



Planning &
Environment

**STATE SIGNIFICANT INFRASTRUCTURE
ASSESSMENT:
*Additional Crossing of the Clarence River
at Grafton (SSI 6103)***



Secretary's Environmental Assessment Report
Section 115ZA of the
Environmental Planning and Assessment Act 1979

December 2014

Cover Photograph: Existing Grafton Bridge over the Clarence River, Grafton.

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EXECUTIVE SUMMARY

NSW Roads and Maritime Services (the Proponent) proposes to construct and operate a road bridge crossing of the Clarence River at Grafton comprising a 553 metre long concrete box girder and Super-T form bridge containing two traffic lanes (one in each direction), road shoulders and a pedestrian/cycle path. The new bridge is proposed to be located approximately 70 metres downstream of the existing Grafton Bridge, which would be retained. The project also comprises approach road work and replacement of a rail viaduct section in Pound Street, Grafton.

The project is located in Grafton, in the Clarence Valley local government area on the NSW Mid-North Coast, about 610 kilometres north of Sydney.

Need and Justification

The project is required to alleviate existing traffic congestion and safety issues that stem from increasing traffic demand at the existing river crossing and design issues inherent in the existing bridge, including kinks, narrow lane widths and reduced lateral clearances. The key project objectives are to enhance road safety for all road users and improve traffic efficiency for local, regional and freight road transport between Grafton and South Grafton, while providing value for money and minimal environmental impact. Linking the communities across the Clarence River would support regional and local economic development.

The proposal is consistent with key strategic and transport planning policies including the *State Infrastructure Strategy* and the *Mid North Coast Regional Strategy*.

The *State Infrastructure Strategy* aims to improve access to employment, connect people and communities, and improve local transport networks. The project would help to achieve these objectives by improving traffic capacity and providing for important access by vehicles, pedestrians and cyclists and relieving congestion across the Clarence River.

The Project is also consistent with the *Mid North Coast Regional Strategy* as it would improve access and transport efficiency, which would enhance the ability of Grafton to fulfil its function as a major regional centre.

Assessment and Approvals Process

The project is State Significant Infrastructure pursuant to 115U of the *Environmental Planning and Assessment Act 1979* and has been assessed under Part 5.1 of the Act. The Minister for Planning is the approval authority.

The Environmental Impact Statement was publicly exhibited between 20 August 2014 and 19 September 2014. The Department received a total of 23 submissions during the exhibition period comprising 6 submissions from public authorities and 17 submissions from the general public (plus 2 late submissions after completion of the exhibition period). Submissions from the public authorities generally supported the proposal subject to recommended conditions should the project be approved. Of the 17 public submissions received, 4 objected to the proposal, 2 supported the proposal and 11 did not object but raised concerns.

The Proponent responded to the issues raised in submissions in the form of a Response to Submissions Report. No amendments to the project were proposed. The Department has completed its assessment of the merits of the project including consideration of all the environmental, social and economic impacts and the relevant requirements of the *Environmental Planning and Assessment Act 1979*.

Key Assessment Issues

Based on the submissions and the Department's assessment, the key issues surrounding the project are:

- route selection process and consideration of the different route options;
- potential flooding;
- traffic and transport including traffic congestion on the surrounding road network; and
- noise and vibration.

The Department concluded that the Proponent has conducted a thorough and suitable route selection process to identify a preferred alignment. The Proponent explored a number of alternatives and conducted community and stakeholder consultation processes to arrive at the selected route alignment. The Department considers the preferred alignment to be optimal given that:

- it best met the project objectives of increasing road safety and improving the efficiency and capacity of the road network;
- provides better transport efficiency for the whole of the road network, for both the short term and longer term;
- provides a better socio-economic outcome by supporting Grafton as a regional centre; and
- fewer environmental outcomes, including reduced impacts on non-Aboriginal heritage

In relation to flooding issues, the Department engaged an independent expert to assist in its assessment. Whilst the project has been primarily designed to maintain the existing flood impacts on Grafton and South Grafton, the Department considers that the project, at a macro level, would ultimately have a net environmental benefit in relation to flooding, particularly in relation to levee improvements and emergency evacuation options for Grafton which will result from the operation of the project.

The Department acknowledges that the operation of the project would provide .the opportunity for improved traffic flow across the Clarence River and alleviate current congestion and safety concerns. While construction would be disruptive in the short-term, this is clearly outweighed by the long-term traffic and transport, economic and community benefits of the proposal.

In relation to noise and vibration, the Department acknowledges construction of the project would result in high noise impacts to nearby sensitive receivers. However, such impacts are temporary and the Proponent has committed to implement management and mitigation measures to reduce noise impacts. The operation of the project is expected to result in higher noise levels at some sensitive receivers in Grafton. Mitigation measures such as a noise barrier on the Grafton embankment of the bridge approach road and the architectural treatment of residences and sensitive land uses would ensure that compliance with the operational noise objectives can be achieved.

Conclusions and Recommendations

The Department's assessment has considered the Proponent's Environmental Impact Statement and Response to Submissions Report and all submissions received from public authorities and the community regarding the proposal. The Department has included draft recommended conditions of approval incorporating stringent and comprehensive environmental assessment requirements to enhance commitments and mitigation measures made by the Proponent, should the project be approved.

Importantly, the Department's assessment concluded that the proposal would result in a number of key benefits including:

- Relieving current and future traffic congestion on the existing bridge (the current bridge is at capacity during peak periods which impacts on road safety and efficient operation of the road network);
- Support regional and local economic development, by improving access and freight distribution efficiency by reducing congestion and providing an alternative crossing over the Clarence River for large, heavy vehicles;
- Improving safety for motorists by providing a bridge that meets contemporary design standards;
- Improving safety for pedestrians and cyclists travelling across the river by providing purpose designed pedestrian and cycle paths;
- Improving the level of flood immunity of the surrounding approach roads, providing greater access and movement during flood events; and
- Providing a direct \$200 million investment into transport infrastructure for the region and up to 90 construction jobs over three years.

The Department has carefully considered the key areas of concern, including route selection, flooding, traffic and transport and noise and vibration impacts against the social and economic benefits of the project and its pivotal role in providing additional bridge capacity, improving safety and relieving congestion in Grafton. The Department has concluded that the proposal's benefits which include improved road safety, increased efficiency for the movement of people and goods, improved evacuation access during flood emergencies and enhanced cyclist and pedestrian links between Grafton and South Grafton, are significant, and outweigh its potential impacts, which can be managed. Subsequently, the project is in the public interest and should be approved subject to the recommended conditions of approval.

Key recommended conditions of approval include:

- the preparation of a Construction Environmental Management Plan which outlines the environmental management practices and procedures that would guide the construction of the project;
- a review of flood modelling and mitigation measures at the detailed design stage and the preparation of a Hydrological Mitigation Report which provides details of flood mitigation measures. The flood mitigation measures are required to be installed prior to construction in the Clarence River commencing;
- archival recording for impacted local heritage items and the preparation of an Urban Design and Landscape Management Plan including heritage design principles;
- a Construction Traffic and Access Management Plan to manage construction traffic and access impacts of the proposal; and
- a Construction Noise and Vibration Management Plan to manage and mitigate construction and vibration impacts on sensitive receivers and review of the operational noise mitigation measures following detailed design.

1. INTRODUCTION

1.1. Purpose and Structure of this Report

This is an environmental assessment report to the Minister for the approval of State Significant Infrastructure and has been prepared in accordance with Section 115ZA of the *Environmental Planning and Assessment Act 1979*. The assessment has been informed by the Proponent's Environmental Impact Statement (EIS), submissions, and the Proponent's Response to Submissions Report.

Section 2 of this report provides details of the proposal. Section 3 outlines both the EIS process and statutory approvals required for the proposed development. Section 4 summarises the public and government agency consultation process. The core part of the environmental assessment is provided in Section 5. Conclusions and recommendations are provided in Section 6.

1.2. Nature and Location of the Proposal

Roads and Maritime Services (the Proponent) seeks approval for a new road bridge across the Clarence River at Grafton. The proposal consists of the construction and operation of a new bridge, approximately 553 metres in length with a deck width of 17 metres, providing two traffic lanes (one in each direction), two road shoulders and a pedestrian/cycle path. The new bridge is proposed to be located approximately 70 metres downstream of the existing Grafton Bridge, which would be retained. The proposal also comprises associated approach road and rail viaduct upgrades and realignment work and flood mitigation work.

The new bridge is required to address current traffic congestion issues, future traffic demand, and safety issues that are inherent in the existing Grafton Bridge. The existing Grafton Bridge provides a rail crossing in addition to road traffic and therefore is proposed to be retained as part of the proposal, however its design, including kinks, narrow lane widths and reduced lateral clearances presents safety issues for bridge users. The existing bridge is the only crossing of the Clarence River in the Grafton area. Road users travelling between Grafton and South Grafton use the bridge as there is no practical alternative route. The existing bridge therefore is used by both local and through trips, and forms part of the alternative regional north-south road link when the Pacific Highway is closed.

The new bridge is required at this locally and regionally important crossing of the Clarence River and enables continued linkage between Grafton and South Grafton for commuters, business and freight transport, and intra-regional and interstate traffic, while providing value for money and minimal environmental impact. The new bridge also addresses the safety issues and traffic congestion during peak periods currently experienced on the existing bridge. These are the key objectives of the proposal.

The proposal would consist of construction work on both the northern and southern banks of the Clarence River, local roads in Grafton and South Grafton and sections of the Clarence River. Part of the existing rail viaduct where it crosses Pound Street in Grafton would also be replaced. The project is located wholly within the Clarence Valley local government area. The location of the proposal is shown in **Figures 1 and 2**. Figure 1

Grafton is a major regional centre located on the NSW Mid North Coast, approximately 610 kilometres north of Sydney and 200 kilometres south of the Queensland border. Grafton is located on the northern and southern banks of the Clarence River, about 37 kilometres inland from the coast, and is a focal point for regional road, river and other transport networks and regional infrastructure services.

The proposed bridge is located adjacent to the existing Grafton Bridge which is a significant regional transport link. The upper level of the Grafton Bridge supports a two way road for traffic via Bent Street (Summerland Way), and its lower level supports a rail bridge that carries the Northern Railway line, a water main, and footbridges on either side.

1.3. Environmental Setting and Context

The immediate surrounding areas are characterised by vegetation along the northern and southern river banks and recreational and open space areas mixed with industrial land uses in South Grafton, and mixed residential and commercial land uses in Grafton. The Clarence River is a major feature in the regional area and contains Susan Island approximately 1 kilometre upstream of the existing Grafton Bridge.

The proposal follows the alignment of the preferred option announced by Roads and Maritime Services (RMS) in April 2013. The southern end of the project is located at the junction of Bent Street (the Summerland Way) and the Gwydir Highway in South Grafton and the northern end is located at the junction of Pound Street and Villiers Street in Grafton.



