Transport Roads & Maritime Services

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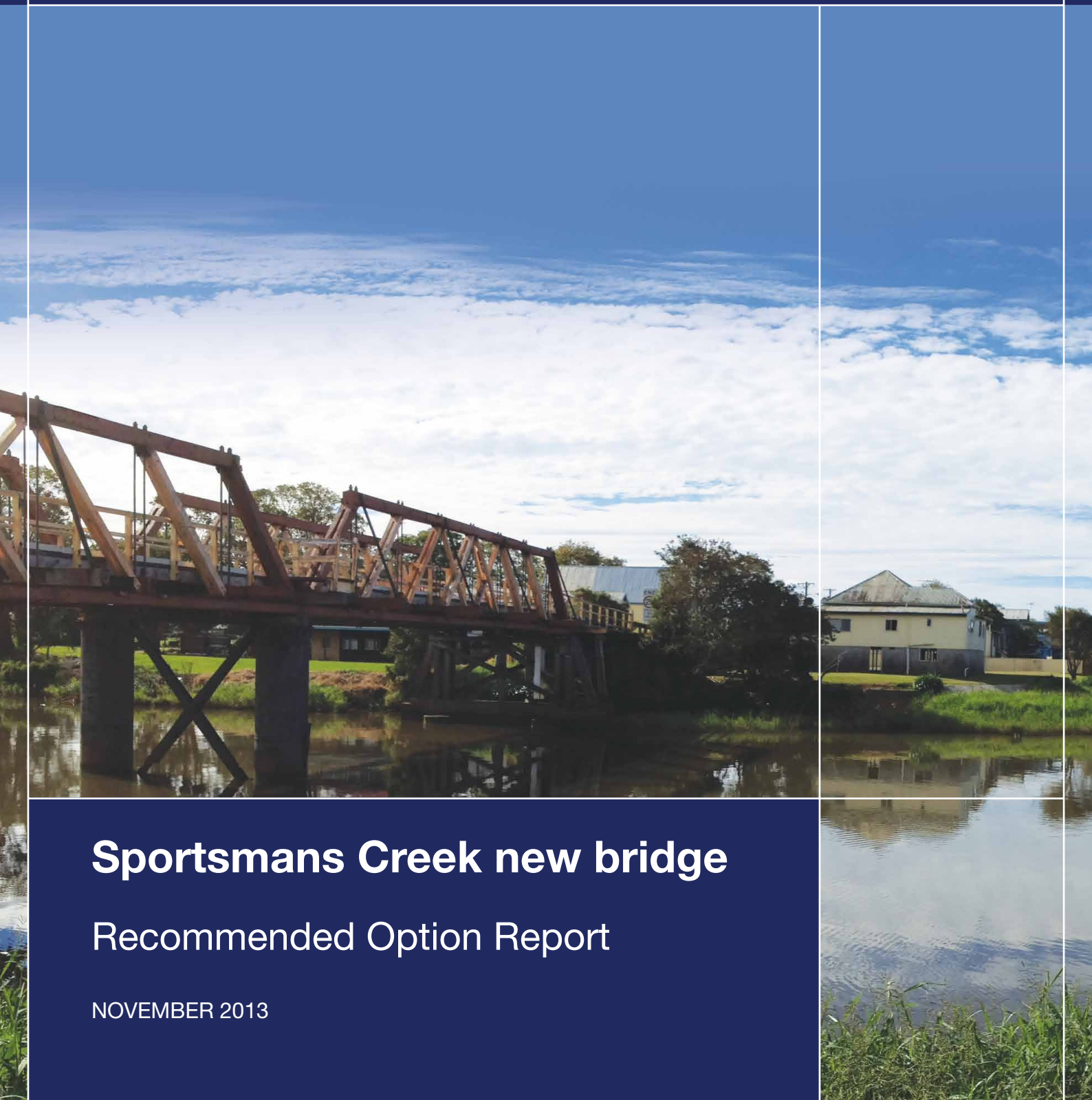

Sportsmans Creek new bridge

Recommended Option Report

NOVEMBER 2013

RMS 13.537

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APPENDICES (AVAILABLE ONLINE AT WWW.RMS.NSW.GOV.AU)

FIGURES

TABLES

Executive summary

Background

Roads and Maritime Services (Roads and Maritime) is undertaking investigations for a new bridge over Sportsmans Creek at Lawrence.

Lawrence is located 25km north of Grafton on the Lawrence Road (MR152) which is managed and maintained by Clarence Valley Council.

Geometry and design limitations of the existing bridge mean it is unable to be safely upgraded to cater for future haulage requirements of local surrounding agricultural industries, two-way traffic and pedestrian access.

Roads and Maritime has developed and published the Timber Truss Bridge Heritage Conservation Strategy for the management of its remaining timber truss bridge stock. As part of this strategy, the Sportsmans Creek bridge has been identified to be demolished and replaced with a modern structure.

The new bridge and associated road works will be handed over to Clarence Valley Council for its ongoing ownership, control and maintenance.

The objectives of the project are:

- Construct a new bridge over Sportsmans Creek, Lawrence
- Enhance road safety for motorists, residents, cyclists and pedestrians
- Improve traffic efficiency within Lawrence
- Improve road transport productivity, efficiency, maintainability and reliability
- Support local and regional economic development
- Allow for safe removal of the existing bridge, in support of the Timber Truss Bridge Conservation Strategy
- Minimise the impact on the natural, cultural, social and built environment
- Consider community members' views
- Deliver value for money
- Facilitate handover of the new bridge and associated roadwork to Clarence Valley Council.

Roads and Maritime has commissioned Kellogg Brown & Root Pty Ltd (KBR) to undertake the development and assessment of options for the Sportsmans Creek new bridge project.

Community comment and technical investigations will help to identify a preferred option.

Community consultation to date

The study area for the project was publicly announced in June 2013 and residents of Lawrence advised by letter which included the background of the project, its objectives and the opportunity for community comment.

Two community drop-in sessions were held on 18 July 2013 and were well attended. The drop-in sessions provided background information on the project and provided community members the opportunity to offer suggestions and identify key areas of concern at an early stage.

The feedback form distributed at the drop-in sessions asked community members to select aspects of the project that were most important to them.

The aspects identified as being most important were:

- Road/pedestrian/cyclist safety
- Impact on business
- Impact on the community (including facilities and services)
- Road transport (efficiency and productivity)
- Impact on property.

Technical and environmental investigations

Preliminary technical and environmental investigations have been undertaken to identify likely constraints and opportunities within the study area.

These technical papers, including a series of constraints maps, were prepared to help assess the options and to ensure all potential constraints were considered and addressed as part of the option development process.

Assessment of options

An initial review of the study area identified three distinct corridors within the project study area as follows:

- Western corridor – All routes west of Grafton Street
- Grafton Street corridor – Bridge crossing centred on the existing Grafton Street alignment
- Bridge Street corridor – Bridge crossing centred on the existing Bridge Street alignment.

Links across Sportsmans Creek were then grouped into these corridors, with the best six chosen to go forward for further assessment.

These concept options were:

- Western corridor – Option 1
- Grafton Street corridor – Option 2, Option 3 and Option 4
- Bridge Street corridor – Option 5 and Option 6

Shortlisted options

The six options were presented for detailed assessment at an internal technical workshop held on 1 August 2013. An assessment of these options was undertaken with consideration given to the project objectives and key constraints of the study area.

The six options were assessed and ranked against the project objectives including road safety, transport efficiency, environment, community views and value for money with the three best performing options selected taken forward for further assessment.

The three options selected were Options 2, 3 and 4.

The following table summarises the ranking of each shortlisted option together with an estimate of cost.

Description	Option 2	Option 3	Option 4
Ranking of each shortlisted option against project objectives	1	3	2
Estimated Cost ($M)	$16.69M	$17.35M	$17.05M

Recommended Option

One option stood out as clearly performing best over all other options and as a result Roads and Maritime has decided to display this option as the recommended option.

The recommended option (Option 2) was found to have benefits when compared to the other shortlisted options as follows:

- Uses existing roads and minimises development on greenfield sites and overall road length
- Maintains passing trade for local businesses
- Connects Flo Clark Park and Sportsmans Park
- Avoids disruption to the boat ramp and allows new access for sail boats
- Delivers value for money
- Minimises impact on natural wetlands
- Reinforces original town plan
- Retains heritage conservation area of Lawrence.

The recommended option, Option 2, is illustrated in Figure 1.

Figure 1 - Option 2, recommended option for a new bridge over Sportsmans Creek

What happens next

This report, advising the recommended option for a new bridge over Sportsmans Creek will be placed on public display for stakeholder and community review and input. Further technical studies will be undertaken to develop the concept design for the bridge, road approaches and urban design.

In particular, community input is sought in relation to:

- Design of the Grafton Street/Bridge Street intersection
- Restoration of the southern end of Bridge Street following demolition of the existing bridge.

The project steps are as follows:

Glossary of terms

AADT	Annual average daily traffic
ABS	Australian Bureau of Statistics
AHD	Australian Height Datum, a common national plane of level approximately equivalent to the height above sea level
AHIMS	Aboriginal Heritage Information Management System
AM peak	Morning traffic peak period, that is, from 7 am to 9 am
ARI	Average recurrence interval, the average or expected value of the periods between exceeding a given rainfall total accumulated over a given duration
ASS	Acid sulphate soils
Austroads	Austroads is the association of Australian and New Zealand road transport and traffic authorities
BCR	Benefit-cost ratio
BOM	Bureau of Meteorology
CBD	Central business district
CMA	Catchment Management Authority
DDA	The Australian Government's Disability Discrimination Act 1992
DP&I	NSW Department of Planning and Infrastructure
EEC	Endangered ecological community
EIS	Environmental Impact Statement
EPA Act	Environmental Planning and Assessment Act 1979
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPL	Environmental Protection Licenses
HML	Higher Mass Limits (HML) is a nationally agreed scheme that permits approved heavy vehicles to operate with additional mass on certain types of axle groups, on a restricted road network and subject to specified conditions
HPAA	High Pedestrian Activity Area
LALC	Local Aboriginal Land Council
LEP	Local environmental plan
LGA	Local government area
MCA	Multi Criteria Assessment
MNES	Matter of National Environmental Significance
Mtpa	Million tonnes per annum
NPV	Net Present Value
OEH	The Office of Environment and Heritage
PAD	Potential Archaeological Deposit

PEP	Protection of the Environment Policies
PM Peak	Afternoon traffic peak period, that is, from 3 pm to 5 pm
POEO	Protection of the Environment Operations
REF	Review of Environmental Factors
RVC	Regional Vegetation Communities
RNP	Road Noise Policy
SEPP	State Environmental Planning Policy
SIS	Species Impact Statement
SEWPAC	Department of Sustainability, Environment, Water, Population and Communities

1 Introduction

1.1 Project background

Roads and Maritime Services (Roads and Maritime) is undertaking investigations for a new bridge over Sportsmans Creek at Lawrence.

Roads and Maritime Services has commissioned Kellogg Brown & Root Pty Ltd (KBR) to undertake the development and assessment of options for the Sportsmans Creek new bridge project.

Sportsmans Creek bridge is located on the southern approach to Lawrence within the Clarence Valley Council local government area. Lawrence is located 25km north of Grafton on the Lawrence Road (MR152) which is managed and maintained by Council.

Roads and Maritime is responsible for the management of the bridge as an “ex-national” bridge and in accordance with the NSW Government Gazette No 83, 1928. The existing bridge over Sportsmans Creek was built in 1911 and is 91.7m in length consisting of three (3) timber beam approach spans and two (2) timber Dare truss spans. The bridge has a carriageway of 5.5m.

Geometry and design limitations of the existing bridge mean it is unable to be safely upgraded to cater for future haulage requirements of local surrounding agricultural industries, two-way traffic and pedestrian access.

Significant seasonal cane haulage activities rely on this bridge for access. A total of 300ha of cane exists to the south of Sportsmans Creek with 40,000 tonnes (3,720 trips) of harvested cane transported across the bridge. This represents about 6% of the harvested cane processed at the Harwood Mill. There is no alternative available should the current bridge be load limited, putting the viability of this important industry at risk.

Roads and Maritime has developed and published the Timber Truss Bridge Heritage Conservation Strategy for the management of its remaining timber truss bridge stock, after conducting public consultation. As part of this strategy, the Sportsmans Creek bridge is proposed to be demolished and replaced with a modern structure.

This bridge has a moderate state significance rating, and s170 listing. There are six other Dare truss bridges that are to be retained in perpetuity by Roads and Maritime, including the nearby Briner bridge in Tucabia as outlined in the Roads and Maritime Timber Truss Bridge Conservation Strategy, July 2012.

The bridge is not listed on the State Heritage Register.

This project will replace the existing crossing, including demolition of the existing timber bridge. The new bridge and associated road work will be handed over to Clarence Valley Council for their ongoing ownership, control, maintenance and inspection.

The study area for the project is shown in Figure 1.1 below.

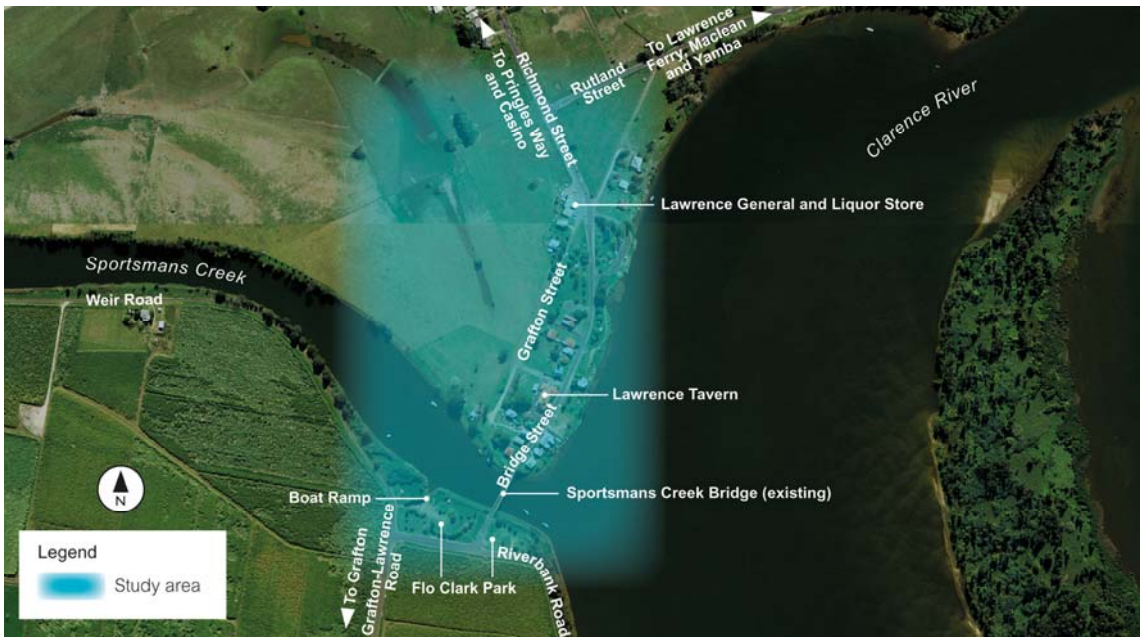

Figure 1.1 - Map of the study area and surrounding streets in Lawrence (Source: Roads and Maritime)

1.2 Purpose of the report

The purpose of this Recommended Option Report is to document and summarise the project processes, methodology, technical and environmental investigations used to shortlist options and provide a recommended option for further investigation and assessment.

This report:

- Describes the existing traffic situation and identifies issues and constraints in relation to constructing a new bridge crossing within the boundaries of the study area
- Describes the existing environment in the Lawrence area and identifies issues and constraints in the vicinity of the study area
- Outlines the development of unconstrained preliminary options identified within the study area during the project workshop held on 26 June 2013
- Documents the assessment method and processes to shortlist options within three corridors
- Outlines the process used to identify a recommended option for a new bridge crossing over Sportsmans Creek.

1.3 Assumptions and limitations

This report is intended to provide information on the existing environment, issues and constraints related to options for a new bridge over Sportsmans Creek.

This report has been developed based on the outcomes of desktop studies, road/bridge design, community consultation, site visits and workshops. As the process for identifying a preferred option progresses, additional investigations, field work and assessments will be carried out to complement the work undertaken to date and further refine the identified constraints within the study area.

2 Project strategic context, need and objectives

2.1 Strategic context

The overarching policies and strategic documents relevant to the Sportsmans Creek new bridge project and to the Clarence Valley local government area are:

- NSW 2021: A Plan to Make NSW Number One (NSW Government, 2011)
- NSW Long Term Transport Master Plan (TfNSW, September 2012)
- Bridges for the Bush initiative (NSW Government 2012)
- Strategic Land Use Plan - Mid-North Coast Regional Strategy (NSW Government 2012)
- Clarence Valley Council - Interim Valley Vision 2024
- Clarence River Way Master Plan - Tourism and Investment Infrastructure Plan (Clarence Valley Council 2009)
- Timber Truss Bridge Conservation Strategy.

2.1.1 NSW 2021: A Plan to Make NSW Number One

NSW 2021: A Plan to Make NSW Number One (NSW Government, 2011) presents the NSW Government's strategy to move the State forward over the next 10 years. It is based on five principal strategies with underlying goals.

The five strategies are:

- "Rebuild the economy – restore economic growth and establish NSW as the first place in Australia to do business;
- "Return quality services – provide the best transport, health, education, policing, justice and family services, with a focus on the customer;
- "Renovate infrastructure – build the infrastructure that makes a difference to both our economy and people's lives;
- "Strengthen our local environment and communities – improve people's lives by protecting natural environments and building a strong sense of community; and
- "Restore accountability to Government – talk honestly with the community, return planning powers to the community and give people a say on decisions that affect them."

The NSW 2021 goals relevant to transport under the plan are to reduce travel times, grow patronage on public transport by making it a more attractive choice, improve customer experience with transport services and improve road safety.

The proposed Sportsmans Creek new bridge project supports the NSW 2021 Plan transport goals by renovating and renewing important community infrastructure, reducing travel times, improving local and through traffic efficiency and improving road safety for the Lawrence locality.

2.1.2 NSW Long Term Transport Master Plan

The *NSW Long Term Transport Master Plan* was released in December 2012 to address key transport challenges that face the State over the next 20 years and put the customer at the centre of everything NSW does in transport.

- The provision of the Sportsmans Creek new bridge supports the NSW Long Term Master Plan by providing essential access to regional NSW and supporting efficient and productive freight movement.

The relevant principles supported by the Sportsmans Creek new bridge project include the focus on provision of essential access to regional NSW and the support of efficient and productive freight.

2.1.3 Bridges for the Bush Initiative

The *Bridges for the Bush* initiative is a commitment from the NSW Government to improve road freight productivity by replacing or upgrading bridges over the next five years at 17 key locations in regional NSW (see Figure 2.1).

Bridges for the Bush initiative includes replacing or upgrading five key priority Higher Mass Limit (HML) deficient bridges on State managed roads and 12 timber truss bridges on State, regional and local roads.

The Sportsmans Creek new bridge project is directly referenced by being an initiative of the State Government's "Bridges for the Bush" Program and has already received government funding.

The Sportsmans Creek new bridge will negate the requirement for ongoing repairs of the existing bridge and remove the current 75 km detour route for HML traffic.

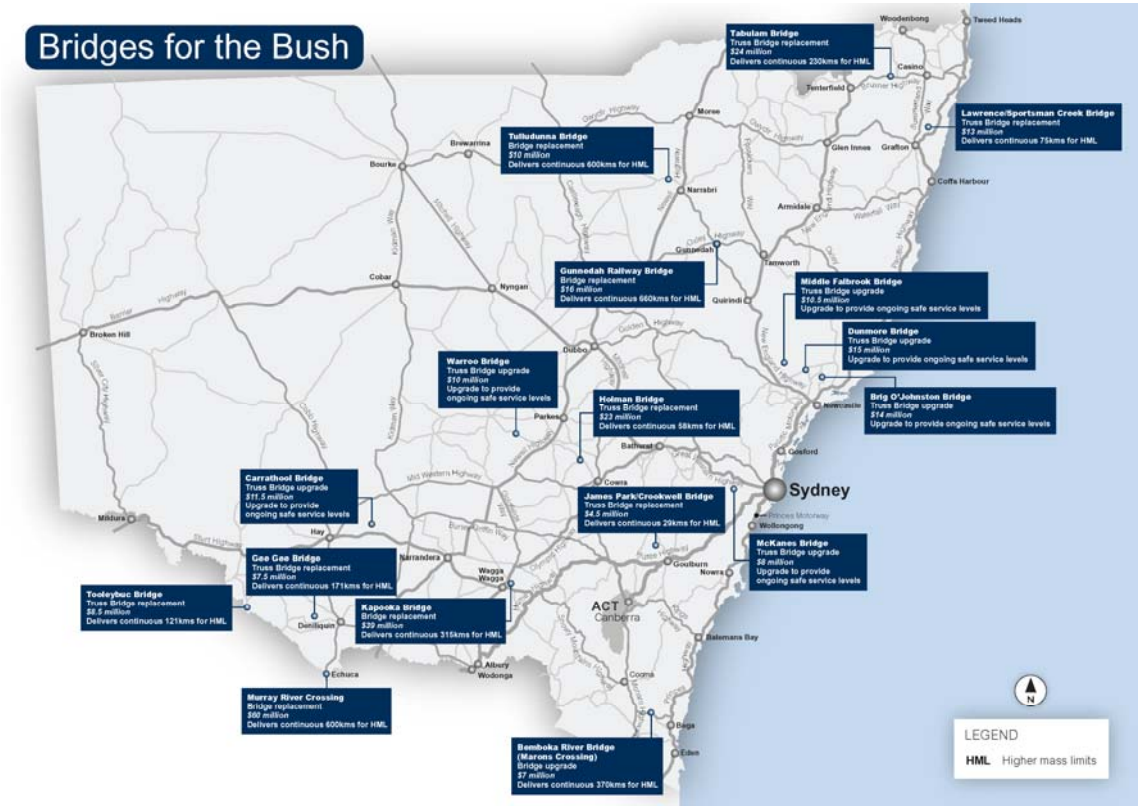

Figure 2.1 - Bridges for the Bush Initiative Map (Source: Roads and Maritime website)

2.1.4 NSW Strategic Land Use Plan – Mid North Coast Regional Strategy

The *Mid North Coast Regional Strategy 2006 - 2031* aims to guide local planning in the eight local government areas of Clarence Valley, Coffs Harbour, Bellingen, Nambucca, Kempsey, Port Macquarie-Hastings, Greater Taree and the Great Lakes (Department of Planning 2009).

The Strategy includes maps of identified growth areas designated to contain expected land in the region over the next 25 years. Lawrence is identified as one of those growth areas.

The proposed Sportsmans Creek new bridge project is an important infrastructure project for the Mid-North Coast region in line with anticipated growth.

2.1.5 Clarence Valley Council – Interim Valley Vision 2024

Valley Vision 2024 is Council's review of the Valley Vision 2020 strategic plan for guiding the area's development for the next ten years with an extended timeframe. It states that the aim for the human habitat is characterised by sustainable communities, supported by efficient and effective transport services.

