 5.

Figure 3.6: Proposed bridge and road design plan, sheet 5 of 5.