Figure 1: Regional context for proposed project (RMS 2014)

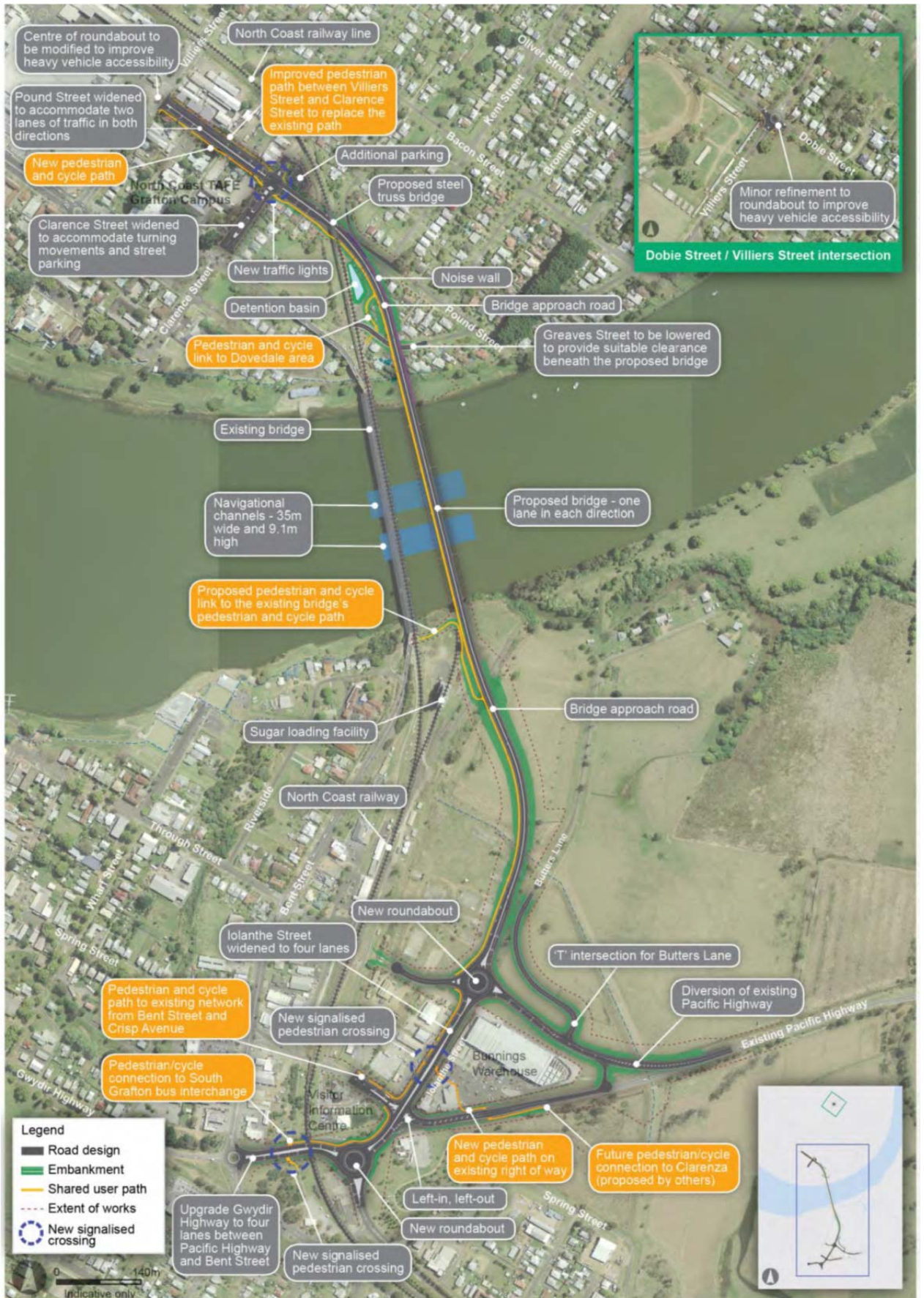


Figure 2 : Proposed route and alignment location (RMS 2014)

2. ABOUT THE PROPOSAL

2.1. Project Description

The Capital Investment Value (CIV) of the project is estimated at \$200 million and would include a peak construction workforce of approximately 70 to 90 jobs. The project would take approximately three years to build. The key construction components of the project are listed in **Table 1**.

Table 1: Key construction components

Aspect	Description
<i>Pre-Works</i>	<ul style="list-style-type: none"> Upgrade of Charles Street (Gwydir Highway) to 4 lanes between the Pacific Highway and Bent Street, South Grafton and associated intersection upgrades in this location.
<i>Construction Summary</i>	<ul style="list-style-type: none"> Construction of a new bridge over the Clarence River about 70m downstream of the existing road and rail bridge (which is to be retained); Upgrades to parts of the road network in Grafton and South Grafton to connect the new bridge to the existing road network, including: <ul style="list-style-type: none"> Widening to 4 lanes: Iolanthe Street; the Gwydir Hwy between Bent St and the Pacific Hwy; and Pound St between Villiers St and the approach to the new bridge; Realigning the existing Pacific Hwy to join Iolanthe St near Through St; Providing new roundabouts at the intersection of the Pacific Hwy and Gwydir Hwy and at the intersection of Through St and Iolanthe St; Limiting Spring St and the Old Pacific Hwy to left in and left out only where they meet Iolanthe St; Realigning Butters Lane; Providing traffic signals at the intersection at Pound and Clarence Streets; Closing Kent St where it is crossed by the bridge approach road; Realigning and lowering Greaves St beneath the new bridge; Realigning Bridge St to join directly to the southern part of Pound St (east of the new bridge approach). There would be no direct connection between Pound St south and the new bridge approach; Widening Clarence St to provide formal car park spaces; Modifications to the existing Dobie St and Villiers St roundabout. Replacement of the existing rail viaduct section across Pound St with a new bridge structure for sufficient vertical clearance for the upgrade of Pound St; Construction of a pedestrian and cycle path and signalised pedestrian crossings for access to the new bridge and throughout Grafton and South Grafton; and Ancillary works.
<i>Construction Footprint</i>	Includes the northern and southern river banks at the new bridge location and across the Clarence River.
<i>Compounds</i>	Ancillary facilities to support construction would be required, including two sites containing workshops, construction equipment and materials storage and workforce facilities. The main ancillary facility would be located in South Grafton including a potential concrete batching plant, and a smaller facility in Grafton to support construction of the northern portion, replacement of the Pound St rail viaduct and road upgrades.
<i>Property acquisition</i>	<ul style="list-style-type: none"> 22 residential properties in the Dovedale area and 1 vacant commercial property would require full acquisition; 2 vacant commercial properties and three private primary production properties in South Grafton would require partial acquisition; and Land owned or controlled by public authorities (Clarence Valley Council, ARTC and TAFE NSW) would be affected.

Aspect	Description
<i>Construction Hours</i>	Standard construction hours would be between 7.00am - 6.00pm Monday to Friday and 8.00am – 1.00pm Saturdays. Some out of hours work would be required. Replacing the Pound Street rail viaduct would require construction to occur 24 hours per day to minimise rail line closure duration.
<i>Earthworks</i>	Vegetation clearance, topsoil stripping, soft soil treatment, cut and fill placement and compaction of earthwork, stabilising and reinstatement work.
<i>Bridge Work</i>	<ul style="list-style-type: none"> • Bridge foundations would comprise piles bored into bedrock to support concrete pile caps of reinforced concrete, piers and the superstructure; • Reinforced concrete or similar northern and southern bridge abutments; • Construction of concrete box girder section across the main river channel; • Transition of the concrete box girder section into a concrete Super-T form at northern and southern river banks; and • The new piers would be aligned with the piers of the existing bridge including piers located in the Clarence River.
<i>Bridge Dimensions</i>	<ul style="list-style-type: none"> • Total length of 553m comprising 466m concrete box girder section across the main river channel and 29m each Super-T section; • Total deck width of 17m; and • Minimum horizontal clearance of 35m and minimum vertical clearance of 9.1m.
<i>Flooding, Drainage and Stormwater Mitigation Works</i>	<ul style="list-style-type: none"> • The height of sections of the existing levee upstream of the existing bridge would be raised by 0.2m, including approximately 3.7km of the existing levee in Grafton and 7km of the existing levee in South Grafton; • Flood mitigation works work be provided for a number of impacted properties located outside the levee system; • Modification and use of the existing surface drainage system during construction works where possible, and replacement of existing drainage networks in some sections with pits to direct stormwater runoff into grass-lined open channels or swales which would provide some water quality treatment. Where this is not possible, a pit and pipe network would be implemented; and • Redesign of any existing grass-lined open channels or swales identified during detailed design to optimise water quality performance.

Table 2: Key operational components

Aspect	Description
<i>Operational Summary</i>	<ul style="list-style-type: none"> • A dual-lane regional roadway comprising one northbound lane and one southbound lane, and one shared pedestrian/cycle way; and • The existing bridge would be retained with one northbound and one southbound lane.
<i>Connection to Existing Roads</i>	<ul style="list-style-type: none"> • Southern approach road is located at the junction of Bent St (the Summerland Way) and the Gwydir Hwy in South Grafton; and • Northern approach road is located at the junction of Pound St and Villiers St in Grafton.
<i>Changes to Local Road and Rail Network</i>	<ul style="list-style-type: none"> • Use of upgraded, widened and/or realigned roads including Villiers, Dobie, Pound, Clarence and Greaves Streets in Grafton, and Iolanthe, Through and Spring Streets and the Pacific and Gwydir Hwys in South Grafton; • Operation of new and modified roundabouts at the intersection of the Pacific Highway and Gwydir Highway, the intersection of Through Street and Iolanthe Street, and Dobie Street and Villiers Street; • Operation of new traffic signals at the intersection at Pound and Clarence Streets; and • Operation of the rail viaduct across Pound Street at its new alignment (by ARTC).

Project staging would be implemented for the construction and operation of the project. The upgrading of Charles Street (Gwydir Highway) to four lanes between the Pacific Highway and Bent Street, South Grafton would be carried out as Early-Works. The construction and operation of the bridge and approach roads in Grafton and South Grafton would be completed as Stage One of the project. The realignment of the Pacific Highway at South Kempsey may occur as a future Stage Two.

2.2. Rationale for the Proposal

Grafton's existing road network, which includes the existing Grafton Bridge across the Clarence River, supports economic growth across the regional area of Grafton by providing an important river crossing point that connects people to jobs, and facilitates trade between businesses. The local road network also supports heavy vehicle movements, including freight movements to, from and through Grafton and South Grafton. The existing bridge connects the Summerland Way with the Gwydir Highway and Pacific Highway, and during closures of the Pacific Highway, the only alternative north-south road link. The majority of commercial transport demand in the region is serviced by road freight, consequently the location of a new bridge crossing at Grafton is important to Grafton and the region. During the route selection process river crossings which bypassed Grafton were investigated, however a bypass of Grafton would not satisfy the objectives of the project to improve road safety on the existing bridge and improve the efficiency of the Grafton road network.

2.3. Need and Key benefits

The existing Grafton Bridge is the only crossing of the Clarence River in the Grafton area for road and rail movements between Grafton and South Grafton. It currently provides for local trips through the area as well as being an important alternative regional north-south road link when the Pacific Highway is closed due to road traffic incidents or flooding. The nearest alternative bridge over the river for road traffic is located at Maclean, approximately 41 kilometres east of Grafton and the nearest alternative crossing is the Ulmarra ferry, which is not suitable for high traffic volumes or heavy vehicles.

Traffic counts conducted across the bridge in August 2010 indicated the bridge was carrying approximately 1,360 vehicles per hour in the morning peak northbound and approximately 1,330 vehicles per hour in the afternoon peak southbound. The existing bridge has a theoretical capacity of between 900 to 1,400 vehicles per lane per hour. The Grafton Bridge is currently operating at capacity during peak periods, and that with forecast traffic growth of around 2,500 vehicles in the morning peak in 2019 (northbound) and 3,000 vehicles southbound in the afternoon peak, the current traffic congestion problems will worsen significantly. The project is therefore needed to improve the efficiency of the local traffic network, which during the morning peak is queued to the Pacific Highway, and in the afternoon peak, impacts on traffic movements in Prince Street, Villiers Street and Pound Street. A summary of forecast traffic demand during peak periods across the existing bridge, in terms of number of vehicles, is provided in **Table 3**.

Table 3: Forecast traffic demands across the existing bridge (RMS 2014)

Year	Morning Peak (7.00am to 9.00am)		Evening Peak (3.00pm to 5.00pm)	
	Northbound	Southbound	Northbound	Southbound
2019	2562	1723	2475	3073
2029	3643	2487	3357	4150
2039	4276	2876	3828	4798

In addition, the proposal is needed due to design problems with the existing bridge that limits its operating capacity. These issues can be summarised as follows:

- the existing bridge has pronounced kinks in its horizontal alignment at the northern and southern ends. Long, heavy vehicles are currently required to cross the centreline to negotiate the kinks. This creates an accident risk along the Summerland Way. This is evidenced in RMS' Crashlink database statistics which has identified the kinks in the bridge alignment and heavily trafficked intersections at each end as 'crash hotspots';

- the kinks in the existing bridge also cause traffic in both directions to slow or stop, as long vehicles negotiate the alignment. This causes traffic queues back past the merging lanes on the approaches at both ends of the bridge, particularly during peak periods. Queuing extends to the Gwydir Highway and Pacific Highway in South Grafton and to Fitzroy Street in Grafton during these periods;
- flow on effects due to traffic congestion associated with the bridge, and the resultant delays, affect the efficiency of the Summerland Way at Grafton. This road is the designated inland heavy vehicle route linking southern Queensland with the Richmond River and Clarence River valleys. RMS forecasts that this traffic congestion will worsen over time, and substantially affect the performance of the State and local road network;
- low speeds resulting from the above safety and traffic congestion issues. During the morning peak period, northbound traffic speeds have been recorded at around 16 kilometres per hour in a 50 kilometre per hour zone. The low speeds reduce the efficiency of commuter and freight movements across the bridge;
- due to the congestion, there is currently a 25/26 metre long B-double trucks ban on the bridge during peak periods, which also restricts freight movement; and
- the project is also needed to provide a safe access way to and across the Clarence River for pedestrians and cyclists in a designated lane way.