Goal 11 of the Vision outlines efficient transport and access, including efficient private and public transport systems that connect the local government area with the region and the world. It also aims to have the transport network provide good access to facilities and services in conjunction with the layout and provision of well-serviced settlements.

The proposed Sportsmans Creek new bridge project supports this vision by providing unimpeded access for transport needs including the cane haulage freight task.

2.1.6 Clarence River Way Master Plan - Tourism and Investment Infrastructure Plan

The Clarence River Way Plan was adopted as a priority in the Clarence Valley Economic Development Strategic Plan in 2009 (Clarence Valley Council 2009). Central to its aim is that the Clarence Valley becomes a 'touring region, not a touring route'. It highlights five core themes that represent the Clarence way of life:

- Continuous culture
- Productive landscape
- Life for the river
- Creative community
- History of play.

It is a plan developed to underpin future products, infrastructure, attractions, investment and marketing.

The 'touring region, not tourist route' is the idea of having a much smaller area for touring that provides a flexible approach for visitors, and not the existing plethora of touring routes, almost too many to consider. The proposed touring region is focused on the lower reaches of the Clarence River and its associated attractions at townships in the region, capitalising on the proximity of the Pacific Highway to the river and scenic qualities of Route 22.

One strategic intent is to develop township hubs along the lower reaches of the Clarence River. The opportunities generally outlined for townships include:

- Focus on substantially increasing water-based access as a priority
- Provide a range of land/water interface access points
- Develop a network of river based hubs and pedestrian linkages access to the water.

More specifically, for the village of Lawrence, the opportunities include emphasising the ferry crossing, providing bird hide/interpretation of the wetland from adjacent road reserves and improving public accessibility of waterfront road reserves.

The Sportsmans Creek new bridge project is in line with the strategic intent of this document and its principles with regard to land/water interface and access by improving access to Lawrence and potentially allowing it to develop as a tourism hub off the through road.

2.1.7 Timber Truss Bridge Conservation Strategy

The Timber Truss Bridge Conservation Strategy was completed in July 2012. The strategy was developed to address the long term management of timber truss bridges in NSW. The strategy, undertaken in consultation with the Heritage Council of NSW aims to establish a balance between infrastructure provision and heritage conservation.

The strategy explains that timber truss bridges are expensive to maintain in terms of planning, approvals, materials, maintenance frequency and skilled resources. The strategy also recognises the road network plays a key role in the efficient transport of freight. Timber truss bridges are a major limitation in allowing for more efficient road freight vehicles such as those carrying HML.

The Sportsmans Creek bridge at Lawrence was assessed as part of the strategy. The strategy found that the existing bridge cannot be upgraded to meet future operational requirements.

Under the strategy, the existing bridge is to be demolished and replaced with a new structure.

2.2 The need for a new bridge crossing

The existing Sportsmans Creek bridge is located at the southern approach to Lawrence on Bridge Street, which connects to the Grafton-Lawrence Road. The bridge comprises three timber beam approach spans and two timber Dare truss spans, which were built in 1911.

Geometry and design limitations of the existing bridge means it is unable to be safely upgraded to cater for future haulage requirements of local surrounding agricultural industries, two-way traffic and pedestrian access.

2.3 Project purpose and objectives

2.3.1 Project purpose

To identify and select a preferred option for a new bridge over Sportsmans Creek at Lawrence.

2.3.2 Project objectives

The key project objectives for this project are:

- Construct a new bridge over Sportsmans Creek, Lawrence
- Enhance road safety for motorists, residents, cyclists and pedestrians
- Improve traffic efficiency within Lawrence
- Improve road transport productivity, efficiency, maintainability and reliability
- Support local and regional economic development

- Allow for safe removal of the existing bridge, in support of the Timber Truss Bridge Conservation Strategy
- Minimise the impact on the natural, cultural, social and built environment
- Consider community members' views
- Deliver value for money
- Facilitate handover of the new bridge and associated road work to Clarence Valley Council.

2.3.3 Supporting objectives

To assist in achieving these objectives, the following supporting objectives have been developed:

Improve road safety

- Minimise vehicle conflict points
- Manage construction elements to reduce traffic/access impacts
- Provide a design which requires minimum ongoing operation/maintenance works and minimises the Work Health and Safety (WHS) risk for maintenance personnel.

Improve local traffic efficiency/transport productivity and reliability

- Reduced travel time
- Increase network capacity
- Business/services patronage
- Reduced road freight user costs
- Property access
- Pedestrian and cyclist safety.

Minimise impact on the natural, cultural and built environment

- Minimise visual impact
- Minimise ecological impact
- Minimise impact on heritage
- Minimise noise and air quality impact
- Minimise impact on drainage/water quality/flooding
- Minimise impact on property
- Minimise impact on the social environment.

Provide value for money

- Provide a design that is affordable and within the capital budget for the project
- Provide a justifiable benefit / cost ratio for the life of the structure.

3 Community involvement and feedback

3.1 Public participation

The Public Participation Plan developed for the project outlines communication activities to inform and consult external stakeholders and the broader community in relation to the development and assessment of options.

3.2 Community involvement to date

Community interactions that have taken place on the project include:

- A project email, 1800 phone number and reply paid mailing address were established to provide greater accessibility to the project team.
- A 'Letter to the Householder' was distributed to residents in Lawrence (including post office boxes) during July 2013, inviting members of the community to attend one of two community drop-in sessions. These sessions were also promoted through newspaper advertisements and a press release.
- Community drop-in sessions were held on Thursday 18 July 2013 from 11am-2pm, and 4pm-7pm. Thirty eight people signed in and provided contact details for further project updates and twenty one submitted formal feedback forms either on the day or by post and email. The subsequent submission period closed on 25 July 2013.
- Individual meetings were also held with the Lawrence Historical Society, the owners of the Lawrence Tavern and the owner of the Lawrence General and Liquor Store.
- All community input gathered through the sessions and other channels has been entered into the Darzin stakeholder database and shared with the project team to assist in the development of the project.
- An Early Feedback Summary report was developed and posted on the Roads and Maritime website (see Appendix C).
- Following the drop-in sessions, emails were sent out thanking participants for their attendance requesting completed feedback forms be returned.
- The Roads and Maritime website was updated to thank people for their feedback and explain that there would be opportunities for further input at future drop-in sessions in late 2013.
- Two people submitted feedback forms after the finalisation of the Early Feedback Summary Report.
- In addition to above activities, there have been numerous phone conversations with members of the public, and emails exchanged through the project email address. All correspondence has been replied to promptly within the agreed timeframes and their content recorded in the database.

3.3 Community feedback and issues

Community feedback is an important aspect of the project and all community feedback has been welcomed and considered.

The feedback form distributed at the drop-in sessions asked community members to select aspects of the project that were most important to them. In response to that question, community members who submitted a feedback form, most frequently identified the following five aspects:

- Road safety
- Pedestrian safety
- Impact on business
- Impact on the community
- Community facilities and services.

Figure 3.1 shows the aspects that were selected five times or more.

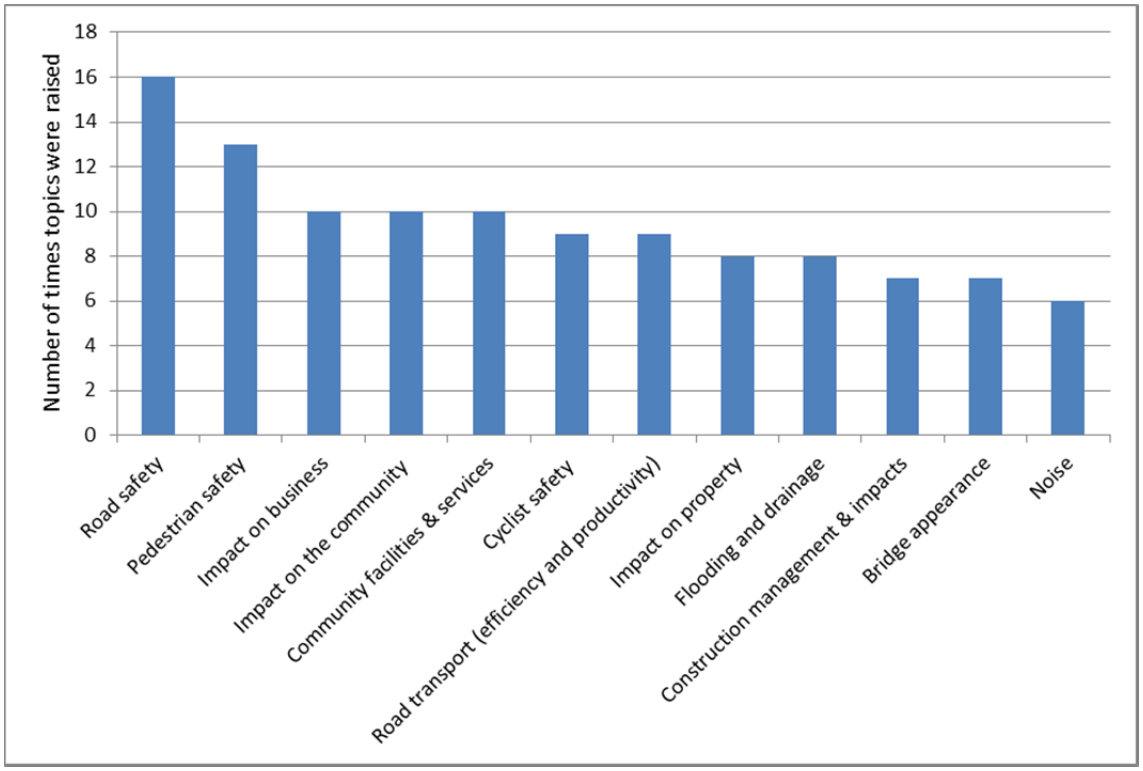

Figure 3.1 - Most important aspects of the project identified on feedback forms completed by community members

All comments recorded within the feedback form in response to various open-ended questions and in discussions at the drop-in sessions were classified by topic. The top five frequently identified topics were:

- Bridge location suggestions
- Flooding and drainage
- Technical specifications for bridge design (e.g. height of new bridge)
- Business and service patronage
- Community facilities and services.

Figure 3.2 shows the top ten most frequently mentioned topics.

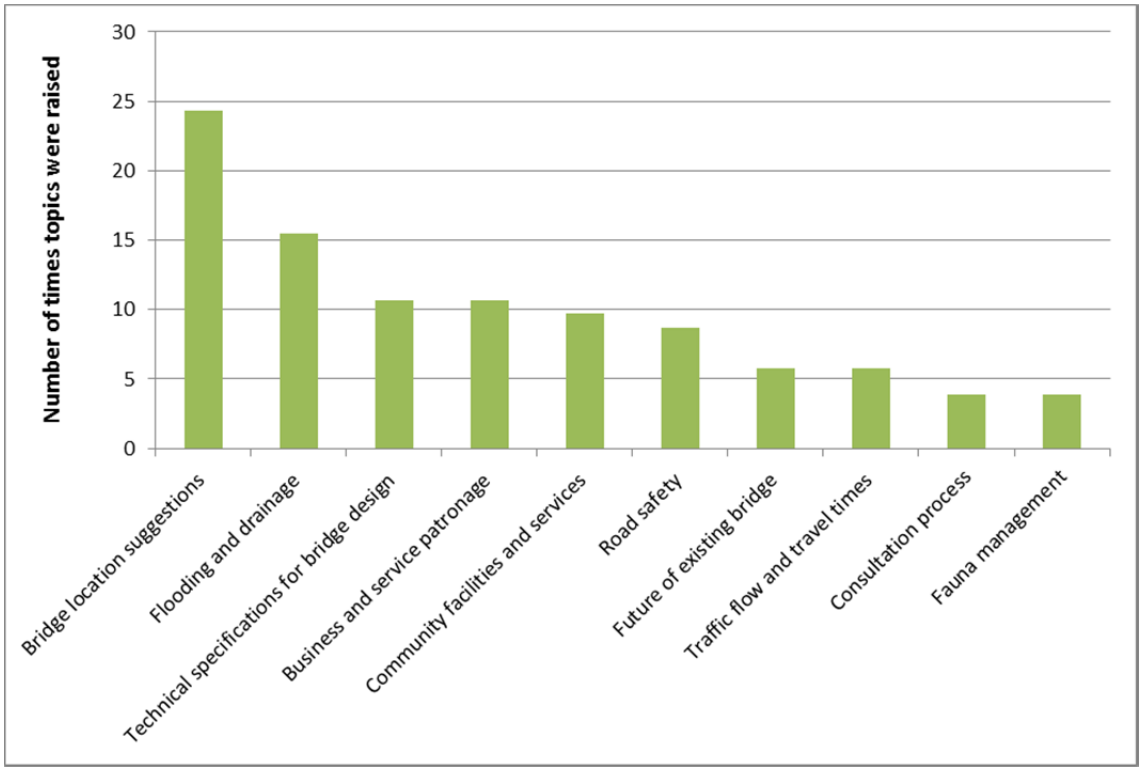

Figure 3.2 - Top ten most frequent topics raised in feedback

A summary of the comments received is documented in Appendix C, Early Feedback Summary Report.

Further public participation activities are planned to take place in December 2013 to present the recommended option. Dates and details will be communicated in the following ways:

- Roads and Maritime website update (www.rms.nsw.gov.au)
- Community Update – letterbox dropped to all resident within Lawrence (postcode 2460)
- Personalised letter to all businesses and property owners within the study area
- Community drop-in sessions
- Face-to-face meetings with businesses, residents and property owners within the study area (upon request)
- Media release
- Advertisements in local newspapers.

Planned public participation activities for the Sportsmans Creek new bridge project is shown in the following Figure 3.3.

Figure 3.3 - Project activity flow-chart

4 Transportation

4.1 Existing transport infrastructure

4.1.1 Regional road network

The Pacific Highway (Route A1) forms the key route in the Clarence Valley and provides a high-capacity road link between Grafton and Maclean and further north to Brisbane.

The Summerland Way (Route B91) forms an inland route linking Grafton with Casino and Kyogle.

Between Grafton and Maclean, the Grafton-Yamba Regional Road (MR152) forms an alternative route to the Pacific Highway, running west of the Clarence River through Lawrence.

Forming part of the alternate route between Grafton and Maclean is a ferry crossing of the Clarence River between Bluff Point in Lawrence and the Woodford Dale Road on Woodford Island, linking with Lawrence Road and MacFarlane bridge to Maclean and beyond to Yamba. The existing Sportsmans Creek bridge forms part of the Grafton-Yamba Regional Road (MR152) Route. See Figure 4.1.

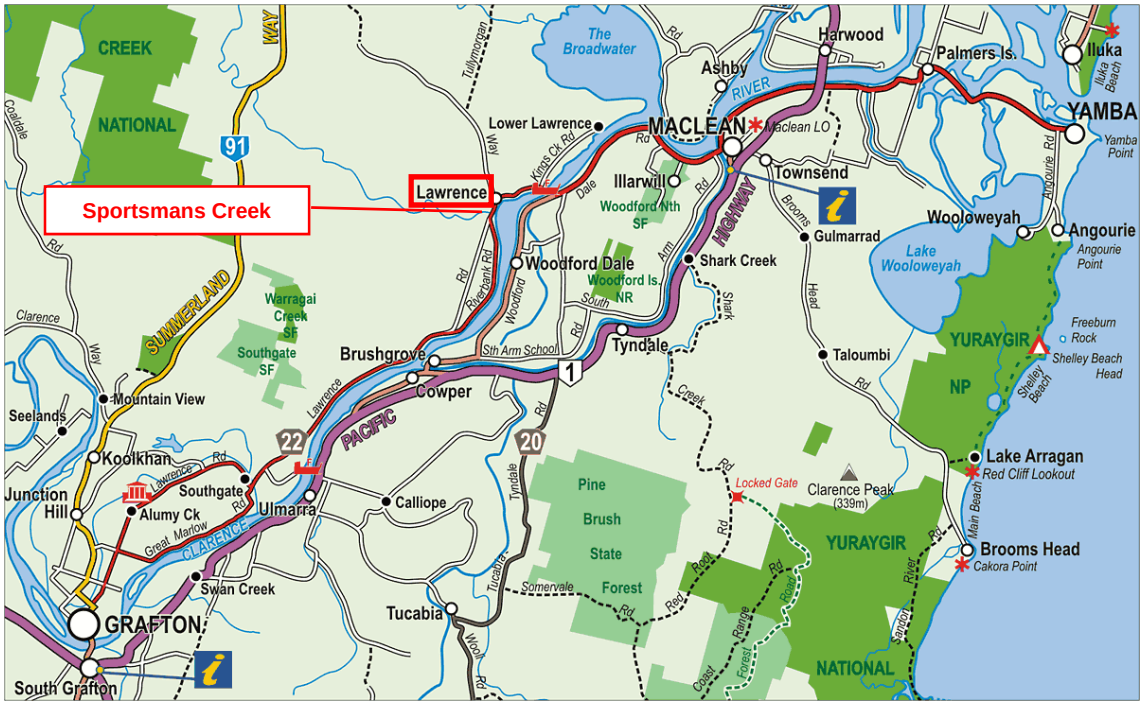

Figure 4.1 - Regional Road Network (Source: Clarence Valley Tourism)

4.1.2 Local roads

Key local roads in Lawrence include Bridge Street, Grafton Street and Rutland Street. Figure 4.2 shows the context of key local roads, key features and the extent of the study area.

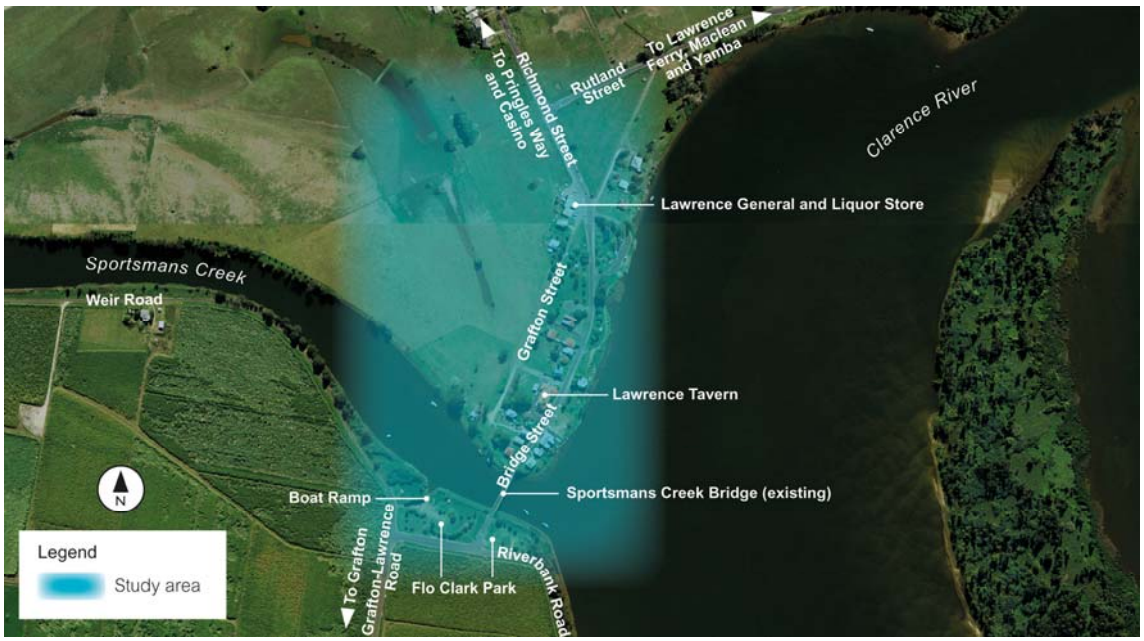

Figure 4.2 - Local Road Network (Source: Roads and Maritime Services)

Bridge Street

Bridge Street is a Regional road providing property access in the Lawrence village centre. It also forms part of the Grafton-Yamba route and as such carries a relatively high volume of through traffic via Rutland Street to the Bluff Point Ferry. It consists of a 10m wide road reserve.

Bridge Street runs in a north-south manner with the existing Sportsmans Creek Bridge at the southern end. Its northern end intersects with Rutland Street and Grafton Street where the Lawrence General and Liquor Store is located.

Figure 4(i) shows an image of the Grafton-Lawrence Road, looking north. Figure 4(ii) shows an image of Bridge Street immediately north of Sportsmans Creek Bridge.

Grafton Street

Grafton Street runs parallel and to the west of Bridge Street, with the southern end terminating at the approach to Sportsmans Creek. It consists of a 20m wide road reserve.

Grafton Street is a local road and provides access to properties fronting Grafton Street and rear access to properties on Bridge Street. The western side of Grafton Street is largely undeveloped.

Figure 4(iii) shows an image of Grafton Street looking north towards the Lawrence General and Liquor Store.

Rutland Street

Rutland Street provides the link to the Bluff Point Ferry about 1 kilometre north east of the Lawrence village centre.

Figure 4(iv) shows an image of Rutland Street from the vicinity of the Richmond Street/Bridge Street intersection.

Figure 4(i) - Grafton-Lawrence Road (looking north)

Figure 4(ii) - Bridge Street (looking north)

Figure 4(iii) - Grafton Street (looking north)

Figure 4(iv) - Rutland Street (looking north)

4.1.3 Traffic volumes

Traffic volume counts undertaken by Roads and Maritime in February 2013 indicate that the Annual Average Daily Traffic (AADT) across Sportsmans Creek bridge is 1,032 vehicles per day, of which about 7.4 per cent are heavy vehicles.

The AM peak hour occurs between 8:00 and 9:00, with an average of 96 vehicles recorded over the survey period. The weekday AM peak volume was 116 vehicles for both directions. The recorded PM peak hour was between 4:00pm and 5:00pm, with about 91 vehicles on average.

Figure 4.3 shows the hourly variation of traffic volumes across Sportsmans Creek bridge in February 2013.

Previous counts undertaken in 2002 indicate that the traffic volume measured 1061 vehicles per day (vpd), with heavy vehicles comprising 10.2% of the volume. While not specifying when in 2002 the counts were undertaken, it is understood that heavy vehicle traffic is influenced by seasonal sugarcane haulage activities (June – December).

Significant seasonal cane haulage activities rely on this bridge for access. A total of 300ha of cane exists to the south of Sportsmans Creek with 40,000 tonnes (3,720 trips) of harvested cane transported across the bridge.

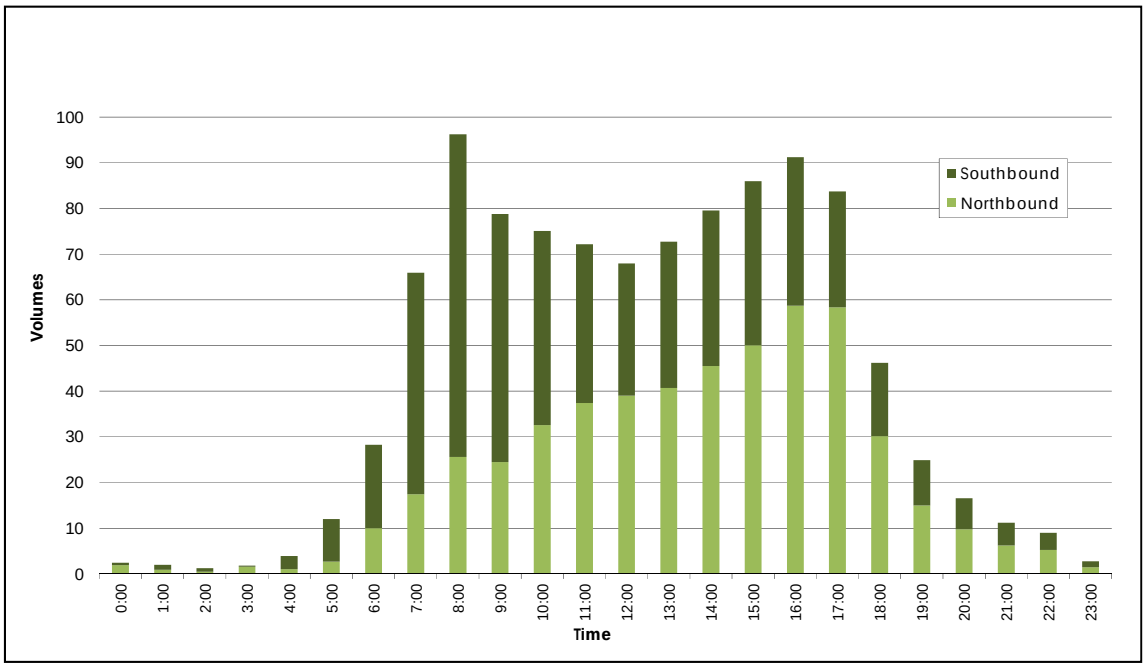

Figure 4.3 - Average Hourly Traffic Volumes (06 -19 February 2013)

4.1.4 Bluff Point Ferry

The Bluff Point Ferry is a cable ferry linking Rutland Street and Bluff Point on the Lawrence side and the Woodford Dale Road – Lawrence Road junction on Woodford Island. It forms part of the transport link between Lawrence and Maclean along Tourist Drive 22 and is used by more than 800 vehicles daily which accounts for between 70 and 80 per cent of the volume on Sportsmans Creek bridge.

The ferry operates 24 hours a day, seven days a week. The ferry stops for maintenance every Tuesday from 9.30am to 11am. However, there is no interruption to service during maintenance periods as two ferries are available at this crossing.

The Bluff Point Ferry has recently been upgraded to provide higher capacity in what is reputed to be the busiest vehicle ferry crossing in Australia. From the previous 35,000 vehicles a month, the ferry's capacity is now 46,800 vehicles a month.

Figure 4.4 shows the river crossings for the Bluff Point Ferry and Sportsmans Creek bridge at Lawrence.

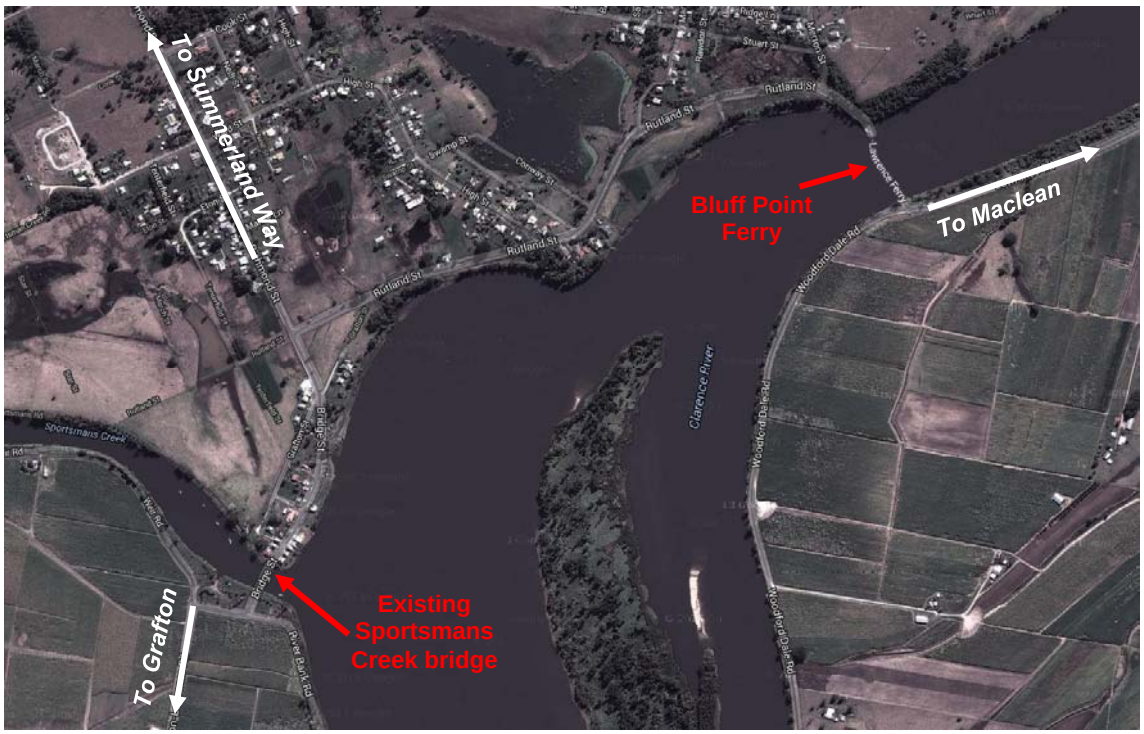

Figure 4.4 - River Crossings at Lawrence

4.1.5 Public transport

Lawrence Bus Service operates two routes in Lawrence:

Route 384: Lawrence to Grafton

- A daily weekday AM service to Grafton departing at 7:45 and arriving at 8:30
- An additional Town Bus AM service to Grafton on Tuesdays and Fridays, departing 9:30am and arriving at 10:10am
- A daily weekday PM service from Grafton departing at 3:10 and arriving at 4:10
- An additional Town Bus PM service from Grafton on Tuesdays and Fridays, departing at 2:00 and arriving at 2:30
- No services operate on public holidays.

Route 385: Lawrence to Maclean

- A daily weekday AM service to Maclean departing at 7:45 and arriving at 8:45
- An additional Town Bus AM service to Maclean on Thursdays, departing 10:30am and arriving at 11:00am
- A weekday PM service from Maclean at departing at 3:20 and arriving at 4:10
- An additional Town Bus PM service from Maclean on Tuesdays and Fridays, departing at 2:00 and arriving at 2:30
- No services operate on public holidays.

Site observations indicate that the main bus stop in Lawrence is outside the Lawrence General and Liquor Store, although no formal bus passenger facilities are provided.

4.1.6 Walking and cycling

There are no designated cycleways in Lawrence and no footpaths exist in the study area.

4.1.7 Crash statistics

Crash data will be sourced by Roads and Maritime for input to the final traffic study.

4.1.8 Traffic growth

Based on a review of previous traffic counts in Lawrence, future traffic growth over the period 1970 to 1990 was at an average of 1.1 per cent per annum. More recent traffic counts undertaken in 2002 indicated that traffic volume over the bridge is expected to increase at an annual growth rate of 2.5% per annum for the next 25 years.

4.2 Transport and traffic issues

Key transport and traffic issues and constraints that need to be considered for the Sportsmans Creek new bridge include:

- Road safety
- Traffic capacity
- Integration with the user and community needs
- Constructability.

4.2.1 Road safety

Pedestrian facilities

One of the key design objectives for the new bridge at Sportsmans Creek is to provide a 2.5 metre shared path to accommodate pedestrians and cyclists on the downstream side of the bridge.

The provision of a pedestrian and cyclist shared path on the new bridge would positively contribute towards improving the level of safety for the pedestrian and cycling environment.

Design speed

A careful balance needs to consider the transition from a less restricted traffic environment through a straight alignment of the bridge and approaches versus a lower speed that would cater to the safety needs of pedestrians and cyclists share the bridge.

Sight lines

The current bridge alignment has sub-standard sight distances which reduces the level of safety. The new bridge alignment will consider sight lines which provide a higher level of road safety.

4.2.2 Traffic capacity

Traffic growth

The design and alignment of the Sportsmans Creek new bridge will incorporate increases in traffic through growth in normal economic activities, as well as growth opportunities identified in a number of strategies and policies that have an impact on Lawrence. These include Council's vision and the anticipated growth in tourism traffic as part of the Clarence River Way Strategy.

Investigations undertaken for the upgraded ferry at Bluff Point will be considered, as the traffic demand for the Sportsmans Creek new bridge and the upgraded Bluff Point Ferry are intertwined. It is noted that the detour for heavy vehicles which cannot use the existing Sportsmans Creek bridge is more than 75 kilometres.

Seasonal variation

Traffic demand in Lawrence, particularly by heavy vehicles increases significantly during the sugarcane harvest season. Activities relating to sugarcane harvest are scheduled, as equipment and heavy vehicle fleet capacities also play a role in controlling the peaks.

Intersection operations

The approach to the existing bridge from the south incorporates two 90-degree turns that slow down traffic speeds on the approach to the town.

The alignment of the new bridge and approach roads will consider how the intersections operate to facilitate key traffic flows along established desire lines, at the same time ensuring that other traffic movements are not delayed beyond acceptable limits.

Changes to the current alignment may have an impact on the Bridge Street/Grafton Street/Richmond Street and the Richmond Street/Rutland Street intersections towards the north of the study area. Towards the south of the study area, the configuration of intersections with the Grafton - Lawrence Road and Riverbank Road will be considered.

4.2.3 Integration with user and community needs

Key desire lines

It is noted that a considerable portion, estimated to be at least 70 to 80 per cent of the traffic on Sportsmans Creek bridge use the Bluff Point Ferry. It could therefore be considered that a key desire line for the bridge alignment would be to link with Rutland Street.

This would need to be assessed against other objectives for the new bridge, including providing local access to Lawrence village.

Land use integration

In selecting options for the new bridge it is important to consider how it integrates with existing and desired land uses in the surrounding area, particularly for the southern section of Lawrence village.

Consideration will be given to how the location of the Lawrence General and Liquor Store is integrated into the new bridge alignment, given that it is a major destination for residents, as well as passing trade.

One particular issue that needs careful consideration are the petrol facilities operated by the Lawrence General and Liquor Store and how vehicles safely access and use this location.

Public transport route integration

Currently, the bus service to Lawrence runs along Bridge Street to service the local village.

The opportunity for providing a link to the local road network needs to be considered so that bus routes can efficiently run through a new bridge alignment without the need for unnecessary detours.

4.2.4 Constructability

Traffic management during construction

Transport links across Sportsmans Creek will be maintained during the construction of the new bridge.

The northern link with Rutland Street and the southern link with the Grafton-Lawrence Road need to be managed during construction of the new bridge, regardless of the option selected.

Construction access routes

The new bridge structure will require construction vehicles including heavy vehicles. Consideration will be given to the identified heavy vehicle access to the construction site on Sportsmans Creek.

5 Existing environment and constraints

5.1 Landscape and urban character

This section summarises the landscape and visual constraints that apply to the selection of an option for a new bridge over Sportsmans Creek. The detailed technical paper is located in Appendix D1 and D2.

5.1.1 Landscape context

The landscape setting of the project's study area is defined by key elements including township (the higher village), heritage village, ephemeral wetlands, waterways and sugarcane fields. These elements define the pattern of the landscape setting and are shown in Figure 5.1.

Township

The main village of Lawrence is situated on the mid and upper slopes north of the older settlement of the study area. This area is on a ridgeline that affords views of the Clarence River and surrounding lower areas including wetlands, rural areas, Sportsmans Creek and sugar cane areas. The village is spread over a wide area and is characterised by low built form elements typically one to two storeys in height.

Heritage village

The Heritage Conservation Area of Lawrence is located along the western bank of the Clarence River at this location and is focused on Bridge Street. This area with a number of heritage properties, combined with the bridge structure, creates a memorable gateway setting as the entry point into town from the south. This entry point is defined by the bridge, historic buildings as well as open space/parks that provide a strong visual and spatial relationship with the Clarence River.

The visual relationship is considered significant as it strongly contributes to the sense of place and character and provides a strong sense of arrival that partly defines the impression of the town.

Ephemeral wetlands

These areas surround the higher village and form a distinctive, strong green lush cordon along the western edge of town that highly contrasts with the otherwise relatively semi-arid landscape.

Waterways

The waterways are defined by the Clarence River and Sportsmans Creek. The wide waterways of the Clarence River offer expansive vistas including views to Woodford Island that underpin the high quality of the setting and natural beauty of the area and strongly contribute to the identity of the township. Sportsmans Creek, a rather narrow tributary/water element in comparison to the expanse of the river, provides a more intimate character and has a limited interface with the village.

Sugarcane fields

Further afield and towards the east and south across the waterways, sugarcane fields dominate the setting. These fields are located within the low-lying land adjacent to the waterways and are characterised by the green uniformity of the fields.

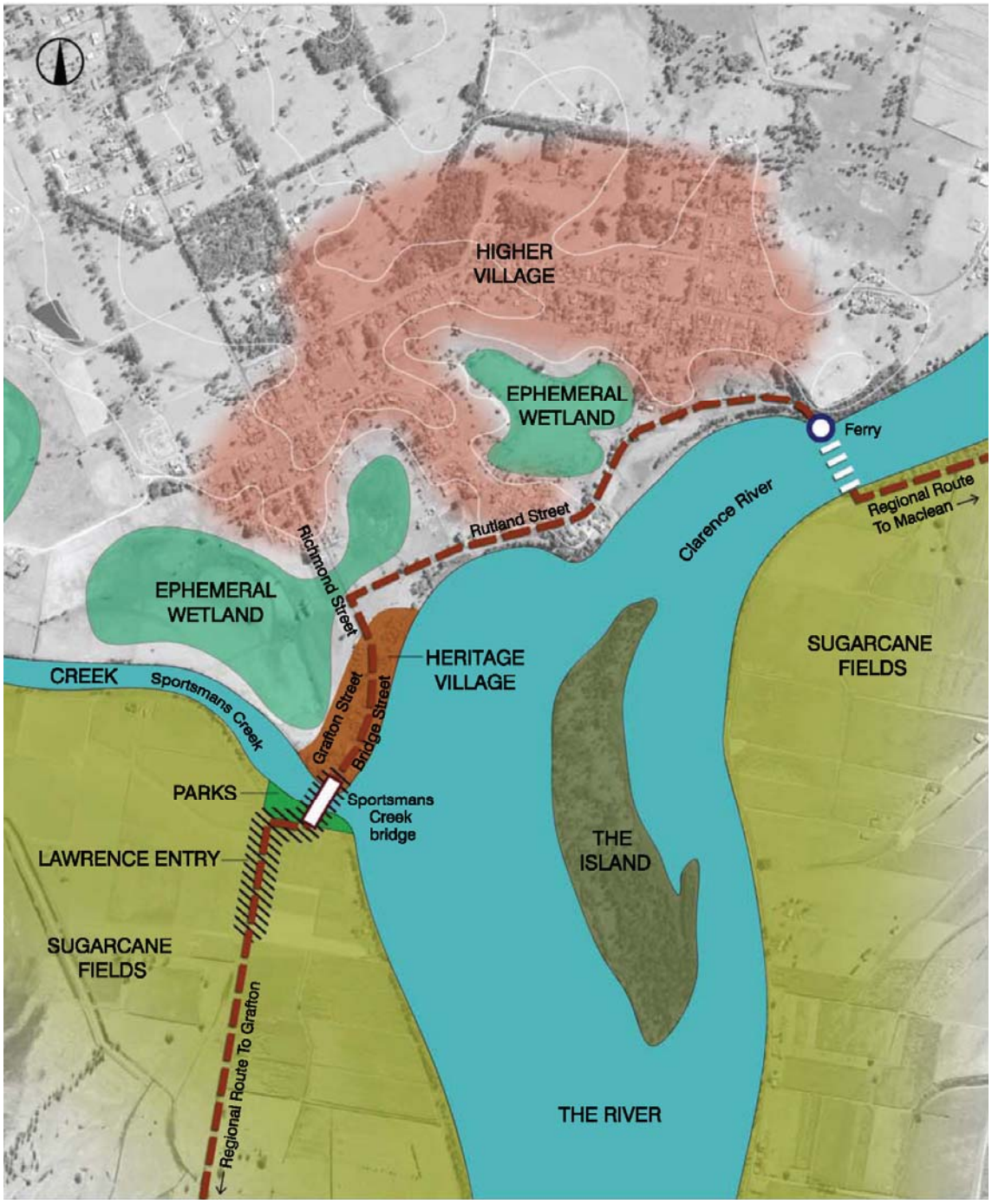

Figure 5.1 - Landscape settings

5.1.2 Landscape characteristics

The following key landscape characteristics have been identified within and around the study area based on preliminary information available and the site visit undertaken. These key characteristics include landscape and built form elements which contribute to the sense of place within the village of Lawrence as shown in Figure 5.2.

Higher ground

The higher ground to the north of the village forms the skyline setting and commands views down onto the floodplain, waterways and heritage village below.

Drainage lines

There are many drainage lines, some defined, others broader and the general direction of fall is shown in Figure 5.2. They run into the ephemeral wetlands which provide ecological and bird habitat to the west and north of the subject site.

Salt Marsh, sea grass and wetlands

The study area is in the vicinity of seagrass beds, wetlands of national significance and saltmarsh areas. All three areas provide bird habitat and the location of a bridge should consider potential impacts upon these areas, or to adjacent areas.

The Clarence River Way Masterplan highlights the need to improve public accessibility to the waterfront road reserves, and to provide bird hide/interpretation of wetlands from road reserves (Clarence Valley Council 2009).

Significant trees

There are mature Eucalypts and other trees/vegetation within and around the study area (beyond the salt marsh, and wetland vegetation and park areas) that provide high landscape value to the village and overall setting of the area. Key trees/vegetation from a landscape/visual point of view includes:

- Mature Eucalypts in the vicinity of Grafton Street
- Avenue plantings to the northern end of Grafton Street
- Indigenous vegetation along Sportsmans Creek banks (Refer to Appendix I).

Open space/recreation areas

There are three main open space/recreation reserves in the village area, (LEP) including Ogilvie Park (outside of the study area), Lawrence Memorial Park and Flo Clark Park. In addition, there is Sportsmans Park, which whilst it is not allocated as “recreation” in the LEP, is situated at the mouth of the creek, and opposite bank to the village.

Ecological resource - bridge and wetlands

The ecological value of the waterways surrounding the site, including the ephemeral wetlands to the west of the study area and the habitat provided by the bridge for the Large Footed Myotis and Eastern Osprey (Refer to Appendix I).

Sportsmans Creek is also a key fish habitat breeding ground.

Heritage precinct

The small scale of the village, the 10m wide road reserve of Bridge Street and relationship of the village to water are all elements that require a sensitive approach to planning and designing a new bridge and road infrastructure. The bridge provides an iconic gateway to the township. Houses are predominantly weatherboard and most have been raised due to flooding.

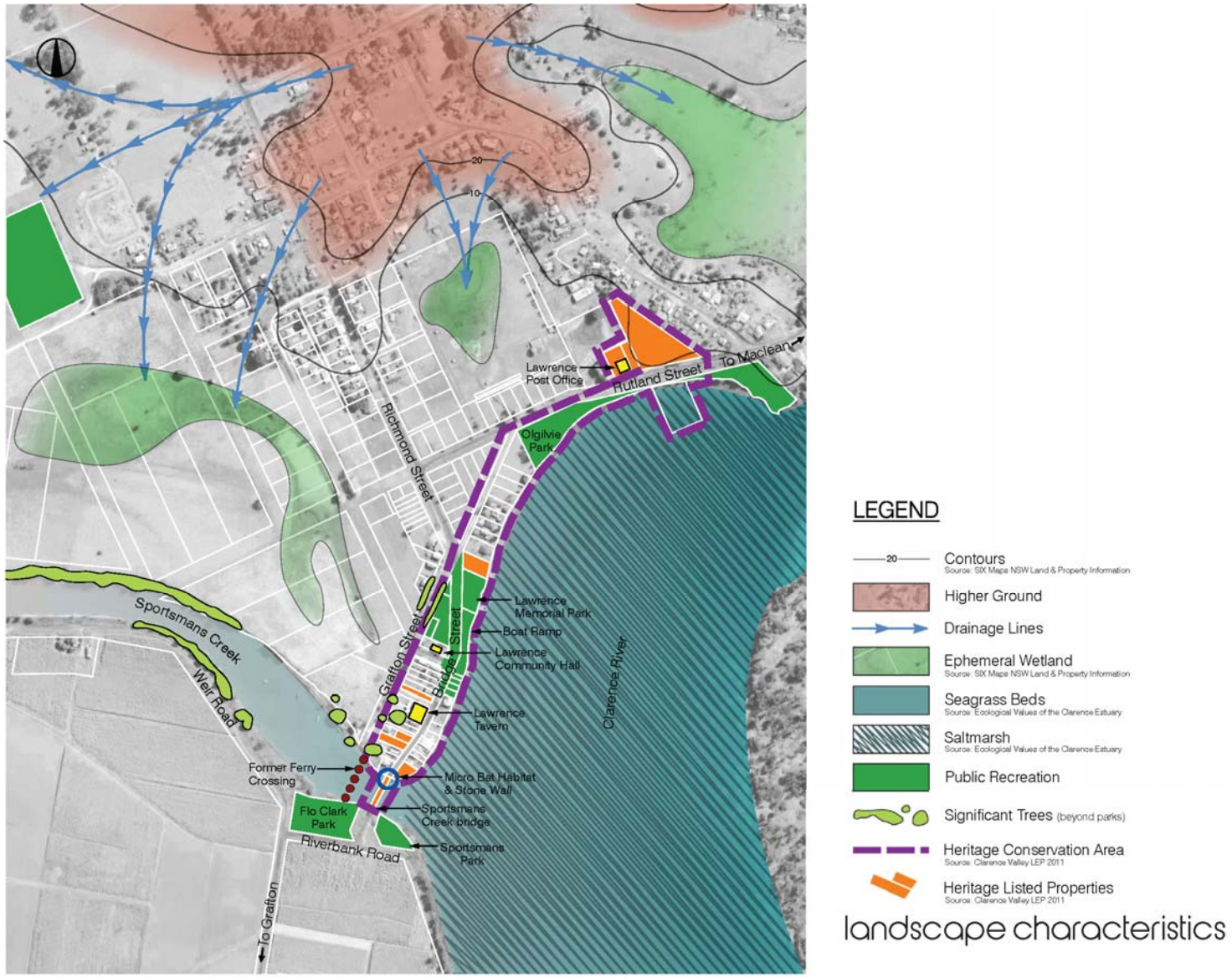

Figure 5.2 - Landscape characteristics

5.1.3 Opportunities and constraints

Figure 5.3 identifies the key opportunities and constraints of the study area and surrounding context. The key elements relevant to the assessment of preliminary options are summarised below.