The proposal addresses these constraints by providing an additional crossing of the Clarence River in Grafton and associated approach road upgrades which would meet current safety and engineering design standards. The proposal objectives were defined at the early stage in the project development and have guided the selection of a preferred project. The key project objectives are as follows:

- enhance road safety for all road users over the length of the project;
- improve traffic efficiency between and within Grafton and South Grafton;
- support regional and local economic development;
- involve all stakeholders and consider their interests;
- provide value for money; and
- minimise impact on the environment.

2.4. Strategic Justification

The proposal is consistent with relevant local, regional and state strategic planning and policy documents. Specifically, *NSW 2021: A Plan to Make NSW Number One* (Department of Premier and Cabinet, 2011) provides as one of its five key strategies to strengthen the local environment and communities while two of the objectives in the *State Infrastructure Strategy* (Department of Premier and Cabinet, 2012) are to improve access to employment and to connect people and communities and improve local transport networks. The project would help to achieve these objectives by improving traffic capacity and providing for important access by vehicles, pedestrians and cyclists and relieving congestion across the Clarence River.

The provision of an additional crossing of the Clarence River at Grafton is identified in the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) as a medium to long term initiative (in terms of funding) for the Northern Rivers region. This initiative is recognised as improving access across the region, providing an alternative route to the Pacific Highway, supporting Grafton as a major regional centre and relieving congestion on the existing bridge. The project would help to deliver a key objective of this plan being to support regional development by improving accessibility to jobs, services and people, improve freight connections and links between clusters of business activities. The Government has allocated funds for the new Grafton Bridge under *Rebuilding NSW*. The *Mid North Coast Regional Transport Plan* (Transport for NSW, 2013) identifies key actions to address the initiatives set by the state-wide plan. This includes an action to invest in the road network, including the progression of an EIS for the second crossing of the Clarence River at Grafton.

The project objectives are consistent with NSW freight and road safety strategy documents including the NSW Freight and Ports Strategy (Transport for NSW, 2013), the National Land Freight Strategy discussion paper (Infrastructure Australia, 2011) and the National Road Safety Strategy 2011-2020 (Australian Transport Council, 2011) which identify ways to improve freight services and safety on NSW roads.

At a regional and local level, the project objectives are consistent with the *Northern River's Regional Plan 2013-2016* (Regional Development Australia – Northern Rivers, 2013) which sets out seven priorities including connecting communities. The project aims to achieve this via improvements to the road network linking Grafton and South Grafton by alleviating traffic congestion and providing for pedestrian and cycle access. The *Clarence River Way Masterplan* (Clarence Valley Council, 2009) sets out a strategic intent to improve local transport networks to connect communities and access to the Clarence River from a tourism perspective, while the *Grafton Waterfront Precinct Masterplan* (Clarence Valley Council, 2011) proposed a revitalisation of the Clarence River waterfront. The project's urban design principles would be in keeping with the desired future landscape and urban design character detailed in both of these masterplans. Specifically the project aims to avoid direct impacts on the waterfront precinct presented in the *Grafton Waterfront Precinct Masterplan*.

The project would provide an important shared pedestrian and cycle way across the new bridge which would be designed in accordance with the design principles and objectives of the Council's *Bike Plan and Pedestrian Access and Mobility Plan* (Clarence Valley Council, 2008) and the *Clarenza Cycleway Options Study* (Clarence Valley Council, 2012).

The proposal would provide a safer and more efficient link between Grafton and South Grafton across the Clarence River, improving access and connectivity for vehicle, pedestrians and cyclists. In providing an alternative route the project would remove the current limitation on freight transport on the existing Grafton Bridge, and alleviate traffic congestion, and improve safety and amenity of this local and regionally important traffic connection across the Grafton area. The Department considers the project to be in keeping with State, regional and local plans and policies. For the reasons listed above, the Department accepts the Proponent's need and justification of the proposal.

3. STATUTORY PLANNING REQUIREMENTS

3.1. State Significant Infrastructure

The new bridge over the Clarence River at Grafton project is being assessed as State Significant Infrastructure under Part 5.1 of the *Environmental Planning and Assessment Act 1979* (the Act). Clause 14 of the *State Environmental Planning Policy (State and Regional Development) 2011* declares development pursuant to section 115U(2) of the Act to be State significant infrastructure.

3.2. Permissibility

The project is defined as a road and road infrastructure facility under *State Environmental Planning Policy (Infrastructure) 2007*. As the road infrastructure facility is being carried out by a public authority it is identified as development that is permissible without consent under clause 94 of the Policy.

3.3. Delegation

On 10 November 2014, the Minister for Planning delegated her powers and functions for the approval or disapproval of the carrying out of State Significant Infrastructure under section 115ZB of the Act to the Executive Director, Infrastructure and Industry Assessments, of the Department in cases where:

- the relevant local council has not made an objection, and
- a political disclosure statement has not been made, and

- there are less than 25 public submissions in the nature of objections.

The subject application complies with the above criteria. Consequently, the Executive Director, Infrastructure and Industry Assessments, may determine the application under delegated authority.

3.4. Environmental Planning Instruments

In addition to *State Environmental Planning Policy (State and Regional Development) 2011* and *State Environmental Planning Policy (Infrastructure) 2007*, there are a number of environmental planning instruments that have relevance to the proposal, however they do not apply to the project by reason of section 115ZF of the Act. Notwithstanding, the objectives of relevant instruments have been considered in this assessment.

3.5. Objects of the Act

Decisions made under the Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The relevant objects are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) *the protection, provision and co-ordination of communication and utility services,*
 - (iv) *the provision of land for public purposes,*
 - (v) *the provision and co-ordination of community services and facilities, and*
 - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
 - (vii) *ecologically sustainable development, and*
 - (viii) *the provision and maintenance of affordable housing, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The Department has given due consideration to the objects of the Act including:

- how the proposal would impact on the natural environment, and the social and economic character, and land use regimes, of the proposal area and the State more broadly (refer **Section 5**);
- the strategic justification of the proposal in terms of the orderly and economic use and development of land (refer **Section 2.2**), and how the proposal would affect traffic and access throughout the region and beyond (refer **Section 5.2**);
- protection of the environment by assessing the effectiveness of proposed mitigation measures. In addition, the Department has considered the impact of the proposal on biodiversity (refer **Section 5**); and
- the principles of ecologically sustainable development (refer **Section 3.6**).

3.6. Ecologically Sustainable Development

The Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD requires the effective integration of economic and environmental considerations in decision-making processes and that ESD can be achieved through the implementation of:

- (a) *the precautionary principle,*
- (b) *inter-generational equity,*
- (c) *conservation of biological diversity and ecological integrity,*

(d) improved valuation, pricing and incentive mechanisms.

The Proponent has undertaken an assessment of how the project meets the principles of ESD in the EIS. Specialist studies of traffic and transport management, flooding and hydrology and heritage were conducted during preparation of the EIS. These studies assessed the construction and operational impacts of the project, including how the proposal addressed the precautionary principle. This principle was considered during the route options development. The principle has also guided the assessment of environmental impacts of the proposal and consideration of mitigation measures, to manage identified risks and threats of environmental harm. The Proponent has designed the project to avoid impacts where feasible and reasonable, including design refinements to avoid the demolition of the heritage item "Ravenswood", adopting bridge design (type, form and element) to avoid direct impacts on the heritage listed Grafton Bridge, and impacts to Aboriginal cultural heritage and biodiversity impacts.

The proposed mitigation measures that aim to address each identified impact are in line with the principle of 'conservation of biological diversity and ecological integrity' principle. Further, the proposal is designed for a 100-year lifespan. Therefore, it would benefit existing and future generation in the Grafton area and in northern NSW. On this basis, the Department considers that the principles of ESD have been appropriately addressed.

4. CONSULTATION AND SUBMISSIONS

4.1. Exhibition

Under section 115Z(3) of the Act, the Secretary is required to make the EIS publicly available for at least 30 days. The Department publicly exhibited the proposal from 20 August 2014 to 19 September 2014 on the Department's website, and at the following exhibition locations:

- Department of Planning and Environment, Information Centre;
- Roads and Maritime Services (Head Office, Grafton Regional Office and Pacific Highway Office);
- Clarence Valley Council (Grafton Office and Maclean Office);
- Grafton Library;
- Maclean Library; and
- Nature Conservation Council.

The Department advertised the public exhibition in the Grafton Daily Examiner on 20 August 2014 and the Yamba Lower Clarence Review on 22 August 2014, and notified State and local government authorities directly in writing.

The Department received 23 submissions during the exhibition period. This included 6 submissions from public authorities and 17 from the general public. Two additional late submissions were received from the general public after completion of the exhibition period. A summary of the issues raised in submissions is provided below. The Department has considered the issues raised in submissions in its assessment of the project.

4.2. Public Authority Submissions

A total of six submissions were received from public authorities. None objected to the project; however each raised key issues for consideration. The key issues raised in public authority submissions are listed in **Table 4**. A link to the submissions is provided in **Appendix B**.

Table 4 : Key issues raised by public authorities

Public Authority	Key Issues Raised
<i>Office of Environment and Heritage</i>	<ul style="list-style-type: none"> • The adequacy of ecological assessment and absence of proposed offsets and appropriate environmental safeguards to mitigate impacts on Threatened Ecological Communities (TECs) within the project area; • Review of the archaeological text excavation methodology by OEH for

Public Authority	Key Issues Raised
	<p>assessment of Aboriginal cultural heritage matters and incorporation of assessment findings into the conditions of any approval; and</p> <ul style="list-style-type: none"> • The assessment of flood mitigation options and consultation with Clarence Valley Council on flood impacts of the project.
<i>Environment Protection Authority</i>	<ul style="list-style-type: none"> • Request for proponent to consult with EPA during detailed design of the project and also request for EPA to review the draft conditions of approval prior to finalisation; • Any requirement for a licence under the Protection of the Environment Operations (POEO) Act 1997 would be determined if/when the project is approved; • Risk assessment of potential impacts on water quality and hydrological processes should be conducted during detailed design of the project; • A revised noise impact assessment should be conducted based on detailed design of the project to determine accurate construction and operational noise impacts; and • An Air Quality Management Plan should be prepared for the project, in addition to other environmental management plans.
<i>Department of Primary Industries – NSW Office of Water (NOW)</i>	<ul style="list-style-type: none"> • NSW Office of Water provided recommended conditions if the project is approved; • An Aquifer Interference Assessment was not provided in the EIS. The aquifer interference activity associated with the project is noted as “minimal impact” though the aquifer in the location is classed as “highly productive”; • Any extraction of groundwater for water supply purposes should be licensed under the Water Act 1912; and • Works undertaken within 40m of the Clarence River and associated watercourses should be constructed in accordance with the NSW Office of Water’s Guidelines for Controlled Activities, to minimise any potential degradation.
<i>NSW Heritage Council</i>	<ul style="list-style-type: none"> • Demolition of any identified heritage items is not supported; • Additional information is requested regarding impact to the turntable associated with the Grafton railway station; • Heritage impacts resulting from architectural noise treatments and flood mitigation works on or in the vicinity of heritage items should also be assessed and mitigated; and • NSW Heritage Council provided recommended conditions if the project is approved.
<i>Australian Rail Track Corporation Ltd (ARTC)</i>	<ul style="list-style-type: none"> • ARTC would require notification of any planned acquisition of the land on the southern bridge approach by RMS as soon as possible. ARTC would need to be provided with plans and detailed site investigation reports; • Any proposed remedial action plans and final validation reports would need to be reviewed by ARTC; and • All relevant approvals and works for replacement of the rail viaduct will be under ARTC procedures and protocols. Archival records due to the Heritage significance of the bridge would need to be referred to ARTC’s Heritage Department.
<i>Transport for NSW, Country Rail Contracts Division</i>	<ul style="list-style-type: none"> • No comments provided.
<i>Clarence Valley Council</i>	<ul style="list-style-type: none"> • Council acknowledges some issues will be addressed during the detailed design phase; • Flood impacts, in particular the feasibility of raising the levee with the constraints of existing buildings and confirmation whether the entire levee is proposed to be uniformly raised. Visual impact of the heightened levees also require assessment;

Public Authority	Key Issues Raised
	<ul style="list-style-type: none"> • Insufficient detail is provided on the proposed Pound Street pump size to allow Council comment; • Additional assessment is required of the following: differential flood impacts due to hydraulic differences upstream and downstream of the bridges; assessment of other events in addition to a 2% AEP event, and a clear assessment of any flood increase in some parts of South Grafton with proposed management measures; • Confirmation of land ownership of project-related infrastructure needs to be clarified and Council access to existing infrastructure needs to be considered in detail road design of the project; • Additional detailed assessment is required of the impact of proposed roadwork including road raising and embankments in the Heber Street catchment area; and • Staging of the project, if proposed, should be clarified.