Heritage conservation area

This area requires sensitive attention to ensure that any proposals do not adversely impact upon the character of the village, including built form and landscape elements. Widening Bridge Street for example from 10m to 20m for example, would have a high impact upon the character of the village and change its sense of place as many dwellings would be impacted.

Grafton Street

This street was originally planned as the main street, as seen from the original 1902 town plan. The road has a 20 m wide reserve, has some large trees set back from the pavement edge and follows the alignment of the previous ferry across Sportsmans Creek. The trees to the east and west of the Grafton Street interface with the water and should be retained as much as practical.

Park consolidation

In the long term, with the removal of the existing bridge, there is the opportunity that Sportsmans Park and Flo Clark Park be consolidated into one park area, as the bridge, the current divider between these spaces, would be removed. This would change the nature of Sportsmans Park and with careful earth shaping and planting design, the two parks could be seamlessly linked, thereby improving recreational opportunities for the community and consolidating green space.

Environmental and heritage interpretation

There are many natural and cultural resources present in the study area. As the bridge location is at the meeting point of the sea grass and salt marsh areas, the area also provides ideal opportunity for saltwater plant interpretation.

Ephemeral wetlands

These ephemeral wetlands are an important ecological resource and form an important visual resource for the town. They are viewed from the higher slopes of the more densely populated areas of Lawrence. Any disturbances should be minimised in these areas.

Pedestrian accessibility

Any future plans should address the need for safe and convenient access to the foreshore area. At present the main traffic runs along Bridge Street.

The design for a new bridge and roadway infrastructure offers opportunity to improve upon the existing situation. There is potential for creating a slow speed environment with strong, legible links between the town and river foreshore.

Streetscape improvements

The proposed project provides opportunity for streetscape improvements to the two cross streets, as well as for Bridge Street.

Northern entry

There is potential to define a northern entry point to the village, in the vicinity of the Lawrence General and Liquor Store. Views towards the park and riverside should be retained where possible, car parking design is to enhance the legibility, quality and safety of this location.

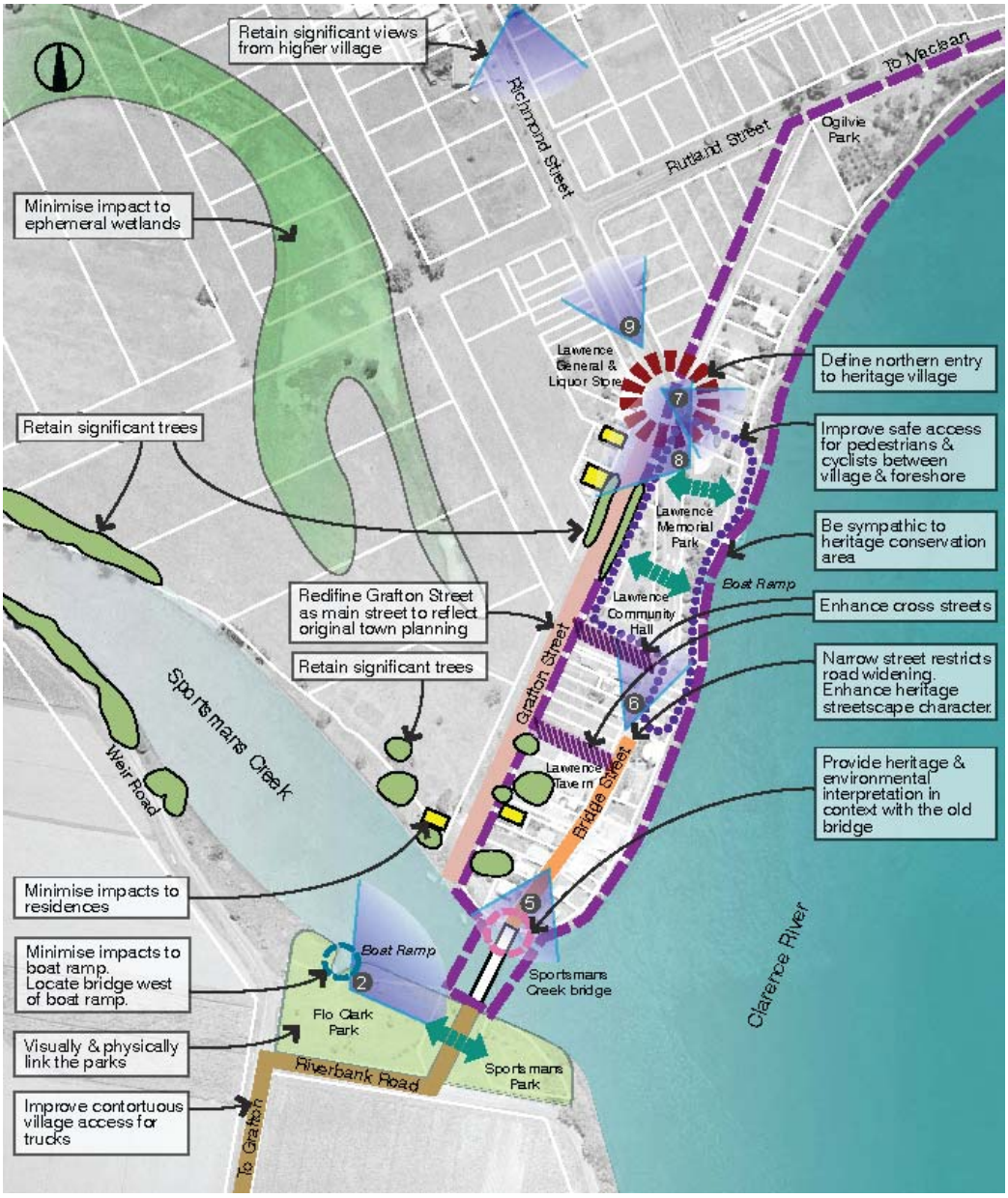

Figure 5.3 - Landscape opportunities and constraints

5.2 Planning and zoning

This section summarises the land use and planning requirements for input to the development of options for a replacement bridge over Sportsmans Creek. The detailed technical paper is located in Appendix E.

5.2.1 Planning framework

The Sportsmans Creek new bridge project falls within the definitions of 'road infrastructure facilities' under Division 17, Reg 93 of the *State Environmental Planning Policy (Infrastructure) 2007* (Infrastructure SEPP 2007). Under the Infrastructure SEPP 2007, Reg 94 states that development for the purposes of road infrastructure facilities by or on behalf of a public authority is permissible without development consent.

This means the project is not subject to the provisions of Part 4 of the Environmental Planning and Assessment Act, 1979 (EP&A Act) but instead is defined as an 'activity' under Part 5 of the EP&A Act.

Part 5 of the EP&A Act permits the environmental assessment and determination of an 'activity' by a 'determining authority'. Under Section 110 of the EP&A Act, a determining authority can be a public authority which includes the NSW Roads and Maritime Services Authority (RMS) (the proponent).

Under Part 5 of the EP&A Act, Section 111 states that a determining authority has a duty to consider the environmental impacts of an activity and is required to 'examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment' as a result of the activity.

Given these planning provisions and the requirements of Part 5 of the EPA Act, Roads and Maritime must consider the environmental impact of an 'activity' under Sections 111 and 112 of the EP&A Act. This would most likely be in the form of an environmental assessment (Review of Environmental Factors (REF)). This environmental assessment would determine the need for further more detailed environmental assessment (EIS) and or Species Impact Statements (SIS). At this stage, it is envisaged that this further detailed environmental assessment would not be required.

As part of the environmental assessment under Part 5 of the EPA Act, the project may require consideration of approvals, permits and licenses under other State environmental legislation. Relevant legislation is summarised in Table 5-1.

Table 5-1: Relevant Legislation

Legislation	Responsible Authority	Aspect of development
Environment Protection and Biodiversity Conservation Act 1999 (Cth)	Commonwealth Minister for Environment, Department of Sustainability Environment and Water, Population and Communities (SEWPAC)	Referrals to Minister for any potential 'controlled actions', being impact on any Matters of National Environmental Significance (MNES). None identified at initial concept stage.
Native Title Act 1993 (Cth)	Given the extent of public lands and the presence of leasehold lands in the study area, Native title may still exist over parts of the study area. Native title is not extinguished over leasehold land.	Search of the National Native Title Tribunal registers will identify if there are any current registered claims or any determined claims of native title over the study area.
Fisheries Management Act 1994	Minister for Primary Industries (Fisheries and Aquaculture), Department of Primary Industries)	Conserve biological diversity of fish and marine vegetation and promote ecologically sustainable development and activities. Notification for dredging or reclamation and permit to harm marine vegetation any waterway barrier works or weirs. Sportsmans Creek is included as a

Legislation	Responsible Authority	Aspect of development
		Key Fish Habitat (KFH) as defined under FM Act.
Native Vegetation Act 2003	Local Catchment Management Authority (Northern Rivers CMA) and the Minister for Environment and Heritage (Office for Environment and Heritage)	Permits for clearing of native vegetation. Section 25 exemptions apply to the proposed project
Threatened Species Conservation Act 1995	Minister for the Environment and Heritage (Office for Environment and Heritage)	If potential threatened species are present or likely, 7 Part assessment of significance with threatened species, populations and ecological communities.
National Parks and Wildlife Act 1974	Minister for the Environment and Heritage (Office for Environment and Heritage)	Conservation of fauna, native plants, threatened species, and Aboriginal cultural heritage and relevant assessment and approvals to disturb.
Water Management Act 2000	Minister for Water, (Office of Water, Department of Primary Industries)	To protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality.
Protection of the Environment Operations Act 1997	Minister for the Environment and Heritage (NSW EPA)	Regulation of Scheduled activities under the POEO Regulations 2008. Issuing of EPLs.
Waste Avoidance and Resource Recovery Act 2001	Minister for Environment and Heritage (NSW EPA)	Consideration of resource management in terms of the waste hierarchy, avoidance, resource recovery and disposal.
Contaminated Land Management Act 1997	Minister for Environment and Heritage (NSW EPA)	Management of listed contaminated sites in NSW. Review NSW EPA Contaminated Lands Register at option identification stage.
Rural Fires Act 1997	Minister for Police and Emergency Services (Ministry for Police and Emergency Services)	The prevention, mitigation and suppression of bush and other fires in local government areas. Notification required to LGA if fires will be required.
Soil Conservation Act 1938	NSW Department of Primary Industries, Catchments and Lands - Soil Conservation Service	Protection and conservation of NSW soils, erosion prone and erosion hazard areas, definition of soil catchments.
Heritage Act 1977	Minister for Environment and Heritage (NSW EPA)	To encourage the conservation of the State's heritage (eg. any listed under the LEP or on state registers / in addition revocation of existing Dare Timber Truss Bridge) Permits required for any proposed impacts to listed heritage.
Roads Act 1993	Minister for Roads and Ports (for relevant parts) (Roads and Maritime Services (Roads and Maritime)	Sets out rights and makes provisions for roads authorities and hierarchy of roads, certain exemptions eg native vegetation clearing.

5.2.2 Commonwealth legislative framework

The following Commonwealth legislations apply to this project:

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, an action will require approval from the Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) if the action has, will have, or is likely to have, a significant impact on a Matter of National Environmental Significance (MNES).

The updated ecological study to be undertaken for the replacing the existing bridge may find, in addition to that already found in previous studies, evidence of threatened species including bats and/or osprey and their habitats at the existing timber truss bridge and in proximity to the proposed project options. If a threatened species is also found to be listed under the Commonwealth EPBC Act, then it would require referral and potential approval under that Act. However, it is not anticipated to be required from the initial review of the proposed project. Section 5.6 of this report discusses the current ecological assessment in further detail.

Commonwealth Native Title Act 1993

The Commonwealth Native Title Act 1993 provides recognition for the rights and interests over land and water by Australian Indigenous people under traditional laws and customs. A search of the National Native Title Tribunal registers undertaken as part of the Indigenous heritage constraints (refer to Section 5.4) analysis will identify if there are any current registered claims or any determined claims of native title over the Project area. Given the extent of public lands and the presence of leasehold lands in the study area, Native title may still exist over parts of the study area.

5.2.3 Relevant State Environmental Planning Policies

The following State Environmental Planning Policies apply to this project:

State Environmental Planning Policy (infrastructure) 2007 (Infrastructure SEPP)

The Infrastructure SEPP provides a consistent planning regime for infrastructure and the provision of services across NSW. It allows greater flexibility in locating key infrastructure and facilities. Clause 94 of this policy applies to this project and allows development of road infrastructure facilities on behalf of a public authority without consent on any land.

State Environmental Planning Policy Rural Lands 2008 (Rural Lands SEPP)

The Rural Lands SEPP aims to facilitate the orderly and economic use and development of rural lands for rural and related purposes. This policy applies to the Clarence Valley local government area and sets out several planning principles to be considered as part of the progression and development of options for assessment. The proposed Project is providing the future means for upholding the rural planning principles outlined in the SEPP being the orderly and economic use of the rural lands associated with the Project and the immediate rural area.

5.2.4 Local planning instruments

The *Clarence Valley Local Environmental Plan 2011* (the LEP) is the relevant environmental planning instrument for the locality. However, the provisions of the Infrastructure SEPP 2007 (as outlined in Section 5.2.3) state inter alia that development for the purposes of roads can be undertaken by a public authority without consent on any land, therefore the proposed development would not be assessed under the LEP.

5.2.5 Land use zoning and development

The study area as includes the following land use zonings as shown in The Clarence Valley Local Environmental Plan 2011 (the LEP) online mapping tool, associated with the LEP as follows:

- RU1 - Primary Production (light brown)
- RE1 - Public Recreation (lime green)
- R2 - Low Density Residential (pink)
- B1 - Neighbourhood Centre (pale blue)

The *Clarence Valley Local Environmental Plan 2011* (the LEP) is the relevant environmental planning instrument for the locality. However, the provisions of the Infrastructure SEPP 2007 (as outlined in Section 5.2.3) state inter alia that development for the purposes of roads can be undertaken by a public authority without consent on any land, therefore the proposed development would not be assessed under the LEP.

5.2.6 Summary of assessment processes relevant to the project

The following steps outline the anticipated assessment process for the project.

1. Recommended Option Report
2. Preferred Option Report
3. Announcement of Preferred Option
4. Level of assessment determined by Roads and Maritime
5. Activity under Part 5 of the EP&A Act
6. Environmental assessment under Part 5, (Review of Environmental Factors (REF) at this stage)
7. Request for requirements from other government approval bodies as outlined in Table 5-1
8. Comments received back from other government approval bodies and incorporated into REF
9. REF submitted to determining authority for approval under s112 of the EP&A Act
10. Approval by Roads and Maritime as determining authority under s112 of the EP&A Act.

5.3 Socio-economic constraints

This section summarises the land use and planning requirements for input to the development of options for the Sportsmans Creek new bridge. The detailed technical paper is located in Appendix F. This socio-economic background profile and analysis forms Stage 1 of a future full social impact assessment, which will occur during the later stage of the project.

5.3.1 Social

The profile of the existing social environment in Lawrence and the Clarence Valley is based on review and assessment of several data sources, including the following:

- Publically available Clarence Valley Council reports and website information
- Desktop study of aerial photography, maps and other sources using a Geographic Information System (GIS)
- Demographic data from the Australian Bureau of Statistics (ABS) 2011 Census
- Feedback from the consultation with community and businesses
- Field investigations.

Population characteristics

The following key elements of Lawrence's demographic profile are summarised below:

At the 2011 ABS Census, the Urban Centre and Locality (UCL) of Lawrence had a total population of 740 with the following age breakdown:

- 3.7% aged less than 14 years
- 29.2% aged over 65 years.

Compared with the Clarence Valley Local Government Area

- 18.7% aged less than 14 years
- 21.2% aged over 65years
- The median age of the population is 55 years, compared with 46 in the Clarence Valley LGA and 38 in NSW
- The Clarence Valley LGA has an indigenous population of 2.6% which is lower than the Lawrence average of 5.7%. A significantly lower portion of residents are born overseas, 13.2% than the NSW average of 31.4%.

Population growth

According to the Social Plan, the Clarence Valley LGA population is growing, with the population reported at 48,425 at the 2006 census, which was an increase of 1026 (2.17%) during 2001-2006 (Clarence Valley Council 2010). This growth is attributed to an increase in retirees and those looking for a sea change and/or tree change and moving to the area. At the 2011 census, the population of the LGA was reported as 49,665 and is projected to grow to 54,500 by 2021 and further to reach 57,300 by 2036 (Clarence Valley Council 2010, ABS 2011b).

Public transport usage

Public transport usage rates are very low in Lawrence LGA. This is due to the limited public transport options (one bus company offering services only to Grafton on weekdays) as discussed in earlier sections of this report.

Housing

Lawrence is generally characterised by low density, detached housing, which makes up 96.9% of the total dwellings in the village. A very low portion of the population of Lawrence live in Group households (2.5%) and the greatest portion live in family households (73.6%). The figures are similar to Clarence Valley and NSW.

56.7% of homes are fully owned, with only 10.9% rented in the village. This is significantly higher than the Clarence Valley LGA and NSW.

Key community facilities, services and events

Few services and retail opportunities exist for the Lawrence community. Residents travel to Grafton or Maclean to access health, education and other related services, retail and employment. Services and businesses in the village are the post office, Lawrence Primary School, Lawrence Tavern (accommodation and restaurant/bar), Lawrence Nursery, Lawrence General and Liquor Store and Lawrence Museum.

The study area contains approximately 21 houses (one under construction), two businesses and one cane farm, located in the south of the study area. Two houses were noted for sale during the field investigations.

There are also two reserves in the study area being Flo Clark Park, located on the southern side of Sportsmans Creek and the Lawrence Memorial Park on the banks of the Clarence River. Both of these parks have boat ramps which are frequently used. Two other recreation reserves exist in the village; Ogilvie Park (near the Lawrence Post Office) and Sportsmans Park (on the opposite bank to the village at the mouth of Sportsmans Creek), which is not a formal designation.

The Lawrence Public Hall is also popular for hosting community events and clubs such as the over 50s Club and the Community Musical Fellowship.

Community values

The following key community values have been identified as part of previous consultation works by Clarence Valley Council and include:

- Scenic views, rural activities, community interactions with their surroundings
- Natural environment and flora and fauna within it and the recreational opportunities it provides
- Protection of natural environment in developing future economic benefits
- Healthy waterways and clean water
- Sense of place, cultural heritage, relationship to surrounding landscapes and human scale
- Community size is such that members can build relationships with others, feel connected and supported. The ability to ‘pull together’ in times of tragedy and natural disaster
- Safe and respectful communities (both safety and property security).

5.3.2 Economic

Business activity

The local economy of Lawrence is very small and is best viewed through an analysis of statistical data for the Clarence Valley LGA, as the main industry in the primary industry in the Lawrence area contributes to the region’s economy as a whole. The local

economy is identified as a growth area with the Clarence River Way Masterplan, particularly in relation to encouraging investment from the tourism industry and improving infrastructure to facilitate industry transport (Clarence Valley Council 2010).

According to the Interim Valley Vision, there were approximately 4,090 businesses in the Clarence Valley in 2011, which has been in steady decline since 2007 (ABS 2011d, Clarence Valley Council 2013). Of the total businesses registered, the Agriculture, Forestry and Fishing industry has the highest number (26.3%), followed by Construction (16.6%), Rental, Hiring & Real Estate Services (7.8%) and Retail Trade (7.6%).

The estimated turnover for industry in the Clarence Valley was $1.3 billion in 2010/2011, which has also decreased by 0.4% annually, however, the average turnover of all businesses has increased by 0.2%. Overall the Gross Domestic Product (GDP) is growing for the Clarence Valley at around 8% per annum and is presently worth approximately $1,703.9 Million (Clarence Valley Council 2013).

The core economic base is comprised of industries such as fishing, timber, agriculture and sugar, with emerging economics in tourism, regional food, arts and design, education, boat building and timber value adding (Clarence Valley Council 2013).

Investment within the region is increasing, in particular in aged care, tourism, timber and core infrastructure, encouraged by sea-change immigration, growing population, more affordable land and lower operational costs (Clarence Valley Council 2013).

Employment, labour force and income

Unemployment rates within Lawrence and Clarence Valley are higher than those rates in NSW, with 13.4% of the population in Lawrence unemployed and 8.9% in the Clarence Valley compared with 5.9% in NSW.

Economic values and trends

The following trends and strategic directions are of note for the region in general:

- Encouraging capital expenditure to improve infrastructure such as, recreational areas, site and landscaping improvements, road upgrades and environmental improvements
- Foster economic prosperity through environmentally sustainable activities
- Encourage economic growth and investment utilising federal funding support (through the Masterplan) to promote the rural coast area as a touring region
- Protection of high value natural environments to ensure that new urban development avoids key habitat corridors, threatened species, vegetation communities, coastal lakes, estuaries and aquifers
- Ensure development and growth does not impact upon the coast and character of local villages
- Increase housing stock to meet the demand of 59,600 by 2031 to meet the population growth, however, also ensure this meets the needs of smaller households and the elderly population
- Ensure the demand for land supports economic growth and capacity of the additional employment opportunities
- Support and value voluntary work and build opportunities for training and mentoring to retain expertise in communities (in particular for disadvantaged, youth and less skilled community members).

5.3.3 Key project socio-economic issues

Future investigations for this project should consider the following social and economic issues and ensure the appropriate mitigation measures are developed to minimise potential impacts:

- Changes to access and passing trade to businesses within the local area, in particular the Lawrence General and Liquor Store and Lawrence Tavern
- Direct property impacts, such as land acquisitions
- Amenity based impacts on community, residences and businesses relating to noise and air quality during both construction and operation
- Changes to existing cyclist, pedestrian and public transport movements, including the needs of the elderly and disabled
- Indirect impacts on the local road network and community within the village as a result of any changes in traffic movements
- Any clearing of vegetation within undisturbed areas or modifications to recreational areas or the visual character of the village.

The likelihood and severity of these potential impacts will be dependent upon the option chosen. By assessing and considering each of the potential environmental and community impacts further during the next stage of the project, any anticipated negative impacts are unlikely to be significant and the project would expect to result in an overall positive benefit for the Lawrence community.

5.4 Aboriginal heritage

This section summarises the preliminary desktop and field investigations and assessment of potential items of Indigenous heritage significance in the vicinity of the study area.

5.4.1 Desktop assessment

Initially, a desktop assessment was undertaken of the relevant heritage databases covering the study area in order to identify any potential issues. The study area is situated within the Clarence Alluvial Plains along Sportsmans Creek which is dominated by alluvial processes and includes alluvial plains, levees, abandoned channels and backswamps. This location is considered to be very well resourced and would have provided valuable and reliable resources that would allow sustained occupation of the local area. Due to waterlogging swamps were not favoured for actual camping (hunting and gathering occurs in the swamps), it was the elevated land above and overlooking swamps that were preferred by past Aboriginal societies and this is typically where evidence of camping may be located.