4.3. Public Submissions

A total of 17 submissions were received from the public. In addition, 2 late submissions were received by the Department. Of the 17 public submissions received, 4 objected to the project, 2 provided support and 11 raised concerns or provided comment. The key issues raised in public submissions are listed in **Table 5**.

Table 5 : Summary of issues raised in public submissions

Issue	Number of submissions			
	Support	Concerns	Object	Total
Traffic and transport	2	6	1	9
Safety, pedestrian and cycle access	1	7	1	9
Community amenity		7	1	8
Project design including lanes and approach roads	1	5		6
Project justification		5		5
Route options		5		5
Flooding		3	1	4
Noise impact	1	2		3
Urban design		3		3
Visual impacts	1	2		3
Property values		2		2
EIS assessment process			2	2

The Department has considered the issues raised in submissions in its assessment of the project.

4.4. Proponent's response to submissions

The RMS provided a Response to Submissions Report to respond to the issues raised in submissions from the general public and public authorities. No amendments to the project design arose from the response to submissions. The Department forwarded a copy of the Response to Submissions Report to authorotoes that made submissions during the exhibition of the EIS. The documents were also placed on the Department's website. A copy of the documents can be found at **Appendix C**.

A further submission was then made by Clarence Valley Council, raising the following issues:

- Council concerns regarding the proposed constructability of levee raising, which aims to ameliorate increased flood heights in the river and is therefore critical to the success of the project, have not been addressed;
- A flood level survey of Grafton was requested by Council at the SEARs stage of the project but not provided in the EIS or Response to Submissions Report; and
- Council's concerns regarding drainage in the Heber Street catchment, due to proposed filling in this area, is yet to be adequately addressed.

The Proponent met with Council to discuss the above issues. The Proponent advised Council that it has committed to undertake a detailed geotechnical investigation of the existing levees with Council. As part of detailed design additional flood modelling would be undertaken to confirm the mitigation measures required. A detailed floor level survey would be undertaken of potentially affected properties outside the levees to inform the flood model. The Proponent advised the existing infrastructure in the Heber Street catchment has been incorporated into the concept design. Further consultation would be undertaken with Council during detailed design to determine impacts and mitigation measures on Council's drainage infrastructure.

The Department received two late submissions on the proposal. The submissions objected to the proposal and raised issues including route selection, community consultation, flooding impacts, heritage impacts; and traffic and transport. The Department's consideration of these issues is contained in the following sections.

5. ASSESSMENT

The Department considers that the key issues for the proposal are:

- route selection and justification for the selection of the preferred alignment;
- flooding;
- traffic and transport impacts;
- noise and vibration impacts; and
- visual impact.

The Department's assessment of key issues is provided in **Sections 5.1 to 5.5**, while the Department's consideration of all other issues is provided in **Section 5.6**.

5.1. Route Selection

Issue

The NSW Government first acknowledged the need for an additional crossing of the Clarence River at Grafton in 2002. Preliminary route option investigations commenced in 2005, but were deferred until 2009 and continued until April 2013 when Option C was announced as the selected route for the project. The selection process by RMS incorporated input from engineering, environmental, social, economic, urban design and heritage specialists.

A comprehensive route selection process for the project, as detailed in **Figure 3**, was conducted by RMS spanning several years. This process provided multiple opportunities for community and stakeholder consultation via forums, meetings, surveys and submissions in response to publicly displayed reports, involvement by government agencies and technical specialists, independent review of certain elements of the assessment process and a value management workshop attended by representatives of these groups.

RMS considered a 'do nothing' option and concluded that not proceeding with the proposal would result in further traffic congestion across the existing bridge during peak periods and declining road safety and traffic efficiency issues. The alternatives of minor road upgrades and traffic demand management (such as increased public transport, parking restrictions,

and peak spreading) without constructing a new bridge were also considered but ruled out as the existing bridge is currently at operating capacity during peak periods. Therefore the alternatives would only provide short-term solutions and would not relieve the existing road safety and congestion issues in the mid to long term.

A total of 13 preliminary route options were identified by the RMS in December 2010. This increased to 41 route options following surveys with the community and local businesses. Issues raised at that time included a need to consider short and long term traffic trends, minimising noise, visual and amenity impacts to the local community and the need to protect the existing Grafton Bridge.

In 2011, the RMS prepared a feasibility assessment of the 41 route options and grouped these options into 5 distinct corridors across the Clarence River. The feasibility assessment addressed:

- engineering and constructability issues;
- land use and land use zoning impacts;
- Aboriginal heritage impacts;
- impacts on native plants and animals; and
- flooding impacts.

A total of 25 route options and 5 corridors were identified for detailed assessment and are shown in **Figure 4**. A process of shortlisting the route options within each corridor was then conducted by the RMS based on technical investigations, community input and submissions made in response to public display of the *Preliminary Route Options Reports* (RMS 2011). Six route options were shortlisted, as shown in **Figure 5** and detailed in **Table 6**:

Table 6: Six shortlisted route options

Option	Location	Lanes on new bridge	Lanes on existing bridge
E	1km upstream of the existing bridge: from Cowan St, South Grafton to Villiers St, Grafton.	1 lane in each direction	1 lane in each direction
A	Adjacent & upstream of the existing bridge: from Bent St, Sth Grafton to Villiers St, Grafton via Fitzroy St.	1 southbound lane and 2 northbound lanes	1 lane southbound
C	Adjacent & downstream of the existing bridge: from the junction of the Pacific and Gwydir Hwys, Sth Grafton to Villiers St, Grafton.	1 lane in each direction	1 lane in each direction
11	About 1km downstream of the existing bridge: from the Pacific Hwy near McClares Lane north of Sth Grafton to Villiers St, Grafton via Fry St.	1 lane in each direction	1 lane in each direction
14	About 2.5km downstream of the existing bridge: from the junction of the Pacific Hwy and Centenary Dr, north of Sth Grafton to Turf St (Summerland Way), Grafton.	1 lane in each direction	1 lane in each direction
15	About 2.5km downstream of the existing bridge: from the junction of the Pacific Hwy and Centenary Dr, north of Sth Grafton to Summerland Way, Grafton.	1 lane in each direction	1 lane in each direction

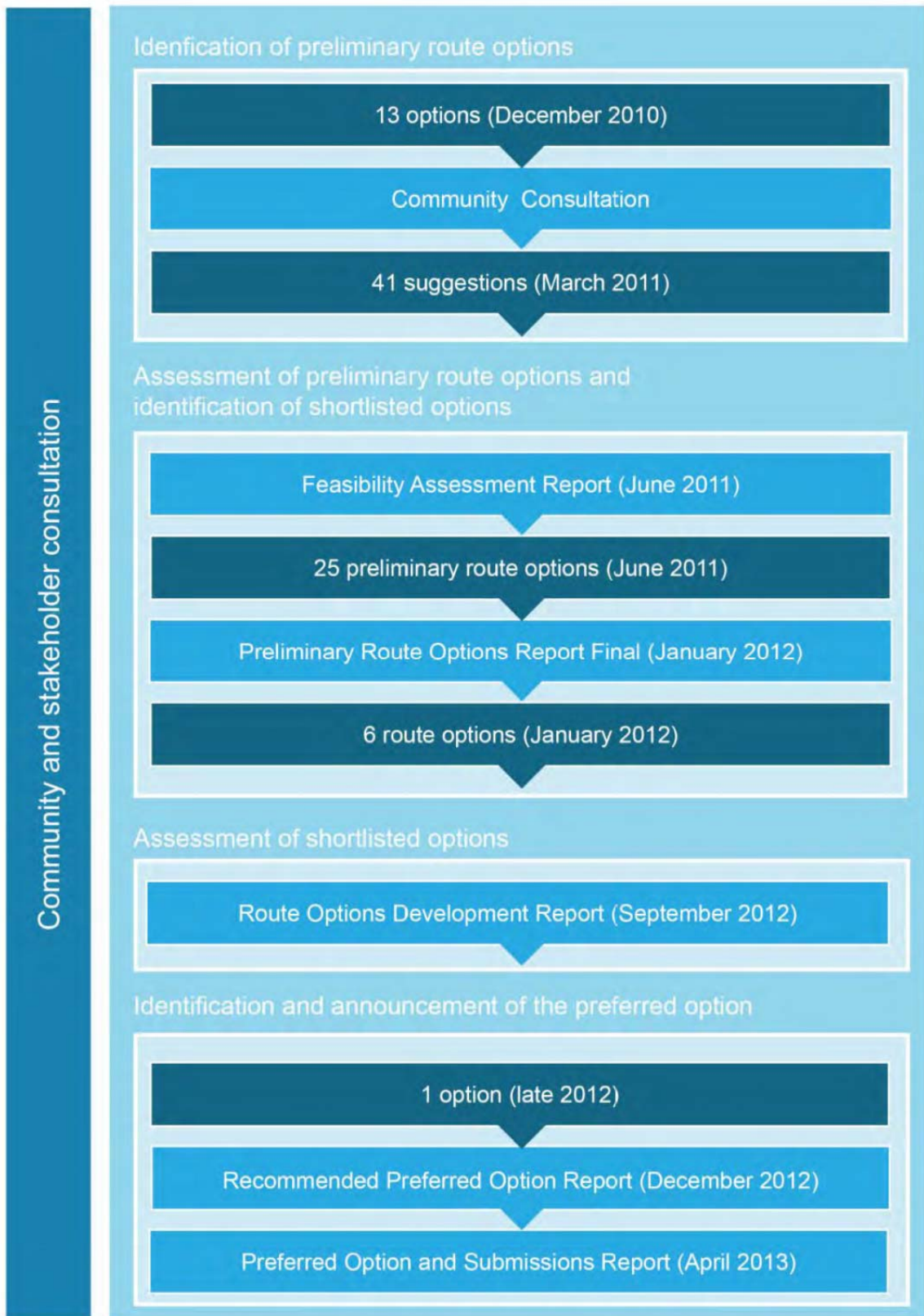


Figure 3: Route selection and investigation process (RMS 2014)

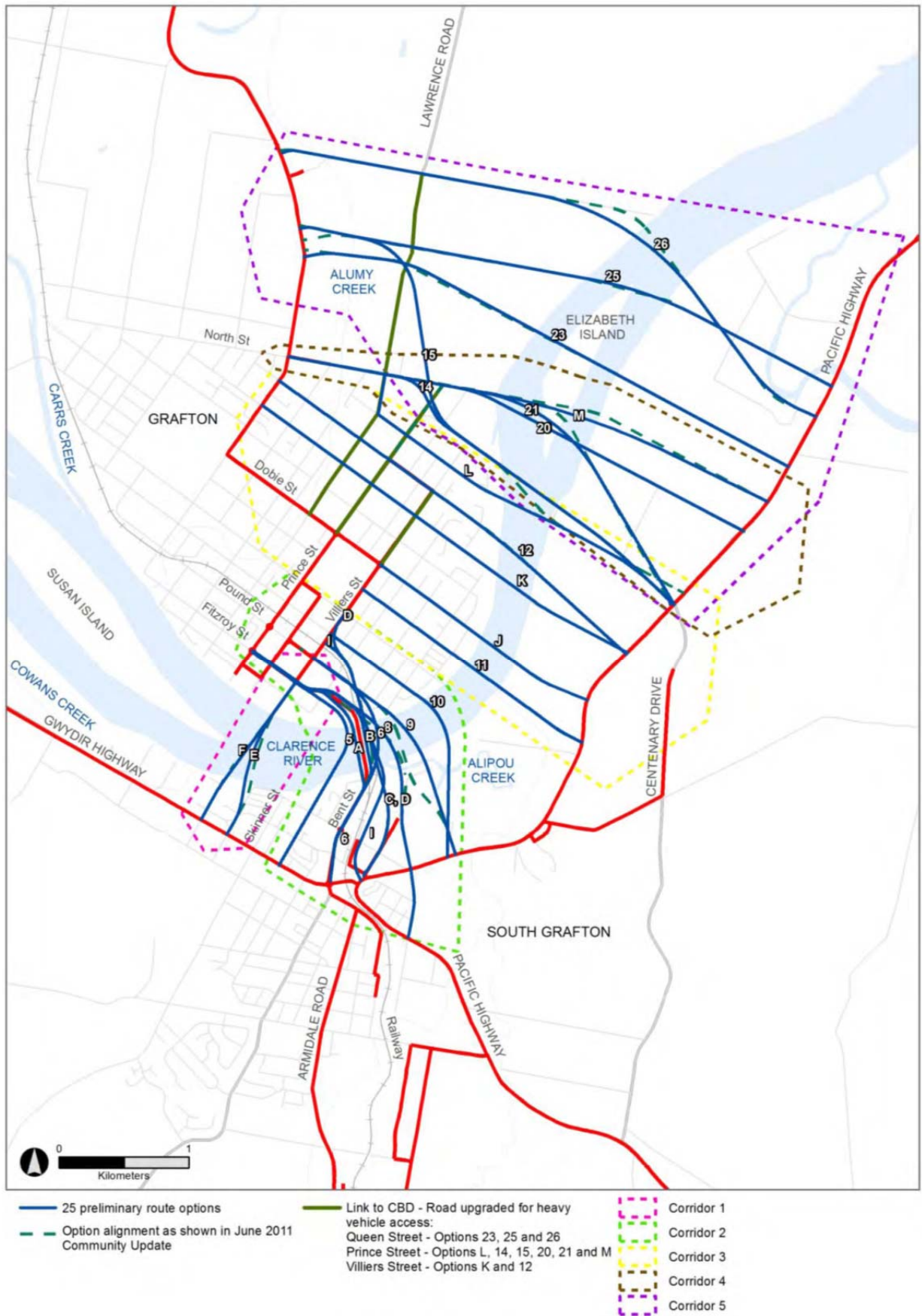


Figure 4: Preliminary route options (RMS 2012)