A search of the OEH AHIMS register has shown that six known Aboriginal sites are currently recorded within five kilometres of the study area and include three modified trees, two artefacts and one burial site. Austral Archaeology undertook a Heritage Assessment and Statement of Heritage Impact (SoHI) in 2002. The survey did not identify any Aboriginal archaeological or cultural sites. However, two Potential Archaeological Deposits (PADs), one on each side of the creek, were identified. PAD1 and PAD2 were both subject to past land use practices such as vegetation clearing and landscaping activities. It was argued that although this sort of activity is likely to have caused some disturbance to any sub surface archaeological remains, such remains, even though possibly disturbed, can still contribute information to the past Aboriginal

occupation of the study area. The results of the database searches are shown below in Table 5-2.

Table 5-2: Results of the database searches

Name of Database Searched	Date of Search	Type of Search	Comment
Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS)	02-07-2013	AGD, Zone : 56, Eastings : 504000 - 514000, Northings : 6731000 - 6741000 with a Buffer of 50 meters,	6 AHIMS sites within the search area (Refer to Appendix H)

The study area has been cleared and primarily used for pastoral purposes (grazing), involving the wholesale clearance of native vegetation, the introduction of pasture grass, the construction of dams, housing, fencing, tracks, roads, developments and associated infrastructure (water, electricity, telephone). These impacts are expected to have resulted in a low potential for in situ indigenous sites within the study area. From the initial desktop assessment, a range of potential indigenous sites were highlighted.

Previous archaeological studies undertaken throughout the Clarence Valley area were found to be limited in number and provide limited information regarding site types, context, extents, location and proximity to water. Sites registered on the NSW OEH AHIMS Register, landforms and past land use activities, provide an indication of site types and site patterning in the area. Research has shown that scarred trees and artefact sites are the most predominant site types likely in the area. The most common site locations are along watercourses or on elevated landforms and artefact density is greatest in close proximity to water sources.

Within the study area it is predicted that there is a moderate potential for evidence of past occupation, in particular artefact scatters and/or isolated finds situated on elevated landforms within 50 metres of water resources in the southern side of Sportsmans Creek and the north-western half of the creek (Refer to Figure 5.4). It is anticipated that sites could contain assemblages dating from the mid to late Holocene, featuring quartz as the dominant raw material, chert, and other raw materials. Artefacts will consist predominantly of flaked pieces, flakes, broken flakes and cores. Some modified artefacts including retouched flakes, and asymmetrical and symmetrical backed artefacts can be expected.

5.4.2 Constraints and opportunities

The desktop assessment undertaken supports the identification of two PADs, further defines the relatively undisturbed portions of the PADs as shown on Figure 5.4 and confirms that a site survey will be required for the next stage of the project.

The results of the constraints and opportunities assessment reveal that parts of PAD1 and PAD 2 may be impacted on by the proposed bridge replacement if an alignment other than the existing bridge location is used. The level of constraint would therefore depend on the significance of the PADs and any surface and/or subsurface sites, and further archaeological investigations are necessary. If, following further archaeological investigations, the PAD areas were found to be of a low archaeological significance, there would be no Aboriginal heritage constraints on the proposal. If the PAD areas were found to be of moderate archaeological significance, further mitigation measures

such as salvage excavation and an AHIP may be recommended before impacts were to occur. If the PAD areas were shown to have high archaeological significance it is possible that the area may be recommended as a conservation zone to protect its cultural heritage values. This would then be a constraint on the bridge replacement option if it were to impact on the PAD.

Further constraints may exist in regard to the cultural significance of the study area to Aboriginal people. These may be identified by the Aboriginal stakeholders only.

The following recommendations should be considered when evaluating design options for a replacement bridge:

- Consultation with Aboriginal stakeholders as per the Aboriginal Cultural Heritage Consultation Requirements for Proponents (OEH 2010) to identify any cultural heritage sites and/or places should be undertaken
- Archaeological survey to visually inspect the study area and identified PADs
- If the PADs are confirmed through survey, and the proposed bridge will impact upon them, test excavations under the OEH Code of Practice for Archaeological Investigations of Aboriginal Objects in NSW would be required to determine the level of significance of PAD areas and to inform an assessment of archaeological significance prior to bridge construction works.

The following recommendations are made for consideration during the environmental assessment phase once the preferred option has been selected:

- Comprehensive Aboriginal consultation to be undertaken by Roads and Maritime if impacts are proposed within the PAD area
- An Aboriginal Heritage Impact Assessment should form part of any further environmental assessment, particularly where it is determined that there may be impact on PADs as shown in Figure 5.4.

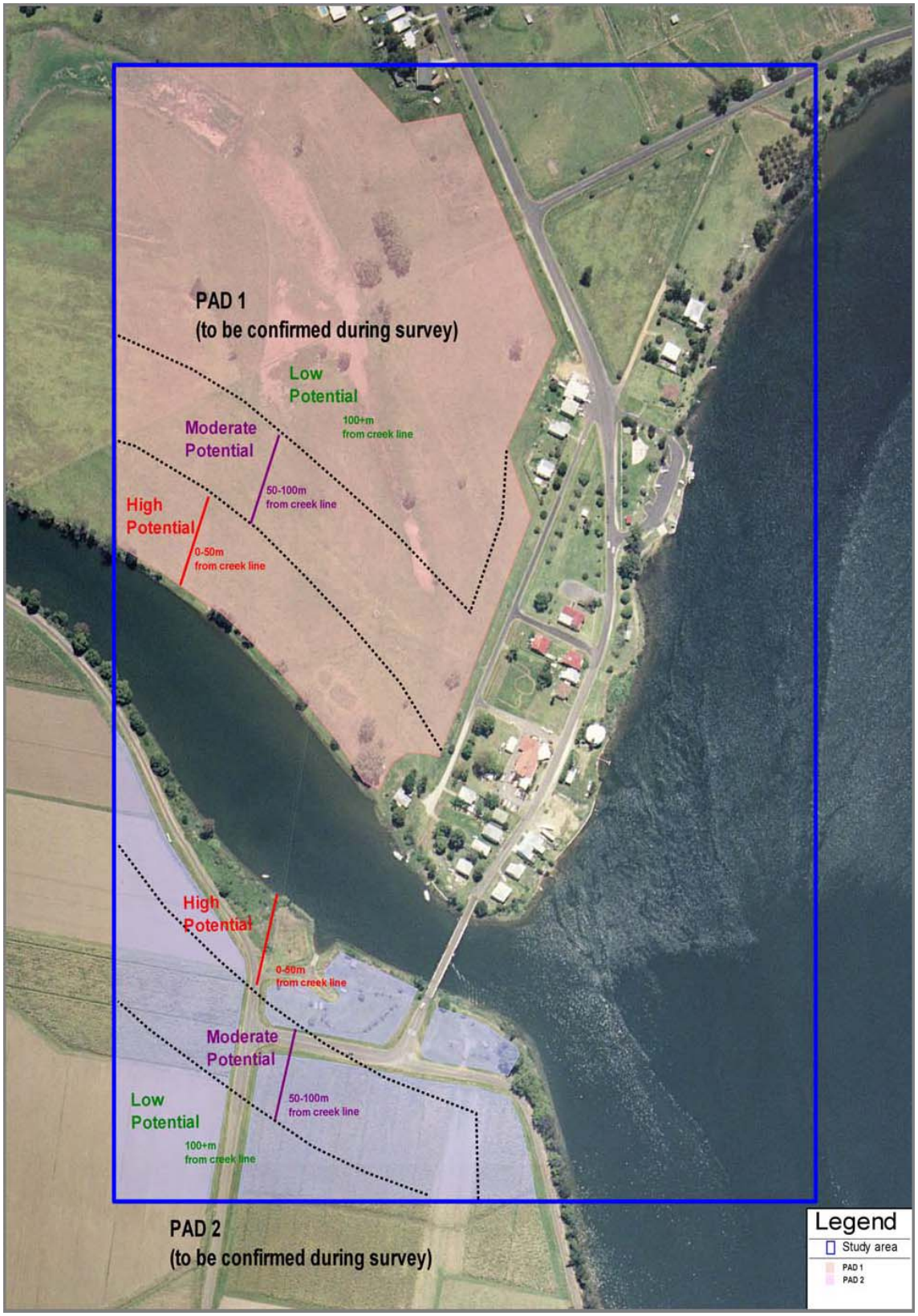

Figure 5.4 - Potential Aboriginal Heritage Constraints Associated with the Study Area

5.5 Historical heritage

5.5.1 Desktop assessment

The desktop assessment using heritage databases and available hard and soft copy resources was undertaken to identify any items or places of potential historical heritage significance within the study area, as shown in Table 5-3.

Table 5-3: Results of the heritage database searches

Name of Database Searched	Date of Search	Search Target	Search revealed…
Australian Heritage Database http://www.environment.gov.au/heritage/ahdb/	13.07.2013	The townships of Lawrence, Maclean and Copmanhurst in the Clarence Valley LGA, NSW	…that one resource was listed in the Lawrence town precinct
NSW Heritage Office State Heritage Register and State Heritage Inventory http://www.heritage.nsw.gov.au/	13.07.2013	The townships of Lawrence, Maclean and Copmanhurst in the Clarence Valley LGA, NSW	...five listings within the Lawrence town precinct, of which three fell within the study area
The Clarence Valley Local Environmental Plan , 2011 http://www.legislation.nsw.gov.au	13.07.2013	The localities of Lawrence, Maclean and Copmanhurst	...15 listings within the Lawrence town precinct, of which six fell within the study area
Local Heritage Studies : The Maclean Community Based Heritage Study, 2006, http://www.clarence.nsw.gov.au	14.07.2013	The area of the former Maclean Shire LGA	...15 listings within the Lawrence town precinct, of which five fell within the study area
The Copmanhurst Community Based Heritage Study, 2005 http://www.clarence.nsw.gov.au/	14.07.2013	The area of the former Copmanhurst Shire LGA	...one listing within the Lawrence town precinct, which fell within the study area
The Maclean Shire (former) Community Based Thematic History, 2006 http://www.clarence.nsw.gov.au/	14.07.2013	The area of the former Copmanhurst Shire LGA	...one listing within the Lawrence town precinct, which fell within the study area
RMS Heritage and Conservation Register, under s170 Heritage Act, 1977 http://www.rta.nsw.gov.au	13.07.2013	The Northern Region	...the detailed listing for the present Sportsmans Creek bridge

Review of databases and information supplied indicates the primary items of historical heritage significance relevant to the current project are summarised below:

- The search of the Australian Heritage Database revealed the listing only of the present Sportsmans Creek bridge within the Lawrence area.

- A search of the State Heritage Register and Inventory revealed no item listed as possessing State level heritage significance within the Lawrence area. A further five sites were listed on the State Heritage Inventory, four reflecting their listing on the former Maclean Shire Local Environmental Plan, 2001, those within the study area marked by asterisk:
    - Lawrence Anglican Church
    - Former Lawrence Baptist Church*
    - CS Manton's residence
    - Lawrence School of Arts*.
- The remaining listing (twice) was for the present Sportsmans Creek bridge reflecting listing in both the former Copmanhurst Shire Local Environmental Plan, 2008 and the RMS Heritage and Conservation Register pursuant to s170, the Heritage Act, 1977.
- The most recent Local Environmental Plan is that of the Clarence Valley Council, 2011, which lists 15 resources in the Lawrence precinct, six of which fall within the study area (marked with an asterisk below):
    - Former Lawrence Baptist Church*
    - Lawrence School of Arts
    - Lawrence War Memorial and Park
    - Former Baptist Manse, Lawrence*
    - Residence, 11 Bridge Street, Lawrence*
    - Sportsmans Creek bridge*
    - Lawrence Cemetery
    - Lawrence Anglican Church
    - Bluff Point ferry
    - Lawrence Museum
    - Lawrence Post Office/Residence
    - Lawrence Police Station
    - Remains of the former Lawrence Baths
    - Residence, 6 Stuart Lane, Lawrence
    - Lawrence Cricket Canteen.

Previously, the heritage resources of the former Maclean and Copmanhurst Shire LGAs were reviewed as community-based studies co-ordinated by J Gardiner, respectively in 2006 and 2005 more or less concurrently with a community based historical study. The results of these studies are reflected in the present listing in the Clarence Valley Local Environmental Plan.

Roads and Maritime (then Roads and Traffic Authority) undertook a study of the heritage values of its properties, in the course of which listing the *Sportsmans Creek Bridge* in its Heritage and Conservation Register, maintained pursuant to s170 of the *Heritage Act*, 1977. Subsequently, in 2002, Austral Archaeology completed a Statement of Heritage Impact in respect of plans for the bridge.

5.5.2 Constraints

Desktop investigations undertaken as part of this constraints analysis sought to correlate all previously identified heritage items and to identify previously unassessed heritage resources. Based on the historical evidence contained in Town and Parish Maps and the community-based historical study, attention has also been drawn to the location of 4 Clarence River wharves on the shoreline in and near the study area. There is a possibility that material evidence remains of these wharves and of their associated infrastructure between the shoreline and the eastern alignment of Bridge Street. This aspect will be investigated and clarified in the course of further fieldwork.

The location of potential historical heritage constraints is shown on Figure 5.5.

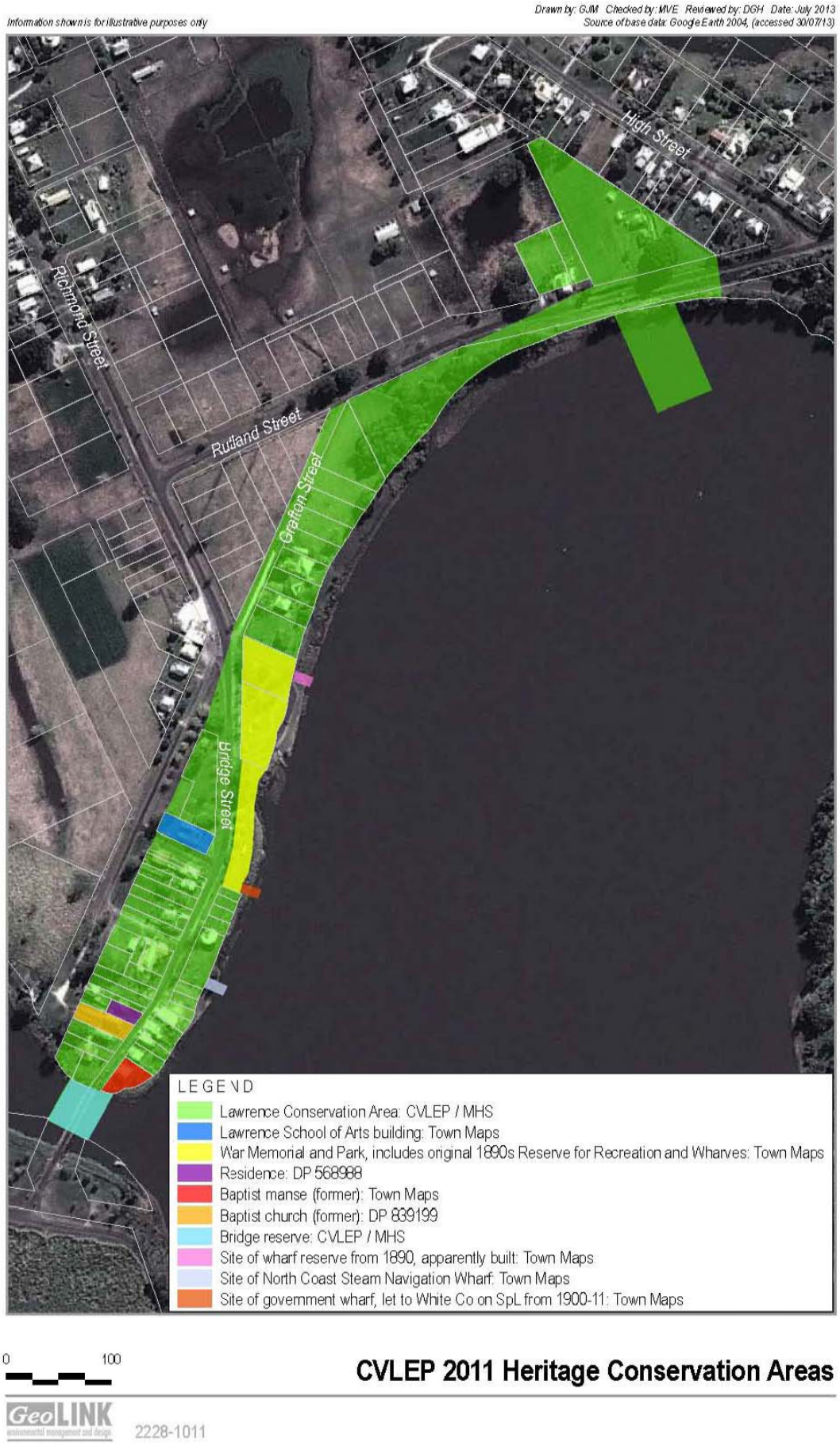

Figure 5.5 - Potential Historical Heritage Constraints Associated with the Study Area

5.6 Ecology

5.6.1 Desktop assessment

The desktop assessment involved a comprehensive review of biodiversity information available on the study area and surrounds, including the search results of a number of biodiversity databases and registers as well as a literature review of ecological studies previously undertaken in the area and liaison with local ecologists.

5.6.2 Flora

The desktop assessment found that one threatened flora species is known to occur within the study area namely, a planted Durobby (*Syzygium moorei*) within Flo Clark Park which is of low conservation significance due to occurring well outside its natural range. Two threatened flora species, Hairy Jointgrass (*Arthraxon hispidus*) and Maundia (*Maundia triglochinoides*) have potential to occur within the study area associated with ephemeral wetland areas to the west of the study area. A number of listed Endangered Ecological Communities (EECs) were identified as potential occurrences at the site with Freshwater Wetland EEC likely to be associated with areas of ephemeral wetland.

5.6.3 Fauna

The study area provides potential habitat for 15 threatened fauna species and eight listed migratory species. Three threatened microbat species have been previously recorded at the site including a roosting colony of Southern Myotis (Myotis macropus) on the existing Sportsmans Creek bridge which are likely to still be present. A number of threatened wetland bird species have been regularly sighted around Sportsmans Creek and its surrounds including the Black-necked Stork (Ephippiorhynchus asiaticus) and Brolga (Grus rubicund). Both of these species have potential to utilise the ephemeral wetlands to the west of the study area for foraging.

5.6.4 Fisheries

A search of the NSW Department of Primary Industries (DPI) (Fisheries) Records Viewer for threatened/endangered aquatic fauna did not find any records of threatened aquatic fauna in the vicinity of the study area. Previous studies for the existing Sportsmans Creek bridge identified that the bridge would be likely to provide habitat for the Estuary Rock Cod (Epinephelus coioides) which is listed as protected under the Fisheries Management Act 1994. Additionally Sportsmans Creek would provide habitat for a number of other fish species including the Australian Bass (Macquaria novemaculeata) which would be likely spawn within this estuary. The creek is a known breeding ground for crustaceans. Sportsmans Creek is also included as part of an area of mapped Key Fish habitat within the Clarence Valley Council LGA.

5.6.5 Endangered populations

No endangered populations have been identified in the study area.

5.6.6 Wetlands

Four Important Wetlands listed in the NSW DIWA Spatial Database were indicated by the EPBC Act Protected Matters Search Tool as occurring within a 10 km radius of the site. These are:

- Clarence River Estuary
- Everlasting Swamp
- The Broadwater
- Upper Coldstream.

Two of these wetlands occur in proximity to the study area namely, the Everlasting Swamp which occurs approximately 500m to the west of the study area and the Clarence River wetland which occurs within the Clarence River immediately to the east of the existing Sportsmans Creek bridge.

A review of aerial photographs indicates that a number of wetland areas occur in the western portion of the study area. These areas are considered most likely to be ephemeral wetlands occurring on the periphery of the Little Broadwater system of wetlands. Although not formally listed as wetlands, these areas are likely to have habitat value to locally occurring wetland bird species including some listed threatened and migratory wetland birds species. As mentioned these areas are likely to contain flora assemblages that are indicative of the listed Freshwater Wetland EEC. Further investigations of these areas will be undertaken during the field surveys.

5.6.7 Conclusion

A small number of potential ecological constraints were identified by the desktop assessments and are shown in Figure 5.6. Upcoming detailed field investigations will verify these and any other potential constraints associated with the site.

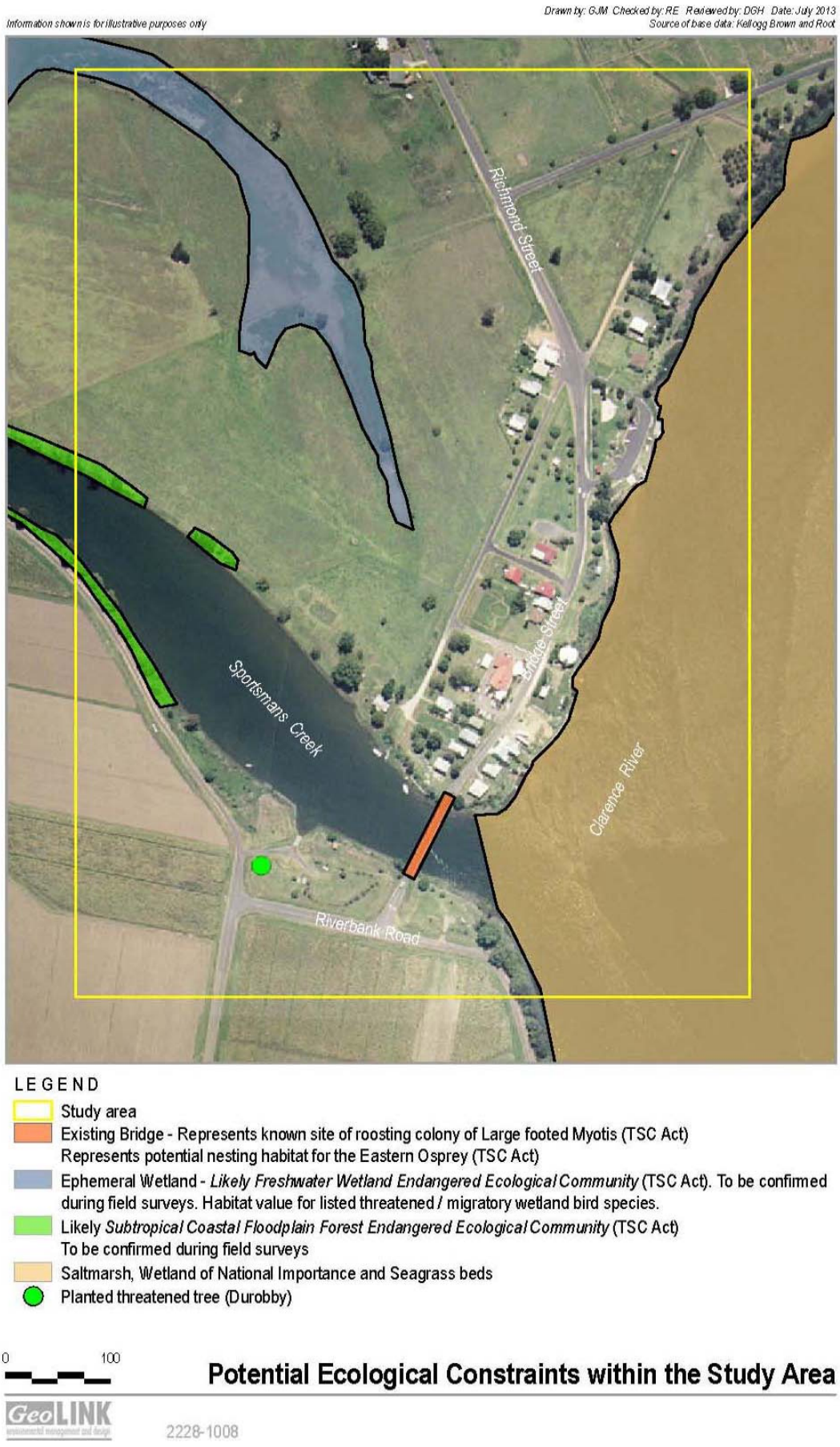

Figure 5.6 - Potential Ecological Constraints Associated with the Study Area

5.7 Flooding

5.7.1 Existing flooding conditions

The Lower Clarence River Flood Study Review shows that the study area is impacted by flooding. Figures 5.7 and 5.8 show the extent of a recent flood event. Figures 5.9 and 5.10 are taken from the Lower Clarence River Flood Study Review and show the extent of flooding for a 5 year and 100 year ARI flood. Figures 5.11 and 5.12 show the flood velocities down Sportsmans Creek. Note that due to the size of the image and model grid size, velocities may be greater than 0.5 m/sec.

Figure 5.7 - Recent flood event (Source: Roads and Maritime)

Figure 5.8 - One week after flood event (Source: Roads and Maritime)

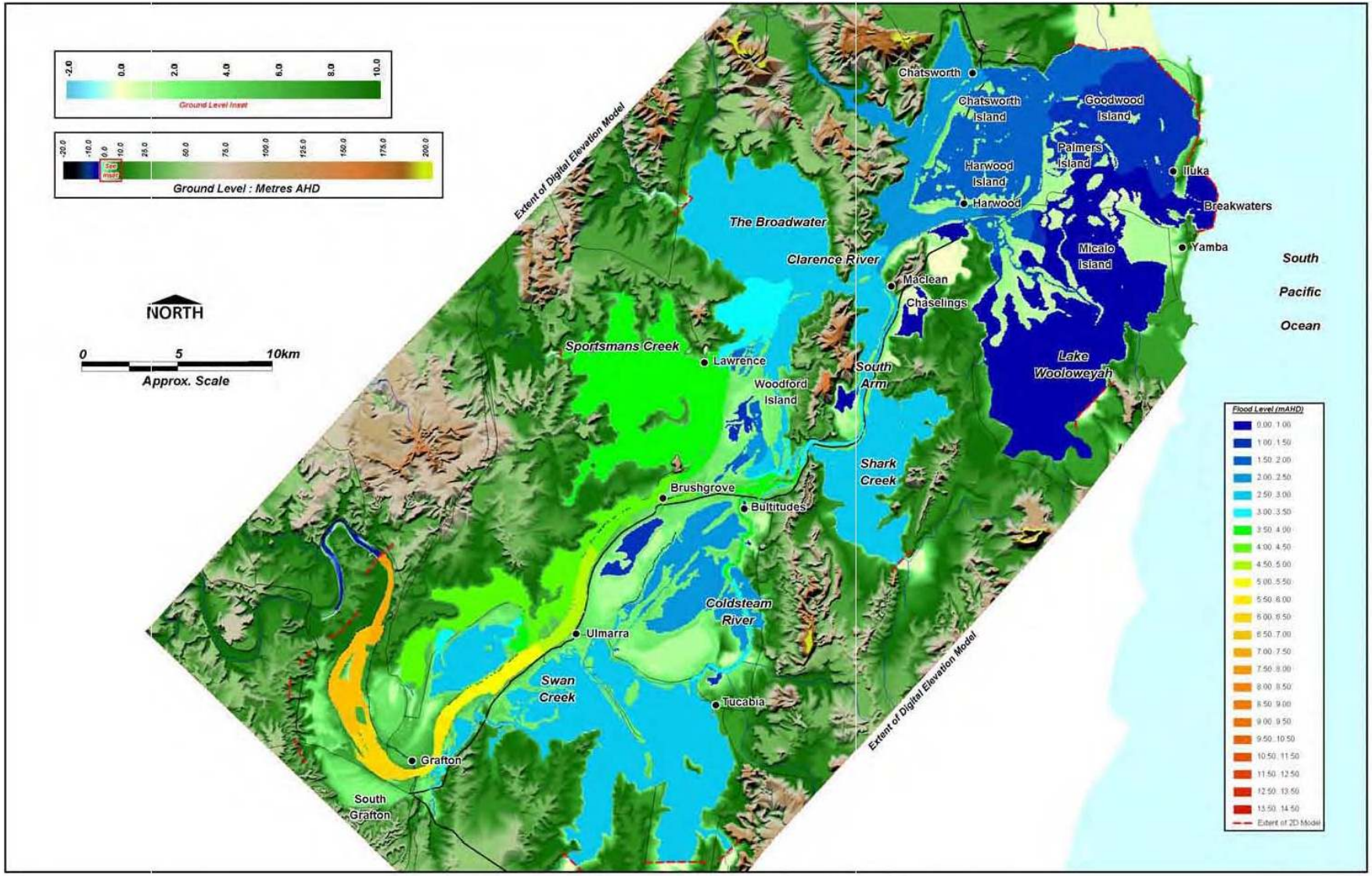

Figure 5.9 - 5 Year ARI Flood level (Source: WBM Oceanics)

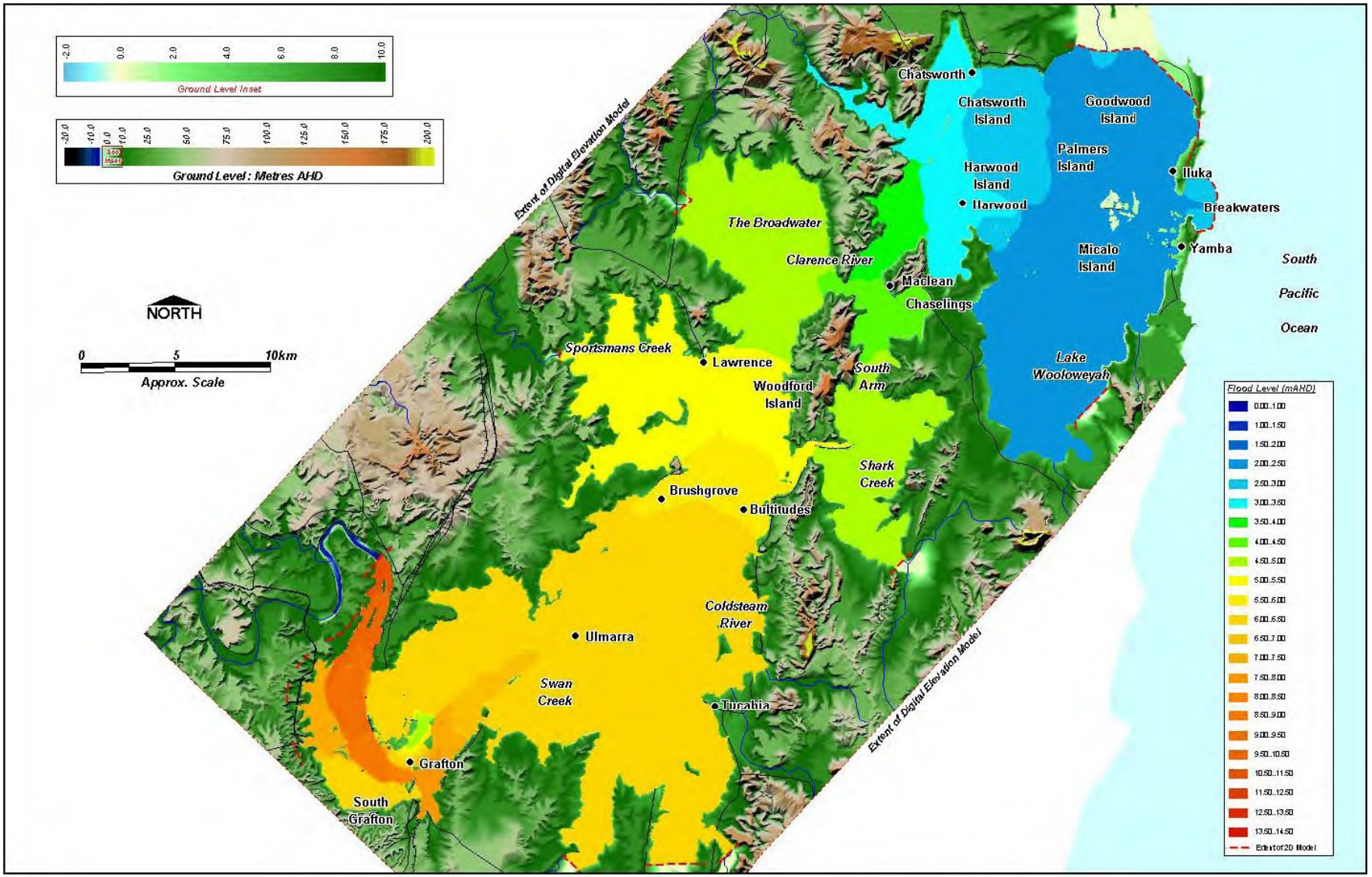

Figure 5.10 - 100 Year ARI Flood (Source: WBM Oceanics)

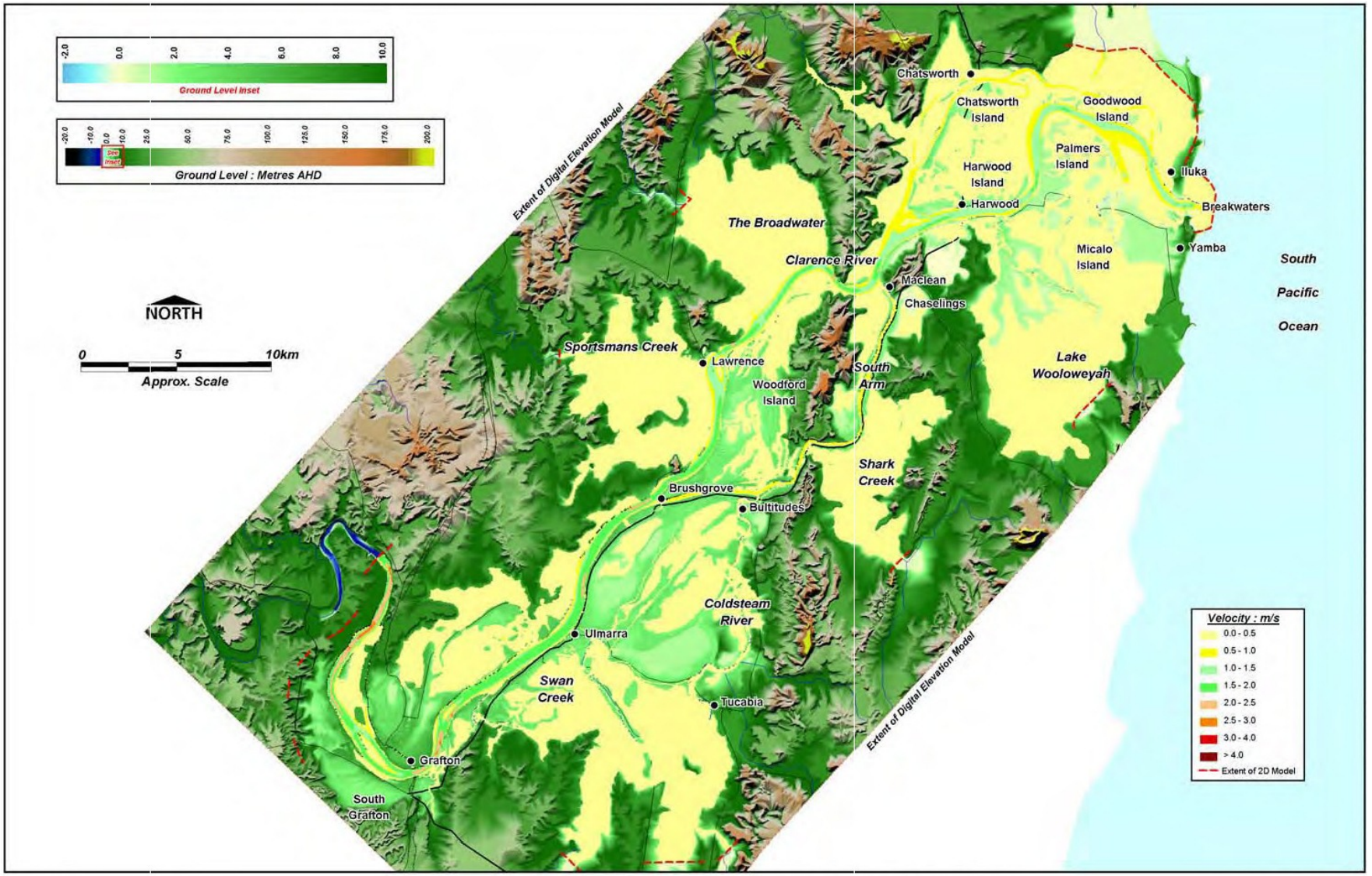

Figure 5.11 - 5 Year ARI Flood Velocities (Source: WBM Oceanics)

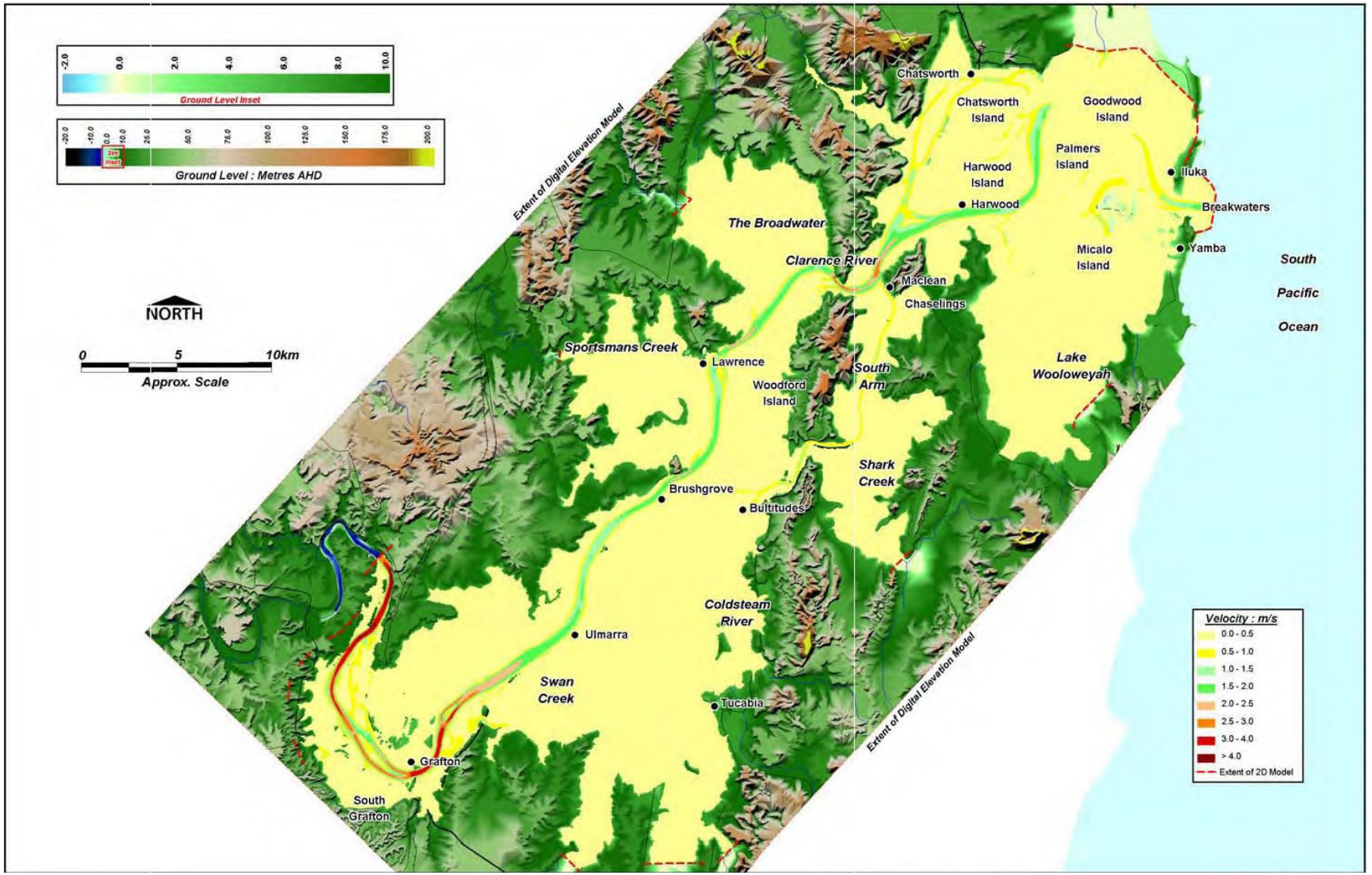

Figure 5.12 - 10 Year ARI Flood Velocities (Source: WBM Oceanics)

5.7.2 Flooding constraints and impact assessment

Flooding is a significant consideration for any design option for the Sportsmans Creek new bridge. In flooding terms, it is generally best to mimic the existing situation as this usually minimises additional impacts. All options are to be assessed in comparison to the existing situation.

At present a design level of 4.39m clearance above mean high water has been adopted. The existing 20 year ARI water level as a result of flooding in the Clarence River is 70mm below the soffit of the design deck, with the existing 100 year ARI water level is 650mm above the soffit of the design deck. This will mean the deck may be subject to debris loading in a 100 year ARI flood event.

Flooding will be further assessed during the next phase of the project. This will include a consideration of the impact of the changes in the flooding regime to properties upstream and properties downstream of the existing bridge and properties between any proposed alignment and the existing bridge. The flooding assessment will include consideration of the full or partial removal of the existing abutments and piers, and location and shapes of new abutments and piers and a consideration of the deck width, depth and span.

5.8 Noise and vibration

There are several residential properties, businesses and other community facilities that have the potential to be directly or indirectly impacted by noise as a result of this project. The most potentially affected receivers are located in the southern part of Lawrence along Bridge and Grafton Streets. Other receivers with the potential to be impacted by those alignments shortlisted are located along Richmond Street.

5.8.1 Residential receivers

Several residential receivers have been identified within close proximity to the shortlisted options. Residential receivers most potentially affected are located along Bridge Street and Grafton Street. Residential receivers located on Bridge Street are located as close as 2.5m from the existing Bridge Street carriageway. Residential receivers located on Richmond Street are in excess of 140m from the nearest shortlisted option.

5.8.2 Commercial receivers

Commercial receivers potentially affected by the shortlisted options are located between Grafton Street and Bridge Street in the southern section of Lawrence village. A commercial receiver is also located on the corner of Grafton Street and Richmond Street.

5.8.3 Other sensitive receivers

Other sensitive receivers potentially affected by the shortlisted options include a community building located at 33 Bridge Street, Lawrence. The community building named “Lawrence Public Hall” is located 18m from the existing Bridge Street carriageway.

5.8.4 Ambient noise environment

Although construction noise impacts will be an issue that needs consideration, any assessment will focus on operational traffic noise and will be guided by the NSW Government EPA's *Road Noise Policy* (RNP). The noise and vibration impacts of the changed traffic conditions during operation and construction for a replacement bridge will be assessed for the listed noise sensitive users in accordance with the RNP assessment criteria (both day and night) for the maximum levels of traffic noise, such as from a heavy vehicle pass-by event. Ambient noise surveys will be conducted to determine existing noise levels. The complete technical paper for noise and vibration assessment is located in Appendix K.

5.9 Geotechnical constraints

This section summarises the preliminary desktop investigations and assessment of potential geotechnical constraints in the vicinity of the study area. The detailed technical paper is located in Appendix J. The following key information has been identified:

- Existing geotechnical information is limited within the study to alignments nearest to Grafton Street. Shallow ground conditions within the study area are likely to comprise alluvial deposits of gravel, sand, silt and clay. The depth to bedrock ranges from 4m to 34m
- Sportsmans Creek presents several geotechnical constraints which should be characterised by further site investigation and assessment. They are the potential for settlement of compressible soils if loaded, the depth to bedrock and competent strata within the creek, and the potential impact on flooding from development within the creek and surrounds
- An absence of underground mining within the study area has been confirmed by the regulator. There is no mining in close proximity to the study area
- Potential for contaminated soils in the study area exist from agricultural residues, underground storage tanks at the general store, fill in existing bridge abutments, previous demolition of structures, and historical industrial sites
- The results of a previous shallow investigation and review of the acid sulphate soils (ASS) maps indicated that the study area has a risk of ASS, showing as Class 1, 2 and 3 on the ASS risk map. There is also potential that soils at depth would like be aggressive towards buried steel and / or concrete structures
- Geotechnical considerations are generally consistent across the study area.

5.10 Engineering constraints

This section summarises the critical design requirements and constraints that have been considered in developing the options for a replacement bridge over Sportsmans Creek. The designs have been developed to generally comply with the following:

- Austroads Guide to Road Design (2009)
- Roads and Maritime Supplements to Austroads Guides (2009)
- New South Wales Development Design Specification D1, Geometric Road Design, Urban and Rural (January 2006) as applying to Clarence Valley Council local government area.

5.10.1 Design requirements

Table 5-4 below provides a summary of the key design criteria used in developing the geometric alignments for the options.

Table 5-4: Key road design criteria

Design Criteria	Design Requirement
Horizontal Alignment - Design Speed	50 km/h
Vertical Alignment – Design Speed	50 km/h
Crest 'K' Parameter	5.2
Sag 'K' Parameter	4
Lane width	3.5m
Maximum Vertical Grade	5%

More comprehensive design work, including superelevation design, safety barrier design, earthworks, retaining walls, sight distance checks, pavement widening and aquaplaning checks will be considered during the next stage of the project.

The following sketch (Figure 5.13) illustrates the typical road cross section forming the basis for the options, based on Roads and Maritime and Clarence Valley Council design criteria for this project.