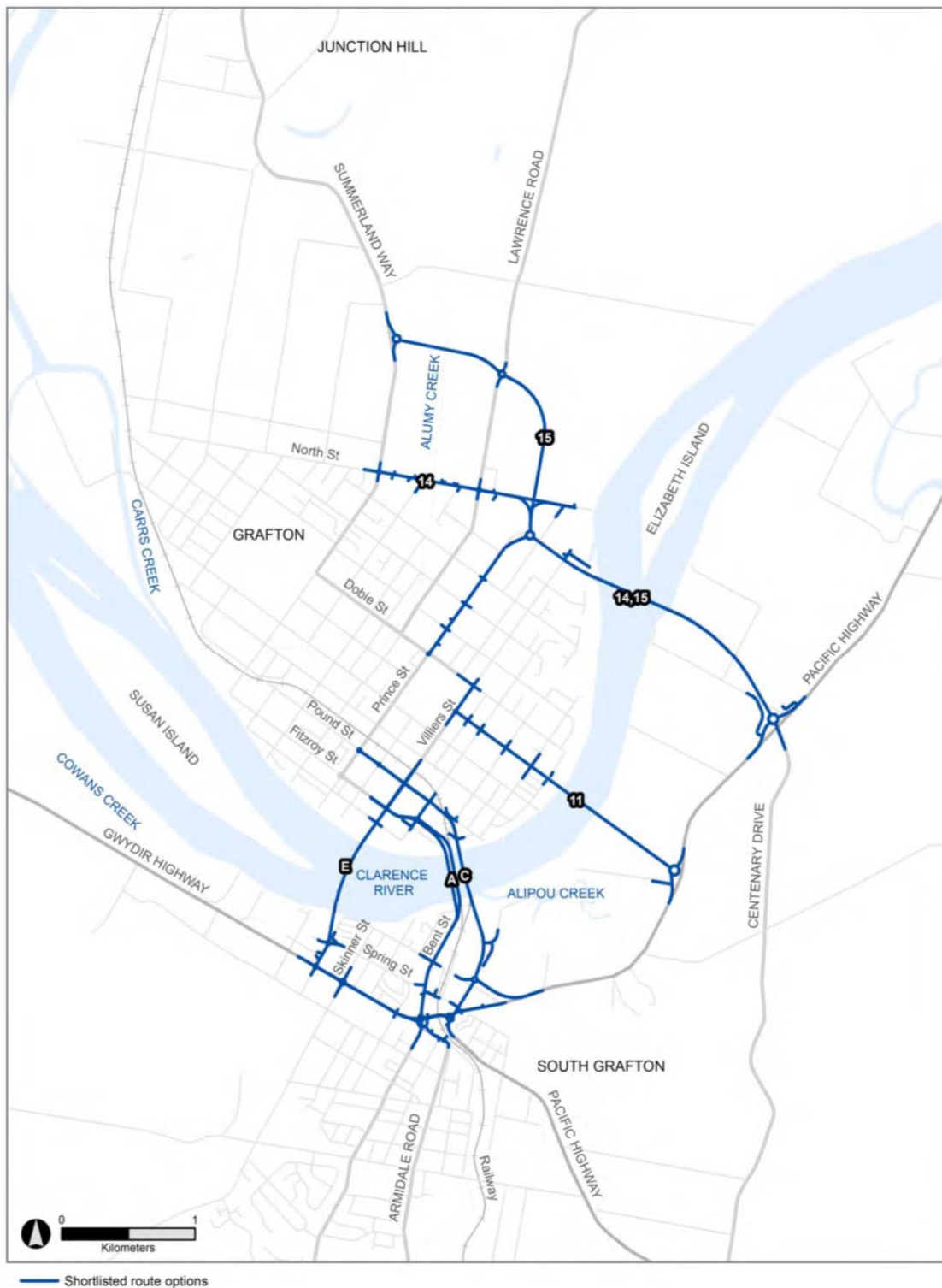


Figure 5: Shortlisted route options (RMS 2012)

The RMS documented the shortlisting process and outcomes in the *Preliminary Route Options Report – Final (RMS January 2012)*. Design refinements and further technical investigations on the six shortlisted route options were reported in the *Route Options Development Report (RMS, September 2012)*, which was publicly displayed. Many submissions at this stage indicated either a preference for a bypass of Grafton in order to remove heavy traffic from the CBD and allow for growth of the city, or a preference for a new bridge near the existing bridge to ensure the new bridge was well used and convenient for the existing communities.

Independent reviews were conducted of the traffic and transport assessments and the community consultation process, and found both to be adequate.

A value management workshop with participants from key stakeholders, the community, government agencies and the project team was held in October 2012 to consider the six shortlisted options against agreed social, environmental and functional issues. This concluded that Options C and E should be further considered.

RMS undertook a final detailed review of the options based on:

- the findings of the technical investigations and specialist studies undertaken for the project documented in the *Preliminary Route Options Report – Final* (RMS, January 2012) and *Route Options Development Report* (RMS, September 2012);
- feedback received from the community and key stakeholders; and
- outcomes of the October 2012 value management workshop.

RMS then prepared a *Recommended Preferred Option Report* which was placed on public exhibition from 19 December 2012 to 4 March 2013 and supporting consultation activities were carried out with the wider community. In April 2013, Option C was confirmed as the preferred option for an additional crossing of the Clarence River at Grafton.

Option C was determined to be the recommended preferred option as it best meets the project objectives and it provides better short and long term connectivity and transport efficiency over the whole road network, including heavy vehicle movements. Furthermore, Option C is predicted to have fewer environmental impacts in terms of business amenity, noise and non-Aboriginal heritage. It is comparable to Option E in terms of capital cost and BCR at this stage of project development.

Refinements to Option C to reduce the potential environmental impacts of the project were published in the preliminary concept design community update in November 2013 and displayed for public comment. The refinements included:

- reduced number of local road and intersection upgrades to provide acceptable traffic performance at least to the year 2039;
- consideration of alternate bridge types considering cost, constructability and flood mitigation requirements;
- refinements to the local road networks in Grafton and South Grafton;
- improved connectivity of pedestrian and cycle paths in Grafton and South Grafton; and
- refinements to the Pound Street railway viaduct.

These refinements have reduced property impacts in some areas such as Skinner Street, South Grafton, but increased impacts at Pound Street, Grafton. The refinements have been incorporated into the concept design, which is assessed in the EIS.

Submissions

Of the 17 public submissions received during the EIS exhibition period, 5 raised issues about the preferred route. Three of these submissions indicated a preference for a by-pass of Grafton and the remaining two commented on the accuracy of traffic prediction data and the proposed road upgrades in South Grafton. The Department notes that the bypass options were found to provide the least improvement to the efficiency of the road network and that the cost, environmental and socio-economic impact was found to be greater. One of the submissions suggested using an existing bridge (Rogan Bridge) as the second crossing, however, RMS confirmed that this bridge is not suitable for use by heavy vehicles and provides insufficient flood immunity.

A late submission raised concern about the lack of community consultation work conducted by RMS in 2003-2004 and 2011. This submission also stated that the majority of the community preferred a bypass of Grafton. The Department has considered this submission

and has formed the view that adequate consultation has been undertaken and that the claim of a majority preference for a bypass is not reflected in the number and contents of submissions made by the community during the EIS exhibition period (three out of 17 submissions). Traffic concerns raised in this submission, including a concern about increased heavy vehicle traffic in Grafton's CBD, are addressed in **Section 5.3** below.

Consideration

The need for a new crossing of the Clarence River is well documented and the Department concurs that a practical alternative for road users needing to cross the Clarence River at Grafton is required. From its review of the information provided in the EIS, the Department understands that a new bridge crossing is required to:

- relieve current traffic congestion on the existing bridge as it currently operates at capacity during peak periods;
- relieve future traffic congestion on the existing bridge based on forecast traffic volume growth;
- improve road safety for motorists, pedestrians and cyclists travelling across the river;
- provide a crossing that is designed for present-day vehicles including heavy vehicles, noting that there is a 25/26 metre long B-double trucks ban on the current bridge during peak periods, which restricts efficient freight movement over the Clarence River; and
- provide a crossing without design problems that exists in the current bridge, namely bottlenecks and kinks.

Overall, the Department considers that the RMS undertook an appropriate and comprehensive route selection and evaluation process to identify the preferred route. The Department notes that investigations were undertaken to identify possible route alignments at both a macro and micro level, with appropriate criteria and objectives guiding the process. The Department is satisfied that the RMS' route selection process has been rigorous, and involved consultation with the community and stakeholders and that a suitable alignment has been identified that meets the project objectives.

The Department understands that the new bridge size and capacity is based on an analysis of future traffic demand levels combined with a careful consideration of a number of factors including engineering, visual impact, hydrology and flooding, and cost. The Department concurs with this analysis.

The Department acknowledges that the selected bridge design, including the clearance height over the Clarence River, two superstructure designs (Super T and concrete box girder), and the number and location of piers has taken into account engineering, environmental and logistical constraints within the local project setting. Importantly, the alignment of piers in the river with the piers of the existing Grafton Bridge aims to reduce visual and river traffic impact. Furthermore, proposed flood mitigation and noise mitigation works form part of the proposal in order to maintain or improve the current situation.

The proposal also includes a suite of specific local approach road and intersection upgrades, including notably the installation of traffic lights at the intersection of Pound and Clarence Street, Grafton, and raising the height of a rail viaduct section at Pound Street, Grafton. Four public submissions and one late submission raised concerns regarding the installation of the traffic lights due to cost and safety factors. One of these submissions recommended the installation of speed and red light cameras at this location to address traffic safety concerns for motorists, pedestrians and cyclists.

The Department notes that this would be Grafton's first traffic light installation and appropriate safety measures and signage would be required. This issue is further considered in **Section 5.3**. Regarding proposed work on the rail viaduct, the Department understands that ARTC has been involved in the route selection process over many years and is generally satisfied with the proposed construction work. ARTC's submission raised

comments regarding ownership of the land affected by rail viaduct work and potential heritage issues (refer **Section 5.5**). Overall, the Department is satisfied that the project has been designed to minimise land use impacts whilst achieving the project objectives.

Conclusion

The Department recognises that a project of this scale and importance within a regional centre will evoke divergent community views. However, the Department believes the Proponent has undertaken a credible route selection process with adequate community and stakeholder consultation and is satisfied that an appropriate route has been selected and project developed.

5.2. Flooding

Issues

The Clarence River is a major coastal river in the NSW North Coast with lower floodplain areas which are subject to frequent and extensive flood inundation. The flooding behaviour of the lower Clarence is dominated by runoff from the large catchment area upstream of Grafton, which typically contributes 80% to 90% of the total volume of floodwater that enters the lower floodplains during major river flood events.

Grafton and South Grafton have a long history of flooding and are protected by a series of levees, along with the railway and Pacific Highway embankments, which surround the towns. The levees are overtopped when flood levels are at or close to 8.0m at the Prince Street gauge. Based on flood modelling, there is an approximately 5% annual exceedance probability that overtopping of the existing levee may occur in a given year. This translates to an approximately 20 year average recurrence interval (ARI) flood event.

Due to the extensive length of the levees, a small change in flood levels within the river has the potential to significantly alter the volume of water overtopping the levee. When the levee is overtopped large areas of Grafton and South Grafton are inundated with floodwater.

Flood Model

The Proponent undertook a flood impact assessment of the proposed new bridge and approaches to identify the hydraulic impacts to existing and potential receivers. The proposal was simulated in the hydraulic model of the Clarence River for a range of flood events, the 20 (base event as no overtopping occurs for lesser magnitude events), 50 and 100 year ARI and probable maximum flood (PMF) events.

The assessment predicted the proposal would increase peak flood levels upstream of the existing bridge by 0.06 to 0.08m. The peak unmitigated flood level impacts of the proposal at various locations in Grafton and South Grafton are summarised in **Table 7**.

Table 7 : Peak unmitigated flood level impacts (RMS 2014)

<i>Design flood event</i>	<i>Change in peak flood level (m)</i>				
	Prince Street gauge	Existing Bridge	Grafton	Grafton (Pound Street and Prince Street intersection)	South Grafton (Abbott Street and Vere Street intersection)
20 year	0.07	0.07		0.00	0.00
50 year	0.04	0.06		0.08	0.67
100 year	0.04	0.06		0.01	0.43
PMF	0.05	0.08		0.04	0.04

No impacts downstream of the proposed new crossing are predicted. The increased river water levels results in an increase in the volume of water overtopping the levees, by 9% and 6% respectively in the 50 year and 100 year ARI events in Grafton, and by 32% and 19%

respectively in South Grafton. The proposal is not expected to increase flood water velocity or result in noticeable changes in flow direction.

Flood Mitigation Measures

A number of engineering criteria have been developed to guide the design of the new bridge, including where impacts adversely affect the flood immunity in Grafton and South Grafton. Flood mitigation measures would need to be implemented to maintain the current level of flood immunity. As the proposal is predicted to increase flood levels upstream of the proposed crossing, the Proponent considered measures to mitigate increases in flood levels, particularly in South Grafton. These included:

- modifying the behaviour of floodwater by reducing flood depths and/or velocities or by excluding floodwaters from certain areas;
- changing or improving a community's response to flooding; and
- increasing the resilience of existing property to flooding and implementing planning controls to ensure new property is compatible with the level of flood risk.

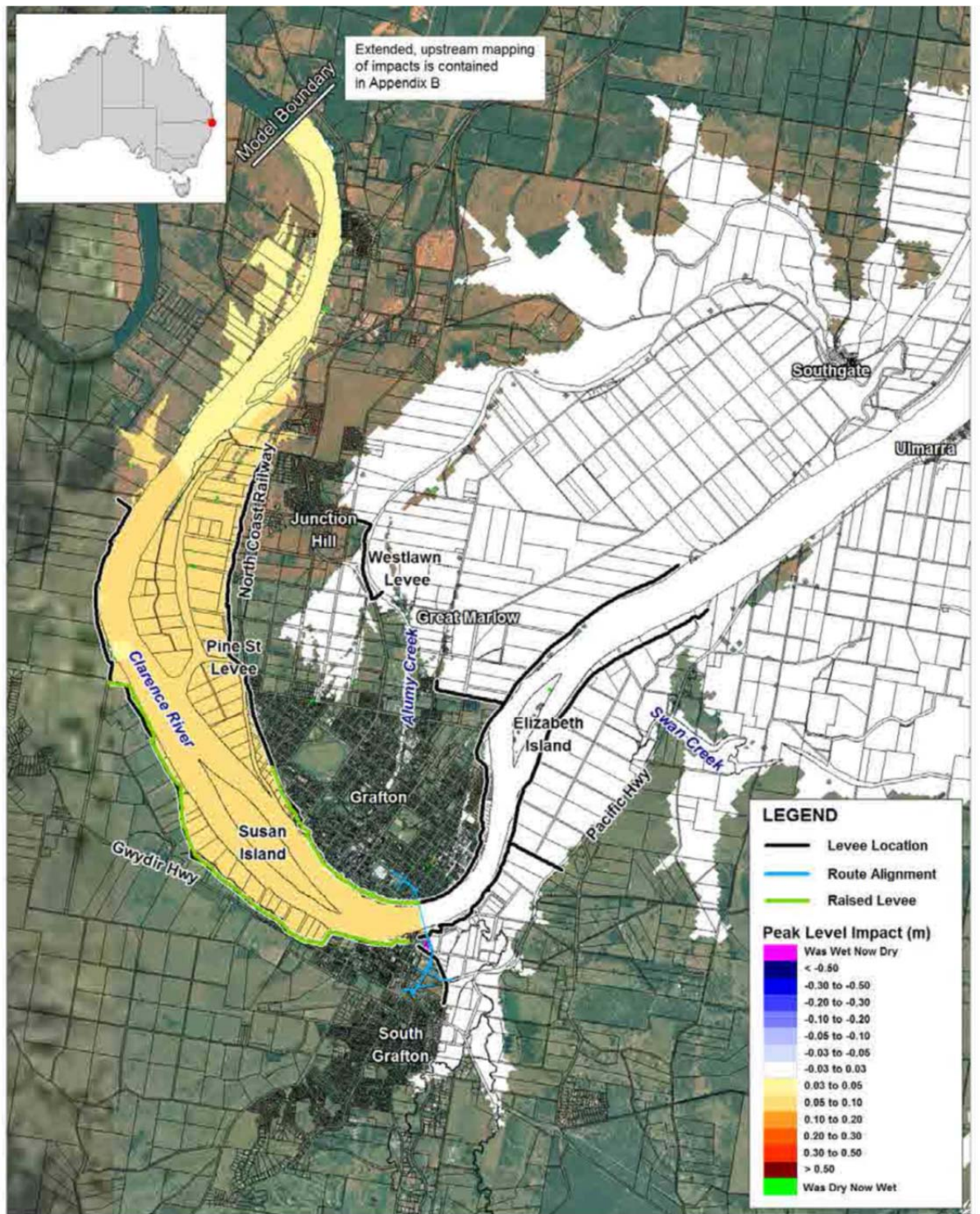
The Proponent identified a number of potential options to mitigate the impact of the proposal on flood levels. The preferred option (option 2) was selected, and consists of raising the levees at Grafton and South Grafton by up to 0.2m.

The implementation of option 2 would result in a net reduction in predicted peak flow levels in Grafton for the 50-year and 100-year ARI events. The flood modelling predicts a net reduction in South Grafton for the 100-year event but a minor increase (0.05m) in flood levels in the 50-year ARI event. The location of the existing levees is shown in **Figure 6**.

The flood model also assessed other flooding impacts and predicted:

- no changes to peak flood velocity and no predicted impacts on bed and bank stability;
- minor increase in flood hazard where flood depths would increase;
- no significant changes in flow direction; and
- no increase in the frequency or duration of flood inundation.

Option 2 measures would decrease the overall level of flood risk in Grafton and South Grafton for the majority of flood events. However there would still be impacts on properties outside the levee systems and during floods greater than the 20-year ARI event. The Proponent has identified 45 properties with residual flooding impacts (4 residential properties inside the South Grafton levee (Skinner Street and South Grafton Airport) and 41 properties outside the levee system (Carrs Island and Riverside Drive, South Grafton). House raising has been identified as a possible mitigation measure for these properties. Floor level surveys would be undertaken during detailed design to determine the impact on each affected property.



<p>Title:</p> <p>Peak Flood Level Impact 20 Year ARI Event Additional Crossing (Mitigation Option 2)</p>		<p>Figure:</p> <p>5-10</p>	<p>Rev:</p> <p>A</p>
<p><small>BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.</small></p>		<p></p> <p>Approx. Scale</p>	
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Figure 6: Location of Grafton and South Grafton Flood Levees (RMS 2014)

Submissions

Four submissions raised flooding impacts as a key concern. The issues raised include the accuracy of the flood model, flooding impacts during construction, operational impacts such as velocities and levee overtopping, downstream flood impacts, impacts on the levee systems, flood mitigation measures and flood immunity.

OEH commented on the flood mitigation options, flood impacts of the proposal and improving the flood immunity for Grafton. Council raised a number of matters which will be need to addressed during detailed design of the proposal. These include feasibility of raising the flood levees, assessment of upstream and downstream impacts during a range of flooding events, details of the Pound Street pump and impact of the proposal on Council's drainage system.

Consideration

The existing flooding regime at Grafton is complex with extensive floodplains and a history of flooding in Grafton and South Grafton. In recognition of these complexities and to assist the Department's assessment of the proposal's flooding impacts, a hydrological and flooding expert was engaged to carry out an independent peer review of the hydrological and flooding impact assessment of the proposal. The report of the independent review is contained in **Appendix D**.

Flood Model

The flood assessment of the proposal used the Lower Clarence River flood model, originally developed for the Lower Clarence River Flood Study Review in 2004 and subsequently updated by Council in 2013. The 2013 model represents the most up to date model of the lower Clarence River and includes updated terrain data.

The Proponent engaged an independent assessment of the flood modelling carried out for the proposal. The purpose of the peer review was to review the flood model and its parameters and to confirm its accuracy and completeness. The Proponent's independent peer review concluded the flood model was suitable for assessing the flood impacts of the proposal. A number of minor issues about the model were identified by the Proponent's independent review, however, the Department's own independent review concluded that these issues did not materially alter the impact assessment of the proposal.

The Department's independent review noted the Proponent's assessment incorrectly reported the extreme flood event as the probable maximum flood (PMF). The extreme event is unknown but is rarer than 5000 years. The PMF is equivalent to an ARI of approximately 100,000 years. The review did not consider this error invalidated the flood assessment, and recommended the Proponent revise and improve the model for future stages of the proposal.

The Proponent has committed to undertake further flood modelling at detailed design. The Department supports this commitment and recommends, on the advice of its independent review, that RMS consider the recommendations of its own independent peer review to improve the flood model (adoption of variable eddy viscosity rather than constant eddy viscosity as used in the EIS flood model, and updating the hydrosurvey of the riverbed and banks). The Department also recommends that the detailed design flood model include the flood events assessed in the EIS flood assessment as well as the PMF event, and that the model include up to date floor level information for the potentially affected properties.

Flooding Behaviour

Extensive levee systems have been constructed within Grafton and South Grafton to protect the towns from floodwaters. Significant overtopping of the levees occurs during floods of greater than the 20-year ARI event. Once the levees are overtopped, large areas of Grafton and South Grafton are inundated with floodwaters.

The occurrence of flooding behind the levees is sensitive to changes in the river water level. Small changes in the river level can produce significantly higher changes in water levels behind the levees. The height of water behind the levee is determined by the river level and the duration of levee overtopping. The Department's independent review has confirmed the flood modelling of the proposal has taken into account these hydrodynamic influences.

The proposal is predicted to increase river levels upstream by 0.06m to 0.08m in a greater than 20-year ARI event. The greatest impact would be in a 50-year ARI event, with maximum flood level rises of 0.08m and 0.67m in Grafton and South Grafton, respectively. Floods such as the 100-year ARI would have a reduced impact as significant overtopping of the levees would be occurring and consequently the impact of the proposal on the significant inundation behind the levees would be negligible.

The review noted that levee raising is a contentious issue in Grafton and South Grafton. Raising the height of the levee reduces the storage of floodwaters on the floodplain behind the levees, leaving additional water in the river channel which can exacerbate inundation of the opposite side of the river as well as areas downstream. Consequently the raising of the levees to compensate for increased river levels caused by the proposal can be problematic if the levees are raised too high. The review recommended that any levee height raising should result in a neutral outcome for upstream and downstream properties.

The Proponent has committed to provide mitigation measures to ensure that the existing flood immunity for Grafton and South Grafton is maintained. The Department notes the Proponent's objective of mitigating the impacts of the bridge proposal on the existing flooding regime and agrees that the objective of flood mitigation should be to maintain the existing flood immunity. The flood assessment has predicted impacts on flood levels upstream of the crossing location and recommended mitigation measures, raising the height of the existing levees to maintain the existing flood immunity.

Increasing the height of the existing levees to improve Grafton's flood protection (beyond the 20 year ARI event) is outside the scope of this proposal and a matter for Council to consider. The Department understands that the issue of extension of the existing levee and its current height to provide additional protection is a longstanding issue between Council and the community. To determine the required mitigation measures the Department has recommended that the Proponent rerun its assessment of flooding behaviour based on the detailed design and that proposals to change the height of the levees be contingent on no adverse impact to properties downstream of the proposal.

Flood Mitigation Measures

The Proponent has proposed to offset the increased flooding from the predicted 0.06m to 0.08m increase in river levels by raising the levee height by 0.2m on 3.7km of the northern (Grafton) levee; and by raising 7km of the levee on the southern (South Grafton) side of the river. The existing levee consists of earth mounds, fences and walls of buildings and is located on public and private land.