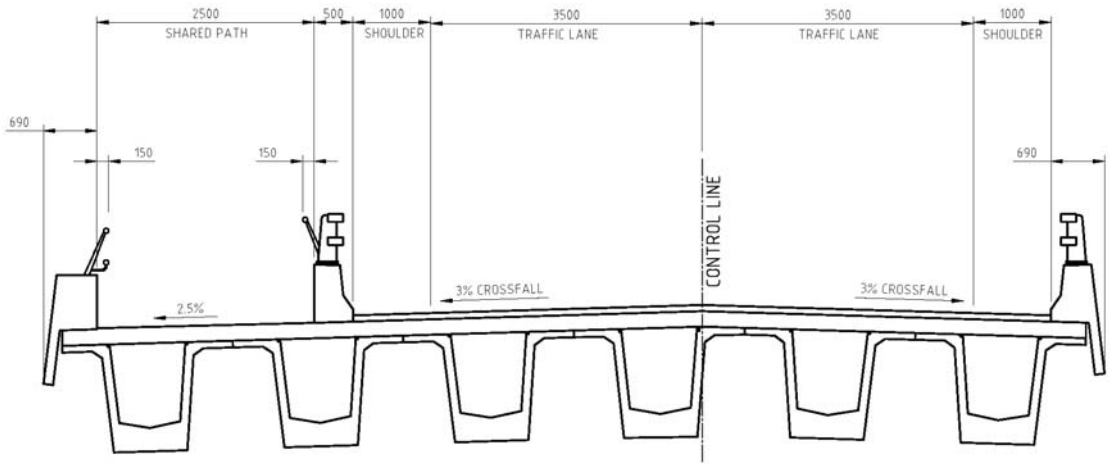

Figure 5.13 - Typical cross section for option development

5.10.2 Utilities

Existing utilities and services in the vicinity of the study area were identified from the "Dial Before You Dig" search across the study area. Table 5.5 below summarises the results of the preliminary utilities investigation works to date.

Table 5-5: Existing utilities within the study area

Utilities	Description
Water main	Water mains run along Bridge Street and Grafton Street. The water supply also crosses Sportsmans Creek to the west of the existing bridge from Riverbank Road to Grafton Street. The location of the water main will need to be considered for options which have an alignment which connects with Grafton Street.
Sewer	Sewer rising mains are present along Bridge Street and Grafton Street.
Telecommunications	Telstra cables, electrical poles and underground earth wires were identified in the vicinity of the study area. Due to the relatively simple relocation works involved, it is a minor constraint.
Electrical	Overhead power cables for both 11kV and 66kV were identified along the existing roads.
Stormwater	Stormwater pipes and pits along local streets were identified in the vicinity of the study area. Due to the relatively small sizes of the pipes, and the fact that road improvements will require upgrades to the stormwater network as part of the works, this is considered a very minor constraint.

The following Figure 5.14 shows existing sewer and water utilities within the study area.

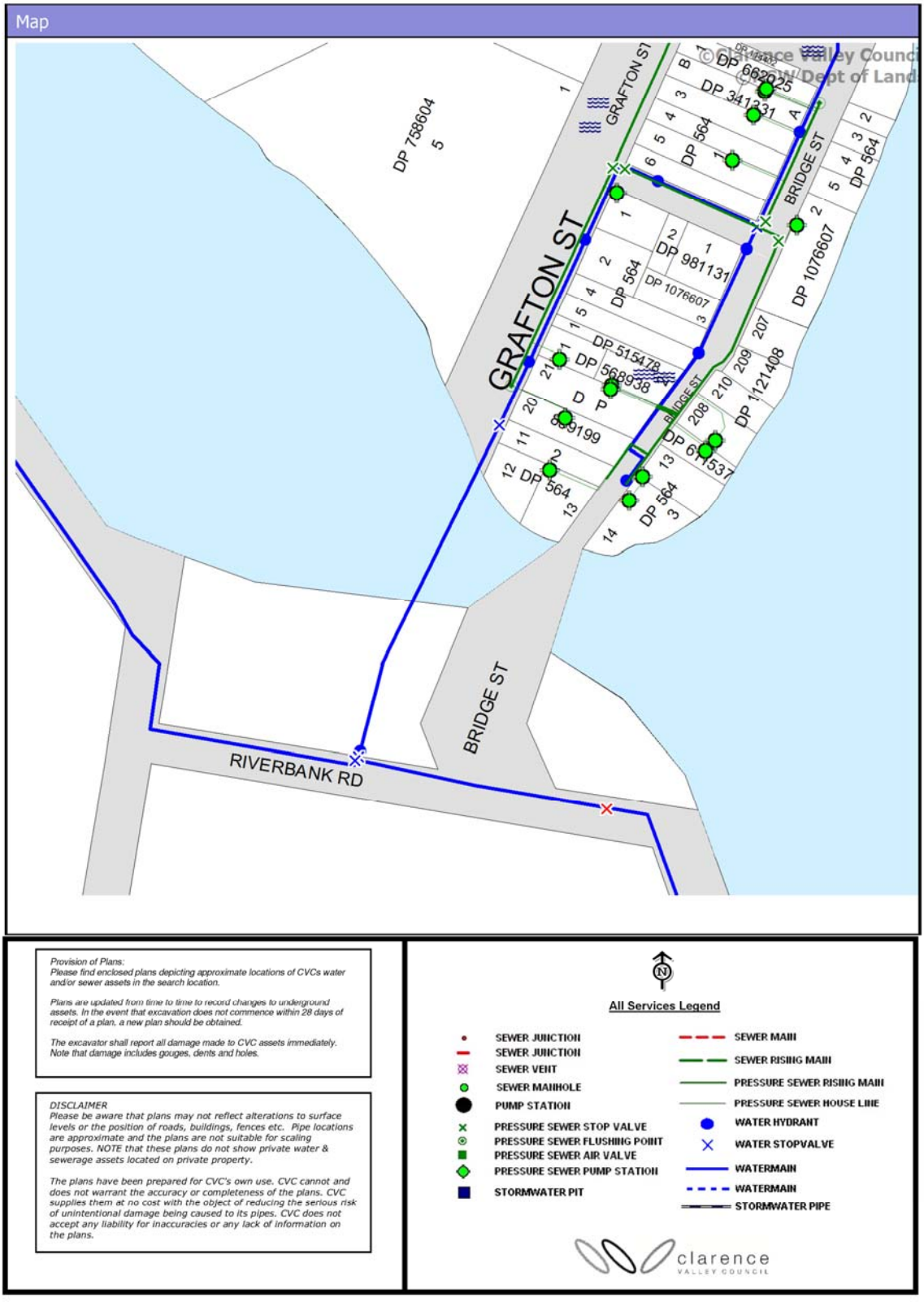

Figure 5.14 - Existing Sewer and Water utilities in the study area

6 Assessment methodology

The aim of the assessment process is to identify a recommended option. The process of assessing and shortlisting concept options is based on the principles of a Multi Criteria Analysis (MCA). This allows preferences to be objectively established between options using criteria relevant to the needs of the project and ensuring transparency.

An overview of the process is presented in the Figure 6.1:

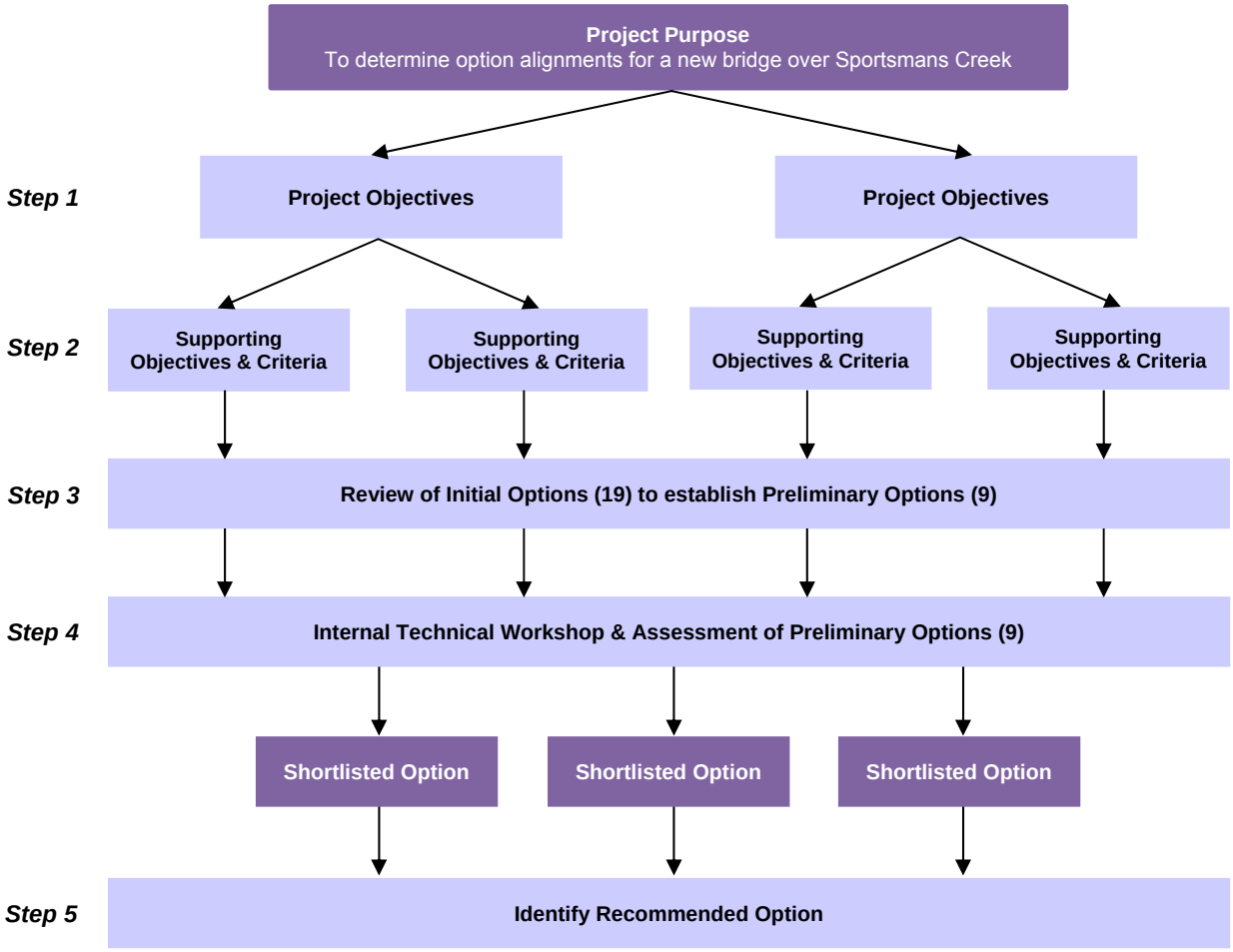

Figure 6.1 - Assessment methodology

The steps used in this process are as follows:

6.1 Step 1 – Identify project objectives

The primary objectives for this project have been developed by Roads and Maritime in consultation with key stakeholders. The objectives used in the assessment of preliminary options are:

- Improve road safety
- Improve local traffic efficiency/transport productivity and reliability
- Minimise the impact on the natural, cultural and built environment
- Provide value for money.

The two project objectives relating to local traffic and road transport have been combined into a single objective for the purposes of the preliminary options assessment. These two objectives address similar issues and have similar supporting objectives and criteria.

6.2 Step 2 – Identify supporting objectives and criteria for assessment

Each project objective contains a series of supporting objectives. These supporting objectives provide measurable criteria that allow an assessment and comparison to be made for each option.

The supporting objectives used in the assessment of the options are shown in the Figure 6.2 below.

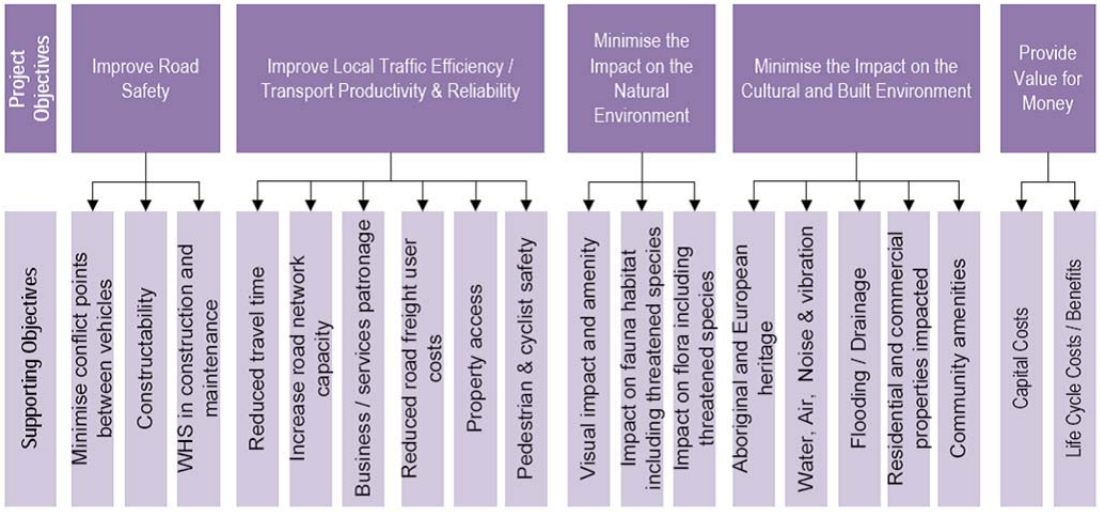

Figure 6.2 - Project and supporting objectives

General descriptions of each supporting objective are illustrated in the following table which provide for a rational and inclusive review for each option.

Table 6-1: Project objective: Improve road safety

Supporting Objectives	Description
Minimise conflict points between vehicles	• Potential conflict points at intersections / road accesses of new road and intersections within the surrounding road network
Constructability	• Issues associated with the construction of the proposed bridge and road work, and subsequent impacts on the community and businesses including staging works and traffic management measures • Above issues applicable to the demolition works
WHS in construction and maintenance	• Minimising the WHS hazards for the construction, operation and maintenance

Table 6-2: Project objective: Minimise the impact on the natural, cultural and built environment

Supporting Objectives	Description
Impact on fauna habitat including threatened species	• Wildlife (particularly bats) impacts
Impact on flora including threatened species	• Vegetation impacts
Aboriginal and European heritage	• The relative impact of each crossing in relation to: ▪ Heritage items likely to be impacted ▪ Areas of high archaeological potential ▪ Indigenous cultural sites such as ceremonial or dreaming sites.
Water quality	• The relative impact of each crossing in relation to impacts on water quality
Air quality	• The relative impact of each crossing in relation to impacts on air quality
Noise & vibration impact	• The relative impact of each crossing in relation to: ▪ Operational traffic noise levels. ▪ Construction noise, vibration and noise sensitive locations
Flooding / Drainage	• The relative impact of each crossing in relation to: ▪ Changes to the drainage / hydraulics , including any potential velocity increases ▪ Changes to the flooding in the area, including any potential afflux effects on properties
Residential and commercial properties impacted	• Any changes to worth / market value of a property • Any property resumption impacts
Community amenities	• Impacts on local community access to the Public Hall, local parks, bus routes etc.

Table 6-3: Project objective: Provide value for money

Supporting Objectives	Description
Cost benefit ratios.	• The relative performance of each crossing in relation to road user costs and benefits (a ratio of total benefits over total costs)
NPV over 30 years.	• The relative performance of each crossing in relation to Net Present Value
Road user costs and benefits.	• The relative performance of each crossing in relation to road user costs and benefits
Infrastructure operating costs (incl maintenance).	• The relative performance of each crossing in relation to infrastructure operating costs
Comparative project costs	• The comparative differences between options at a strategic high level capital cost level.

6.3 Step 3 – Review of initial options

Based on the methodology described, the assessment for shortlisting options for a new bridge over Sportsmans Creek at Lawrence was implemented using the following process.

6.3.1 Option generation

An initial workshop and site visit was undertaken in Lawrence on 25 and 26 June as part of the project familiarisation and was attended by members of the project team. This workshop provided the team with an opportunity to identify a variety of options without consideration of constraints. The exercise identified a significant number of diverse options which were then categorised into three corridors. For full details of the options development refer to Appendix L.

The options generally fell into three corridors as follows:

Table 6-4: Corridor description

Corridor	Corridor Description
Western	This corridor consists of a new bridge to the west of Grafton Street.
Grafton Street	This corridor consists of a new bridge in the vicinity of Grafton Street.
Bridge Street	This corridor consists of a new bridge in the vicinity of the existing Bridge Street location.

The workshop then examined the three corridors to identify issues associated with each corridor. Following this workshop, six options were designed geometrically and alignments developed for each.

6.3.2 Preliminary options

The six options were numbered sequentially and were representative of the corridors initially developed. The alignments were categorised into the following corridors within the study area:

- Western corridor – Option 1
- Grafton Street corridor – Options 2, 3 and 4
- Bridge Street corridor – Options 5 and 6

The six options are shown in Figure 6.3 and were developed using a combination of inputs from the project team and from the following sources:

- Project Team initiation meeting and site visits
- Community feedback, suggestions and community recommendations from the July 2013 drop-in sessions
- Input from Clarence Valley Council, Roads and Maritime and key stakeholders.

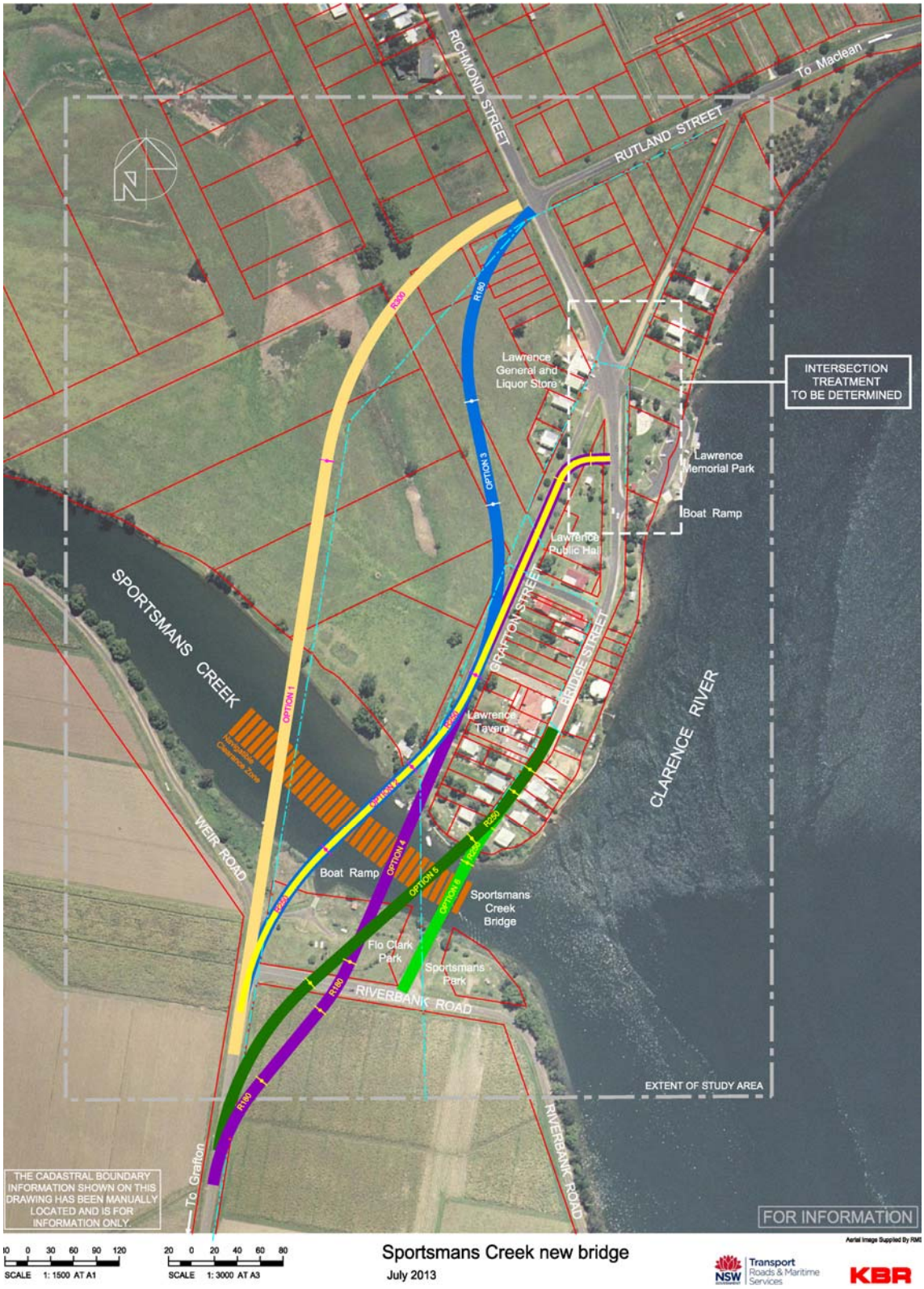

Figure 6.3 - Six selected options

Western corridor

Table 6-5: Options in the Western corridor

Option	Description
Option 1	• This option has a new bridge crossing to the west of Grafton Street and connects to the intersection of Richmond and Rutland Street. • New intersections and local realignment of Weir Road and Riverbank Road would be required. • Alternative access to the Boat Ramp would be required from Riverbank Road.

Grafton Street corridor

Table 6-6: Options in the Grafton Street corridor

Option	Description
Option 2	• This option has the same horizontal alignment starting point as Option 1 with a different alignment crossing the creek to connect into the existing Grafton Street. • New intersections and local realignment of Weir Road, Riverbank Road and Bridge Street would be required. • Alternative access to the Boat Ramp would be required from Riverbank Road. Local adjustments for property accesses would be required along Grafton Street.
Option 3	• This option has the same southern alignment as Option 2. The alignment then diverges to the west of the Lawrence General and Liquor Store and connects to the intersection of Richmond and Rutland Street. • New intersections and local realignment of Weir Road, Riverbank Road and Bridge Street would be required. • Alternative access to the Boat Ramp would be required from Riverbank Road. Local adjustments for property accesses would be required along Grafton Street.
Option 4	• This option follows the existing Grafton Street alignment with an intersection connecting to Riverbank Road and Bridge Street. • New intersections on Riverbank Road and Bridge Street would be required. • Local adjustments for property accesses would be required along Grafton Street. Acquisition of cane land on the southern approach is required.

Bridge Street corridor

Table 6-7: Options in the Bridge Street corridor

Option	Description
Option 5	• This option follows the existing Bridge Street alignment with the new bridge to the west of the existing structure. • A new intersection with the Riverbank Road would be required. • Local adjustments to properties and property accesses would be required along Bridge Street. Acquisition of cane land on the southern approach is required.

Option	Description
Option 6	• This option follows the existing Bridge Street alignment with the new bridge in the same location of the existing structure. A temporary crossing structure or long term closure would be required to facilitate construction.

6.4 Step 4 – Internal technical workshop and assessment of preliminary options

6.4.1 Workshop aims

An Internal Technical Workshop was held on 1 August, 2013 to assess the six preliminary options using the adopted MCA criteria. The objective of this workshop was to confirm and agree on a shortlist of options to take forward to the next stage of the project. The workshop was attended by twenty one representatives including the project team and Roads and Maritime stakeholders.

6.4.2 Workshop process

The process to assess the preliminary options involved:

- A brief discussion on the background and work undertaken to date.
- A series of discussions and presentations by KBR and specialist sub-consultants to identify and describe key constraints.
- Dividing workshop participants into four groups (5 to 6 people) to develop and agree ratings ranking of option, with reference to the objectives.
- Predetermining composition of the groups prior to the workshop to ensure a balance between client and project team representatives and multi-discipline expertise.
- Scoring sheets and guide notes used to highlight issues and provide prompts under the four higher level objectives.
- Illustrating the six preliminary options (A1 size) on walls, with ‘Pros & Cons’ sheets to allow participants to record their opinions of positive and negative aspects of the options.
- Ratings for each option were recorded and agreed within the groups under the four higher level objectives.
- The rating sheets were discussed within the groups and reviewed by all participants, to agree an overall rating.