The independent review noted that a detailed investigation of the condition of the existing levees has not been carried out. Council also raised the condition of the levee and whether augmentation work is required to accommodate the additional height. The Proponent has committed to carry out detailed engineering and property investigations of the levee as part of detailed design. The Department agrees with the review that the investigations should be undertaken early and that they should inform an assessment of the impacts of the mitigation works. Should the investigation and assessment determine significant impacts on environmental or amenity impacts, the Proponent would be required to undertake a consistency review of the proposed works with the Minister's approval. Should the works be outside the terms of the approval a modification of the approval may be required.

One submission requested the Proponent raise the height of the Cowan Creek levee by the same height as the South Grafton levee. The Cowan Creek levee is located along the southern side of the river and protects rural land to the northwest of South Grafton. There are no residential buildings in this area. The Proponent considers the proposal has minimal impact on the area protected by the Cowan Creek levee. The proposal would result in the levee being overtopped about 10-15 minutes earlier during a 20 year ARI event, and water levels would increase by approximately 0.06m.

A landowner in Riverview Drive, South Grafton requested the Riverside Drive levee, which protects his and other properties in Riverview Drive be raised. The existing Riverside Drive levee is 0.8m lower than the South Grafton levee, consequently houses in the street are impacted more frequently by flooding. The Proponent has committed to mitigate the flood impacts of the proposal on residences in Riverside Drive. Consultation would be undertaken with property owners to develop flood mitigation measures, which could involve at residence treatment or increasing the height of the levee to maintain the current flood immunity.

The Department is satisfied the Proponent has adequately responded to requests for increases in the height of the Cowan Creek and Riverside Drive levees. The Department concludes that the proposal to increase the height of the Grafton and South Grafton levees would ensure that the impacts of the proposal are adequately mitigated. The EIS states that the mitigation measures would need to be completed before construction work in the river commences. This is because the new piers in the river result in an upstream afflux and that once they are constructed, the risk of additional flooding upstream arises. To ensure that the flood mitigation measures are completed before construction in the river commences, the Department has recommended a condition that require the flood mitigation measures to be completed before work in the river for the installation of piers and the temporary rock platforms (if required) commences.

The Proponent identified 45 properties which are outside the existing levees and where flood levels are predicted to rise. The majority of the properties are in the rural and rural residential area of Carrs Island northwest of Grafton. The main method of flood protection for these properties is raising the height of the houses so that floor levels are above the flood level. The Proponent has committed to undertake a survey of floor levels to inform the modelling of flood impacts and the required mitigation measures. The Proponent has committed to raise floor heights to the 100-year ARI event plus 0.5m freeboard. The review notes that there may be limited opportunity to flood proof houses, the only practical measures are to raise houses or acquire flood impacted properties that cannot be mitigated or payment of compensation in lieu of acquisition. The Department agrees with the independent review on the need for mitigation or in the absence of mitigation, some compensatory action by the Proponent. The Proponent's commitment to house raising where feasible and reasonable is an appropriate response. The Proponent has committed to raise the level of habitable floors to be above the 100 year ARI event plus 0.5m freeboard. Surveys of affected properties would be undertaken to inform the flood model.. To reinforce this commitment, the Department has recommended conditions that require the Proponent to prepare a Hydrological Mitigation Report which would provide details of mitigation measures and to address flooding impacts by changes to the design of the SSI or the provision of at property treatment such as house raising, provision of stock refuges or flood free access, and the engagement of an independent hydrologist to provide advice to landowners on flood mitigation measures..

Construction Impacts

Development of the proposal will require construction activities and plant and equipment within the floodplain. These include the establishment of ancillary facilities on the floodplain, in particular the main compound in South Grafton which straddles the South Grafton levee. The Proponent has committed to ensure that use of the portion of the ancillary site within the floodplain is used for car parking and storage of construction material such as culverts, bridge formations, girders, etc.

The Department is satisfied with the measures to ensure construction activities and plant and equipment would not become flood debris and hazards during periods of flooding. The Proponent states that there is sufficient warning of a flood event to move plant and equipment and secure construction sites and ancillary sites. The Department has recommended a condition which requires the preparation of a Construction Flood Management Plan to minimise and manage flood risks to construction sites and ancillary facilities and avoid significant adverse impacts to people and property.

Operational Impacts

The proposal is designed to maintain a 20-year ARI flood immunity on the bridge approach roads. The bridge itself has a higher level of flood immunity. During periods of flooding emergencies the proposal provides additional evacuation capacity for Grafton residents. The Grafton Bridge is the only access for the evacuation of Grafton. The proposal provides an alternative evacuation access which would improve the ability to evacuate Grafton during a significant flooding event. The bridge approach roads is designed to a 20-year ARI flood immunity, similar to the existing bridge. The Department considers the proposal, as well as meeting the project's objectives of improving road safety and road network capacity, during flooding event provides an alternative evacuation route and access for emergency services.

The Department's independent review recommended the involvement of NSW State Emergency Service (SES) in the design of the bridge approach roads to maximise the flood evacuation benefits for Grafton. The Department considers that the SES has an important role in notifying and co-ordinating the orderly evacuation of residents during an emergency situation. The Proponent has designed a bridge to maintain the existing flood immunity and it is appropriate that the Proponent provide feasible and reasonable assistance to Council and the SES to prepare new or updated flood evacuation plans and community information. The Department has recommended conditions to require the Proponent to consult SES on the detailed design of the bridge approach roads and assist in the updating or preparation of evacuation, traffic management and flood plans, etc.

The Proponent proposes to construct a stormwater detention basin to service the Pound Street underpass. This would provide storage during periods of high and sustained rainfall and when the river water levels are high. To manage stormwater the Proponent proposes to provide a pumping station to discharge stormwater downstream when the floodgates are closed. The Council has raised concern of the impact of raised roads on the local drainage system. The Proponent has committed to consult Council on impacts to the drainage network. The Department has recommended a condition to require the Proponent to consult with Council on impacts to Council's drainage system and the design of the Pound Street pumping station.

Conclusion

The Proponent's flood impact assessment predicts an increase in flood levels of 0.06m to 0.08m during the 20-year ARI event. To offset these impacts the Proponent would implement flood mitigation measures to maintain the existing flood immunity. The measures include an increase in height of the existing Grafton and South Grafton levees by 0.2m. Residual impacts remain to properties outside the levee and the Proponent has committed to investigate raising the floor levels of 45 properties. The Department's review considers the flood modelling of the proposal is robust and appropriate and endorses the proposal to maintain the existing flood immunity and raise the height of the existing levees. The Department's key recommendations are:

- to undertake further flood modelling at the detailed design stage to inform the mitigation measures and confirm the flooding impacts;
- prepare a hydrological mitigation report of mitigation measures to private property and infrastructure assets;

- construct the flood mitigation measures prior to work commencing in the Clarence River; and
- prepare a Construction Flood Management Plan to guide construction activities in the floodplain.

5.3. Traffic and Transport

Issues

Congestion and traffic delays are experienced on the existing bridge during AM and PM peak periods with commuters timing trips to avoid periods of congestion. The proposal is expected to address these and road safety matters and enhance traffic efficiency between Grafton and South Grafton. The Department has assessed the existing bridge's capacity, predicted future demand for an additional crossing, and potential impacts on the existing road network during construction and operation of the project.

The following consequences are likely to be experienced should additional road network capacity not be provided to cross the Clarence River at Grafton:

- traffic performance of the existing bridge will continue to deteriorate;
- road safety issues will continue;
- peak time restrictions for freight and large vehicles accessing the Summerland Way will continue, impacting on the ability of Grafton to function as a major regional centre;
- limited traffic capacity is detrimental to local and regional economic development; and
- the local road network will not meet Grafton's short-term and long-term transport needs, with congestion resulting in unpredictable travel times.

The *Guide to Traffic Management Part 3: Traffic studies and analysis* (Austroads 2009) outlines the theoretical capacity of the existing bridge to be in the range of 900 to 1,400 vehicles per lane, per hour. Traffic surveys carried out in 2010 determined that the existing bridge was carrying in the order of 1,360 vehicles per hour (vph) northbound during the AM peak period and 1,330 vph southbound during the PM peak period.

The origin and destination survey carried out in August 2010 found that 97% of all vehicles crossing the bridge either originate or terminate in Grafton or South Grafton, including 88% of all heavy vehicles crossing the existing bridge, reinforcing the decision to locate the bridge in the assessed location. The proposed new crossing alignment and connections to the existing road network are shown in **Figure 7**.

Table 8 outlines the predicted traffic volumes on the existing bridge during the AM peak period in 10 year intervals up to the year 2039. The table outlines predicted traffic volumes based on a scenario where no new bridge is provided ('do minimum'), and a scenario where both the existing bridge and proposed new bridge are operational ('project').

Table 8 : Predicted AM Peak Traffic Volumes at Existing and Proposed Bridge Crossings – 2011 to 2039

Year	Scenario	Existing Bridge		Proposed Crossing	
		Northbound	Southbound	Northbound	Southbound
2011	Base/Existing	2,306	1,573	-	-
2019	* Do Minimum	2,763	1,884	-	-
	** Project	1,237	473	1,526	1,411
2029	* Do Minimum	3,760	2,516	-	-
	** Project	1,676	529	2,084	1,987
2039	* Do Minimum	4,260	2,852	-	-
	** Project	1,779	831	2,481	2,021

* *Do Minimum* refers to a scenario where no new bridge crossing is provided

** *Project* refers to a scenario where the proposed crossing is provided in conjunction with the existing bridge

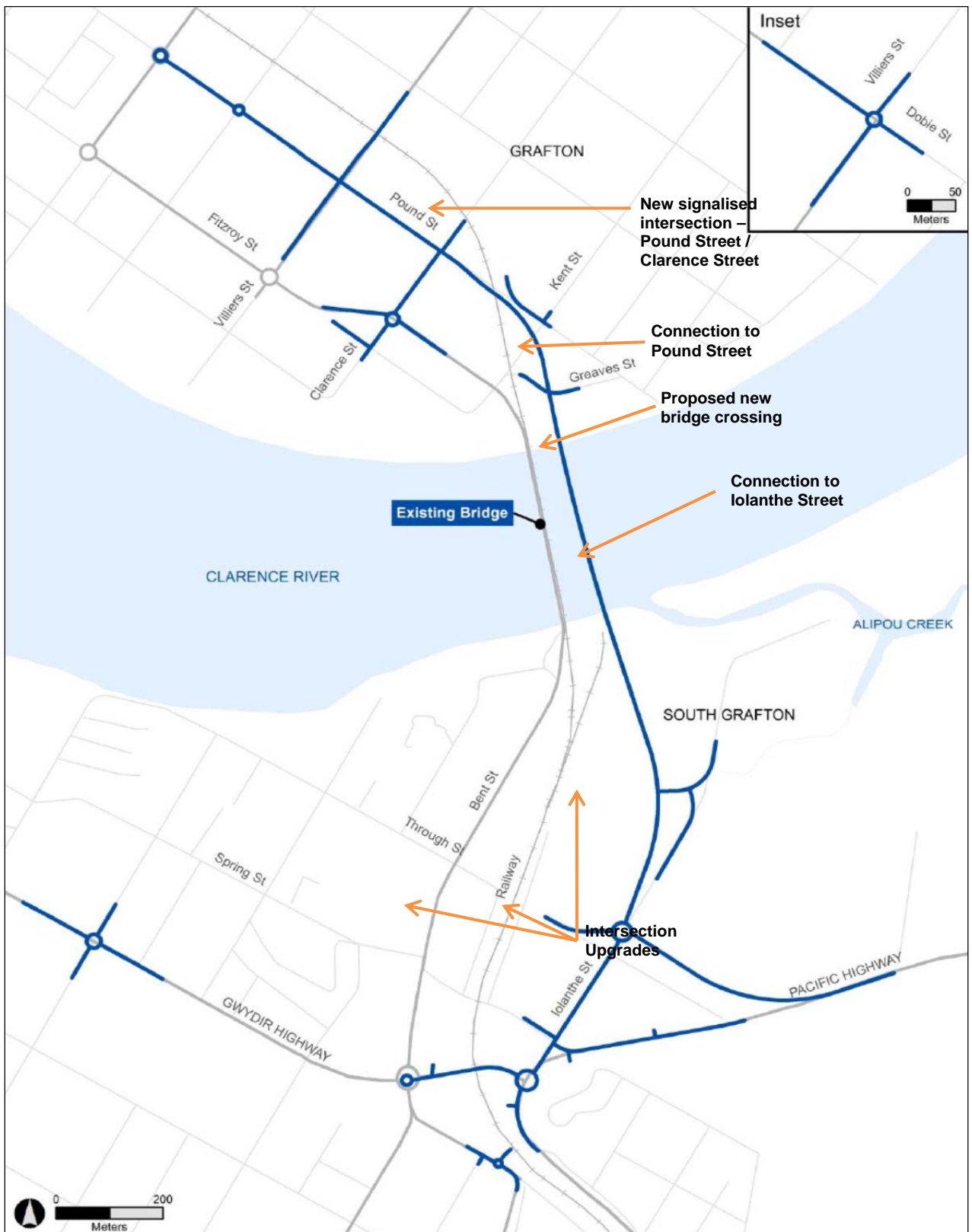


Figure 7: Proposed new crossing alignment and connections to the existing road network (RMS 2014)

A second crossing will assist in relieving the current congestion problems through the dispersion of traffic across both bridges. Without the provision of an additional crossing, traffic modelling predicts up to 4,260 northbound vehicles will utilise the existing bridge during the AM peak by the year 2039, well beyond its capacity of 900 to 1,400 vehicles per lane, per hour. Up to 65% of the peak period traffic is expected to use the additional crossing during the first 20 years of operation, and a significant reduction in overall travel times is expected (including network wide travel time savings of up to 40% in the year of opening).