6.4.3 General assessment results

The general assessment of each option was summarised in the pros and cons sheets provided underneath each of the option displays. Table 6.8 below summarises the workshop assessment of each option.

Table 6-8: Key assessment results for the six selected options

Option	Pros	Cons
Option 1	• Improved traffic efficiency – best option	• Longest:

Option	Pros	Cons

	• Road Safety
	• Improves access to boat ramp, sail boats
	• Enhances integrity of village
	• Best for noise overall
	• Least impact on:
	  ▪ Non Indigenous Heritage
	  ▪ Homes/Property
	• Enables Flo Clark Park to be consolidated
	• Retains connectivity with Weir Road and Riverbank Road
		▪ Embankment/Flood land crossing
		▪ Bridge
		▪ Road work
		• High cost – may be prohibitive
		• Impacts ephemeral wetlands;
		• Landscape/Visual
		• Removes passing trade from existing businesses
		• Flood Impact – increased afflux may affect homes
		• Difficult Soils/Settlement
		• Longer travel distance to village for bus and cyclists and pedestrian integration
		• New noise receivers on Lawrence Hill
		• Highest impact to ecology
		• Lose passing access to parks and toilets
		• Land acquisitions high
		• Speed risk due to horizontal alignment

Option 2	• Shorter bridge • Squared off alignment • Minimises impact on ephemeral wetlands • Retains heritage conservation area of village • Uses existing infrastructure • Avoids heritage conservation area • Reinforces original town plan • Better soils than Option 1 • Connectivity to store and town maintained • Provides opportunity for a direct future link to Rutland Street via Option 3 alignment • Retains main vistas • Allows Bridge Street to be improved • Good pedestrian and cycle connectivity • Allows good access to Grafton Street homes near bridge • Decrease noise on Bridge Street • Less environmental impacts than Option 1 • Improves access to boat ramp – sail boats • Enables Flo Clark Park/Sportsmans Park to be consolidated • Improves access to allotments in Grafton Street adjoining Sportsmans Creek • Uses existing road infrastructure Weir Road/	• New noise receivers on Grafton Street (due to new traffic on Grafton Street) • Unclear road hierarchy at northern end • Impact on properties - acquisition • Limited access during construction (Grafton Street) • Encroaches on heritage conservation area - minor • Potential to direct headlights into homes (north bound)

Option	Pros	Cons
	Riverbank Road • Provides improved view of Flo Clark Park and Clarence River from southern approach • Maximum business exposure to passing trade • Opportunity to rejuvenate area in vicinity of Lawrence General and Liquor Store	
Option 3	• Tavern access is maintained (in options 2-6) • Least encroachment into heritage conservation area • Second best for transport • Could be parallel with an additional Grafton Street laneway for local access • Good connectivity to Rutland Street • Shorter bridge • Squared off alignment for bridge • Retains heritage conservation area • Avoids conservation area • Allows Bridge Street to be improved • Allows good access to Grafton Street homes near bridge • Decreases noise on Bridge Street • Less environmental impacts than Option 1 • Improves access to boat ramp – sailing • Enables Flo Clark Park/Sportsmans Park to be consolidated • Improves access to allotments in Grafton Street adjoining Sportsmans Creek • Uses existing road infrastructure Weir Road / Riverbank Road • Provides improved view of Flo Clark Park and Clarence River from southern approach	• Decrease in passing trade to Lawrence General and Liquor Store • Impact on wetlands/ecology • Additional acquisitions required • Big footprint • Increased construction costs/low use of existing roads • Pedestrian/cyclists poor connectivity (not the worst) • Foreign to town grid layout • Segmentation of rural land • No opportunity to improve Lawrence General and Liquor Store / Park access for pedestrian movements • Construction of new road across wetland areas will increase Afflux, impacting homes and Lawrence General and Liquor Store
Option 4	• Natural landscape impacts • Heritage constraints • Flo Clark Park constraints • Good Pedestrian/Cycle connectivity • (Options 1-4) Compatible with town development including access to riverfront • Maximum business exposure to passing trade • Provides opportunity for a direct future link to Rutland Street via Option 3 alignment • Slows north traffic to town if existing approach road alignments maintained	• Constructability issues – constrained site • Cuts off boat ramp to sail boats • Segments Flo Clark Park • Isolates one house on left • Car park for boat ramp reduced – serviceability • Increased property acquisition of prime cane land on southern approach • Adversely effects access to Grafton Street properties adjoining Sportsmans Creek • Southern approach road levels may

Option	Pros	Cons
	• Fits heritage grid form • Shorter bridge length • Opportunity to rejuvenate area in vicinity of Lawrence General and Liquor Store • Headlights parallel to village (not in windows) • Least disturbance to acid sulphate soils	require the raising of Riverbank Road • Weir Road intersection to be re-configured
Option 5	• Builds alongside existing alignment • Decrease length of works required • Existing situation maintained with respect to noise for residents (noise receivers) along Bridge Street • User friendly for pedestrian/cyclists	• Continues to take heavy traffic through town • Higher bridge – prevents access to one home from road • Insufficient road width – will require road widening • High safety risk • Continues to dissect Flo Clark Park and Bridge Street residents from river foreshore • Maximum construction/noise/vibration and operational noise due to traffic • Doesn't meet safety objectives efficiently • Prohibitive heritage impacts • Major (unacceptable) land acquisitions • Major (unacceptable) property purchases and social disruption
Option 6	• Maintains existing conditions • Shortest route • Existing situation maintained with respect to noise for residents (noise receivers) along Bridge Street • User friendly for pedestrians / cyclists	• Severe construction issues • Heavy traffic through village • Higher bridge – prevents access to one home from road • Highest safety risk • Insufficient road reserve width to accommodate proposed bridge approach width on northern side • Dissects Flo Clark park • Doesn't meet safety objectives • Prohibitive heritage impacts • Major (unacceptable) land acquisitions • Major (unacceptable) property purchases and social disruption • Alternative crossing required. Temporary bridge and ferry • Major social disruption if temporary ferry used to maintain access to Grafton during construction – unacceptable to community

The subsequent option rankings for each group have been provided in Table 6.9.

Table 6-9: Assessment rankings of the six options

Groups	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Group 1	13	17	15	15	6	5
Group 2	12	20	15	16	8	4
Group 3	12	15	13	18	11	9
Group 4	15	18	17	20	5	4
Total Score	52	70	60	69	30	22
Overall Rank	**4**	**1**	**3**	**2**		

6.4.4 Strategic cost estimates of options

Strategic cost estimates were undertaken for each option selected by the Workshop, and to confirm the potentially excessive project costs for Option 1. The estimates were based on details appropriate to this early stage of design. Contingency has been based on the applicable range for strategic level estimate from the Roads and Maritime guidelines. The value of this is 40 per cent on the base estimate (infrastructure only), and 40 per cent on all other delivery costs. A risk and opportunity analysis has not been undertaken at this stage of the project.

A large number of assumptions have been made and appropriate contingencies allowed due to the limited level of detail of the available design. The full strategic cost estimate is located in Appendix M.

The following Table 6-10 provides a summary of costs for options shortlisted.

Table 6-10: Strategic cost estimates for shortlisted options

Item	Description	Option 1	Option 2	Option 3	Option 4
1	Project Development	$327,167	$278,970	$284,777	$284,989
2	Detail design and Documentation	$509,067	$431,952	$441,243	$441,583
3	Property Acquisitions	$666,000	$222,000	$444,000	$222,000
4	Utility Adjustments	$222,000	$277,500	$222,000	$277,500
5	Infrastructure (including construction (including temporary sidetrack) costs and Principals project accommodation	$12,388,190	$10,452,501	$10,741,454	$10,694,243
6	Finalisation	$335,073	$256,154	$260,471	$259,766
Total Strategic Estimate (excluding contingency)		**$14,447,496**	**$11,919,077**	**$12,393,946**	**$12,180,081**
Total Strategic Estimate (including contingency)		**$20,226,125**	**$16,686,338**	**$17,351,154**	**$17,051,743**

Refinement of the costings will be undertaken with further design. It should be noted that the following key areas will have the largest impact on estimates:

- Length of the bridge structure
- Height of the road approach embankments: minimising these works will aid in reducing costs.
- Local roads interfaces: minimising the amount of permanent and temporary works on and near local roads;
- Utility adjustments: finalising the impact for temporary and permanent utility locations will aid in confirming costs and thus reducing risk.
- Confirmation of survey and geotechnical conditions: will aid in confirming the requirements for the bridge.
- For the purpose of this cost estimate a ‘Super T’ construction methodology is adopted.
- The strategic estimate for Option 1 is $20.0M which is substantially higher than the shortlisted options, and is outside the project financial scope. This confirmed the Workshop recommendation to exclude Option 1.

6.4.5 Shortlisted options

Based on the assessment rankings above, the Workshop agreed on the following shortlist of options:

First preference Option 2 (Grafton Street corridor)

Second preference Option 4 (Grafton Street corridor)

Third preference Option 3 (Grafton Street corridor)

Option 1 was excluded on the basis of anticipated high project costs predicted to be beyond the financial scope of the project. Strategic estimates are to be prepared to confirm this position.

6.4.6 Assessment conclusions

Option scores

Based on the methodology and the assessment criteria, Options 2, 3 and 4 deliver many of the project objectives including, enhanced road safety, improved traffic and transport efficiency, low impact on the natural and social environment and value for money. Table 6.11 below summarises the ranking of the three shortlisted options according to their score against the study objectives by the Workshop.

Table 6-11: Summary assessment for shortlisted options

Description	Option 2	Option 3	Option 4
Ranking of each shortlisted option against project objectives	**1**	**3**	**2**
Estimated Cost ($M)	**$16.69M**	**$17.35M**	**$17.05M**

The three shortlisted options are illustrated in Figure 6.4 on the following page:

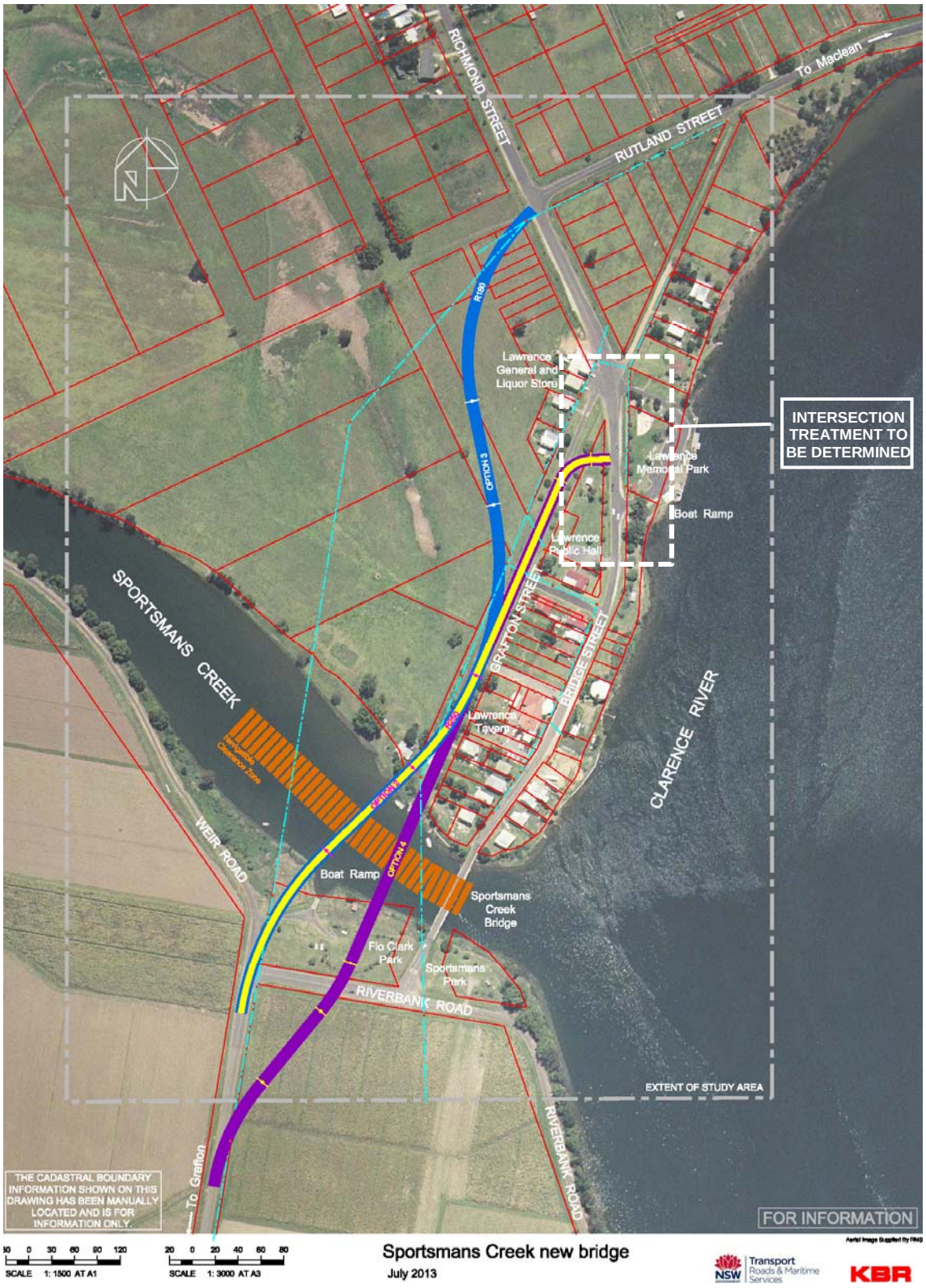

Figure 6.4 - Three shortlisted options

6.5 Step 5 – Identify Recommended Option

The shortlisted options were reviewed by Roads and Maritime in conjunction with Transport for NSW

The review concluded that Option 2 was the recommended option to be taken forward for community review and comment as it provided key benefits in comparison to Options 3 and 4. See Table 6-12 below.

A comprehensive list of positive and negative issues for each option has been presented in Section 7 of this report.

Table 6-12: Summary of key benefits for Option 2

Recommended preferred option – key benefits
Description - Option 2 The recommended preferred option is to build a new bridge west of the existing Sportsmans Creek bridge and boat ramp. This new bridge will connect the Grafton - Lawrence Road with Grafton Street and re-join Bridge Street south of the Lawrence General and Liquor Store. **Benefits** • Makes use of existing roads and minimises development on greenfield sites and overall road length • Maintains passing trade for local businesses • Connects Flo Clark Park and Sportsmans Park • Avoids disruption to the boat ramp and allows new access for sail boats • Delivers value for money • Minimises impact on natural wetlands • Reinforces original town plan • Reduces fragmentation of the heritage conservation area.

Option 2 was deemed superior to the other shortlisted options for the following reasons:

Option 3

- *Excessive land acquisition at northern approach* – The northern approach crosses agricultural farmland to the west of the Lawrence General and Liquor Store and adjoining residences. The land acquisition is extensive.
- *Potential flooding impacts on residences and Lawrence General and Liquor Store in Grafton Street* – During the recent (February 2013) flood event, floodwater from the Clarence River flowed across Rutland Street to Sportsmans Creek, damaging the road pavement. Option 3 has the potential to impede water flows across this area which may result in increased local flood heights impacting the Store and adjacent residences.
- *Bypass Lawrence General and Liquor Store* – The Lawrence General and Liquor Store has significant passing trade business. This option would redirect passing trade away from the store.

- *Potential environmental effects* – Potential Archaeological Deposit (PAD) in undeveloped land - Due to the undeveloped land on the northern approach, there is a possibility that a PAD could be found as a result of further site investigations. Whilst this could be managed, this risk is unique to this option.
- *Reconfiguration of the Richmond/Rutland Street intersection* – Crossroad intersections are to be avoided due to traffic safety aspects. The intersections with Richmond Street would be offset, resulting in higher cost, land acquisition, etc.

Option 4

- *Extensive land acquisition at southern approach* – The land acquisition on the southern approach is extensive and involves prime agricultural land. Productive cane land will attract a premium land value.
- *Dissection of Flo Clark Park* – The alignment of this option will dissect the existing park, alienating the boat ramp from the remainder of the park.
- *Impedes access to boat ramp for sail boats* – With the alignment being on the downstream side of the existing boat ramp, access will be limited due to the clearance under the structure.
- *Local access to land in Grafton Street adjacent to Sportsmans Creek is restricted* – There are properties on the eastern side of Grafton Street adjoining Sportsmans Creek. The bridge approaches for this option will impact access to the downstream property.

7 Recommended option

Option 2 is the recommended option to take forward for further investigation and community consultation. The alignment for Option 2 is illustrated in Figure 7.1.

Figure 7.1 - Recommended Option - Option 2 (For detail of insets refer to Figure 7.2)

7.1 Matters for community input

While Option 2 is the recommended option Roads and Maritime is seeking community input on this decision, there remain matters of road and intersection design which will require input from the Lawrence community and further technical advice.

These include:

- Configuration of the Grafton/Bridge Street intersection and the southern approach intersections with Riverbank Road and Weir Road.
- Treatment and re-construction for the southern end of Bridge Street following demolition of the existing bridge.

7.1.1 Intersection treatments

The intersections design is preliminary and based on manually input property boundaries.

Grafton/Bridge Street

Preliminary designs for the intersections at Grafton/Bridge Street intersection have been developed for review and comment. Refer to Inset 2 – Figure 7.2.

Option A involves a T intersection from Grafton Street to Bridge Street.

Option B involves a minor realignment of Grafton Road to form a through route from Grafton Street to Richmond Street. Realignment of the intersecting roads is required to accommodate this revised through route. The horizontal alignment is based on a design speed of 50km/h with a minimum radius of 60m.

In both A and B vehicles will continue to travel along Richmond Street before turning right onto Rutland Street when heading towards Maclean.

Riverbank Road and Weir Road

A single option (Inset 1 - Figure 7.2) has been developed for this intersection as it is considered to be the most appropriate treatment for this location. The design involves offset T intersections for Riverbank Road and Weir Road. Other options involving cross roads were considered by discounted on a safety basis.

7.1.2 Southern end of Bridge Street

A hammerhead turning bay is proposed at the south end of Bridge Street following the removal of the existing Sportsmans Creek bridge. The turning bay will be located within the existing 10m wide road reserve. Refer to Inset 3 – Figure 7.2.

The existing northern approach to the bridge would be removed and reconstructed pavement, kerb and gutter and drainage provided. Access would be provided to the existing residences. The end of the Bridge Street would be landscaped and shaped subject to design.

Figure 7.2 illustrates possible intersection designs and Bridge Street treatment for the recommended option.

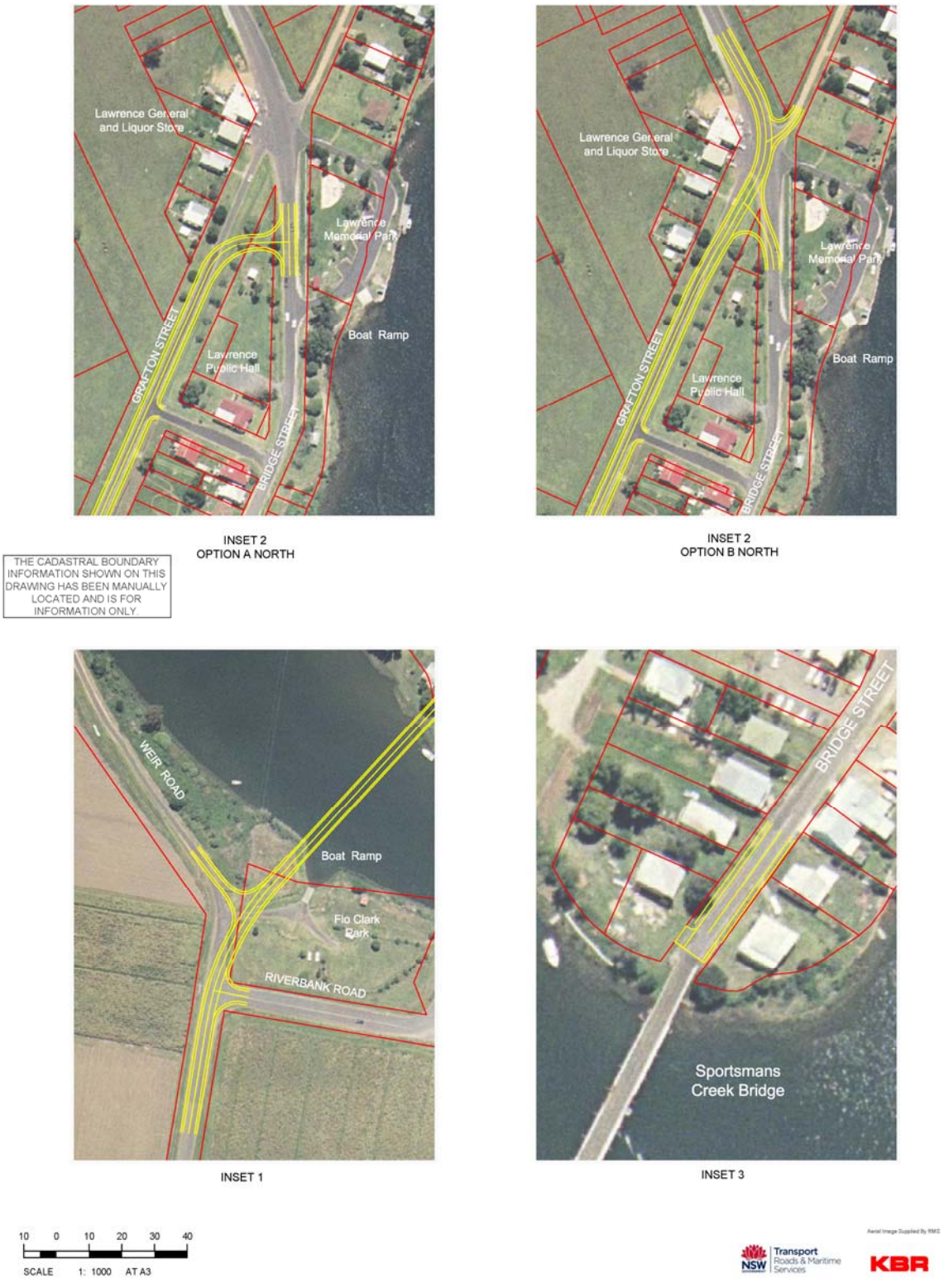

Figure 7.2 - Possible intersection designs and Bridge Street treatment for Option 2

8 Next steps

Following display and community consultation of the recommended option planned for late 2013, further technical and environmental investigations will be undertaken to provide more detailed information.

Community input is important for the further development of designs for the bridge, road work and intersections.

The investigations and assessment will be documented as part of the next stage of this project. When complete, the Preferred Option Report will be published. The flow chart in Figure 8.1 represents the process to select the preferred option.

Figure 8.1 - Project process to select a preferred option

References

Clarence Valley Local Environmental Plan 2011

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Appendices can be found online at www.rms.nsw.gov.au/roadprojects

END OF REPORT