Improvements for heavy vehicle freight operations are also expected. Currently B-Double trucks are not permitted to use the bridge during peak periods. Time restrictions for heavy vehicle operators to cross the Clarence River into Grafton and South Grafton will cease once the proposed new crossing is opened.

Several intersections within the project area are likely to be impacted by the project due to increased traffic volumes currently not experienced at these locations. Upgrading works are required to support the forecast traffic demands resultant of the new bridge and subsequent shift in traffic volumes through these intersections. **Table 9** describes the works proposed at each affected intersection and the modelled intersection analysis. The analysis predicts that all the intersections would perform within acceptable Level of Service (between A and C) during peak periods up to the year 2039.

Table 9: Proposed Intersection Upgrade Works and Predicted (LoS) by the Year 2039

<i>Intersection</i>	<i>Proposed Works</i>	<i>LoS AM Peak (2039)</i>	<i>LoS PM Peak (2039)</i>
Pound Street / Villiers Street	Retained as all movements, four-leg roundabout. Widening is proposed at the southeast Pound Street leg to accommodate an increase in traffic from the new bridge.	B	C
Pound Street / Clarence Street	Upgraded to a signalised intersection with a four lane Pound Street carriageway. This upgrade is driven by the increases in traffic from the bridge, and the needs to accommodate pedestrians crossing Pound Street and / or accessing the TAFE.	B	B
Iolanthe Street / Pacific Highway / Through Street	Upgraded from a three-leg priority controlled intersection to four-leg roundabout, including realignment of the Pacific Highway. This upgrade is to provide additional capacity for traffic accessing the new bridge, and improve deficiencies at the highway's intersection with Spring Street.	B	B
Gwydir Highway / Pacific Highway	Upgraded to three-leg roundabout, with widening of the Gwydir Highway to four lanes. This upgrade is proposed to increase traffic capacity at the intersection which is forecast to reach capacity in the short term. Preliminary analysis demonstrates that without any upgrading of the intersection, right-turn movements from the Gwydir Highway would perform at a LoS F.	A	A
Gwydir Highway / Bent Street / Ryan Street	Retained as all movements, four-leg roundabout. The form of this intersection is not proposed to change significantly.	A	C

B-Double trucks will be banned from utilising the existing bridge, instead being diverted to the proposed new crossing. This will see an adjustment to the current route used by heavy vehicles through Grafton. Those travelling south along Summerland Way will be directed along Pound Street, on to the new bridge and onwards to Iolanthe Street. Similarly, those travelling northbound into Grafton will access the new bridge via Iolanthe Street, exiting on to Pound Street. From here, heavy vehicles will make a right-hand turn onto Villiers Street to the intersection of Dobie Street. A left-hand turn into Dobie Street is then required to access the Summerland Way. This is the approved heavy vehicle route through Grafton. The modified heavy vehicle access route will result in reduced heavy vehicle volumes between

Fitzroy Street and Bent Street, with comparable increases along the new alignment at Pound Street (as far as Villiers Street), and Iolanthe Street.

Pedestrian and cycle links have been incorporated as part of the project and have been designed to improve connectivity for key strategic movements outlined in Council's *Bike Plan and Pedestrian Access and Mobility Plan 2008* (PAMP). Also, the proposal seeks to retain the shared path on the existing bridge, and provide a new 2.5m wide shared path along the proposed new crossing. Strategic connections are proposed at the following locations as shown in **Figure 8**:

- Gwydir Highway – providing access to the west including Waterview Heights;
- Pacific Highway to the south – providing access to South Grafton and Clarenza; and
- Pacific Highway to the north – allowing access to the north including McAuley Catholic College and Clarenza.



Figure 8: Proposed pedestrian and cyclist access and circulation (RMS 2014)

Construction is expected to take up to 3 years with approximately 18,700 truck movements expected during this time, averaging at 40 construction vehicle trips per day. Construction deliveries are proposed to be timed outside of peak traffic periods when feasible, to minimise impacts on the road network. The construction work zone is outlined in blue in **Figure 9**.



Figure 9: Construction works zone (outlined in blue) (RMS 2014)

Temporary lane closures or reductions in traffic capacity, on-street parking and pedestrian and cyclist access on the following streets will be required during construction:

- Clarence Street – between Fitzroy Street and Bacon Street;
- Kent Street – between Fitzroy Street and Bacon Street;
- Pound Street – between Villiers Street and Bromley Street;
- Through Street – between the rail corridor and Iolanthe Street;
- Iolanthe Street – along the whole road corridor;

- Spring Street – east of the rail corridor;
- Pacific Highway – between the rail corridor and the start of the highway diversion; and
- Gwydir Highway – between Bent Street and the Pacific Highway.

In addition, temporary road closures are expected at:

- Greaves Street near the northern approach to the new bridge. Road users will be required to detour via Bacon Street; and
- Pound Street between Kent Street and Clarence Street. An average of approximately 1,500 vehicles per week uses this section of road, and will be detoured along Bacon Street.

Construction of the project will not impact on existing evacuation routes or emergency services. Furthermore, emergency services will be notified of any changed traffic conditions. Whilst the existing bridge will continue to be operational during construction, surrounding road network upgrades may cause delays to freight services travelling through Grafton.

A range of standard and accepted construction traffic management measures will be incorporated as part of a Construction Environmental Management Plan for the project, which will be managed in accordance with relevant standards, including *Traffic Control at Work Sites* (Roads and Maritime, 2010), AS1742 and Maritime Roads and Maritime Specification G10. Potential safety implications associated with temporary road closures and traffic redirections will also be addressed in the Plan.

The Northern rail line will need to be temporarily closed as part of the reconstructive works of the viaduct at Pound Street. During this time, alternative passenger transport services will be provided where possible (such as coach services). The Proponent advises that efforts will be made to ensure any works coincide with other scheduled works to the rail line, to mitigate the impact of temporary closures. This generally occurs in off peak periods of the year in terms of patronage and freight movements, and will be undertaken in consultation with Australian Rail Track Corporation.

The Proponent requested that the Department consider proposed early construction works on Charles Street (Gwydir Highway) between the Pacific Highway and Bent Street in South Grafton. The works involve duplication of approximately 200m of road between the Pacific Highway and the roundabout at Bent Street, as shown in **Figure 10**. The works will provide two lanes in each direction, with a central median and a pedestrian refuge at the crossing of the shared path. Conduits for the pedestrian signals will be installed as part of these works. Specific elements of the proposed works include:

- contaminated soil removal and treatment (as required);
- street lighting adjustments;
- stormwater adjustments;
- roadworks; and
- shared path (pedestrian and cycleway) adjustments.



Figure 10: Scope of proposed early construction works – Gwydir Highway between the Pacific Highway and Bent Street, South Grafton

Two ancillary compounds will be required to support construction of the early works. The compounds will be located immediately north and south of the Charles Street (Gwydir Highway) road reserve. The early works construction activities may be undertaken outside the standard construction hours to minimise impacts to road users. Due to the relatively minor scope of the works and related environmental impacts, the Department has no objection to the early works.

Submissions

Submissions received by the Department raised issues in relation to the traffic capacity of the new bridge, pedestrian and cycle access and safety, including integration with cycle plans and connections, and impacts on bus routes.

In response to concerns regarding future capacity of the bridge, the Proponent advised that the overall width of the proposed bridge deck is approximately 16m which will enable additional lanes to be created, should the need arise in the future.

A suggestion made in the public submissions involved upgrading of the existing Pound Street and Villiers Street roundabout to cater for an increase in heavy vehicle numbers using this intersection to access the Summerland Way. The Proponent advised that works to the roundabout will include the removal of existing vegetation and widening of the concrete apron to provide an encroachment area for B-double turning movements.

Public submissions provided suggestions to improve pedestrian and cyclist access including a formalised footpath connection between Bridge Street and Clarence Street, and a formalised footpath on Greaves Street underpass. A footpath between Bridge Street and Clarence Street will be incorporated into the project design. The suggested footpath on Greaves Street underpass will be considered during the project's detailed design stage.

Public submissions also questioned the safety of pedestrians and cyclists. The proposed bridge is expected to provide a safer crossing as it would provide clear sight lines from the approach roads and pedestrian/cycle pathway. Physical barriers will also separate vehicles from the designated pathway. The design has been developed through the implementation of

Crime Prevention Through Environmental Design principles including enhanced bridge deck lighting to increase surveillance and visibility of pedestrians and cyclists.

Consideration

Road network performance

The existing bridge is the only crossing option of the Clarence River in the Grafton area, with the nearest alternative crossing located at Maclean some 41 kilometres east of the site. The Department recognises the existing bridge is currently operating at capacity during peak periods, and acknowledges the need for an alternative crossing option. The consequences of not providing a secondary crossing are likely to be increased congestion, reduced traffic performance, road safety implications, and local and regional economic impacts.

It is recognised that the upgrading of intersections listed in **Table 9** is required to support future traffic demand generated by the proposed new crossing. The Department is satisfied that the traffic modelling provided in the EIS demonstrates that the proposed intersection upgrades will ensure an acceptable Level of Service up to the year 2039 is maintained. Furthermore, no significant impacts on public bus and rail services are anticipated once the proposed bridge is open to traffic.

Pedestrian and cyclist networks

The Department is satisfied that sufficient pedestrian and cyclist connections are provided as part of the proposal. The identified connections are consistent with Council's PAMP and have been designed to ensure the safety of pedestrians and cyclists through sufficient lighting and barriers.

Construction

The Department acknowledges disruptions to existing traffic conditions and rail operations will occur to some degree during construction of the project. These impacts are consistent with projects of this scale and can be appropriately managed with standard traffic management measures and ongoing consultation with affected stakeholders and the broader community.

To reinforce the Proponent's environmental management measures on these matters and in order to avoid or minimise traffic and transport related disruptions during the construction process, the Department recommends the following conditions:

- the preparation and implementation of both a Construction Environmental Management Plan and Construction Traffic and Access Management Plan to manage impacts on local traffic and roads;
- the provision of alternative temporary parking spaces for formal on-street parking spaces removed and/or impacted during construction of the project; and
- a Road Dilapidation Report is to be prepared to assess the current condition of existing local roads and describe mechanisms to restore any damage that may result due to its use by traffic and transport related to the construction of the project.

Conclusion

The Department is supportive of the proposal from a traffic and transport perspective and considers the following overall benefits will be provided as part of the project:

- improved performance of existing intersections as a result of proposed upgrade works;
- improved road safety for commuters with the proposed new bridge being the designated heavy vehicle route. The alignment of the current bridge with kinks at the end of the bridge requires heavy vehicles to deviate across both lanes of traffic;
- the upgrading of intersections within the project area will improve road safety across the broader road network due to the more efficient movement of vehicles;
- travel time savings will be experienced for both heavy and light vehicles, including improved road freight operations; and

- the proposed bridge will provide an additional flood evacuation route across the Clarence River and a secondary access choice for emergency service vehicles.

5.4 Noise and Vibration

Issues

The noise environment in the locality includes both rural and urban land uses with the main contributors to background noise being road traffic noise along the main arterial roads and in and around the city centre and rail activity along the Northern Railway. The proposal route traverses commercial, educational and residential uses in Grafton and rural and industrial uses in South Grafton. The levee mitigation works will be undertaken in mixed commercial/residential uses close to the existing bridge, residential areas in Grafton and South Grafton, and rural uses outside the urban areas. The majority of sensitive receivers relevant to the proposal are residential with a small number of non-residential, open space and educational (TAFE and pre-school) land uses.

The Proponent undertook a noise assessment of the proposal, including modelling of “build” and “no build” scenarios for the year of opening (2019) and ten years after opening (2029), based on noise surveys of existing background noise levels and traffic counts conducted concurrently. The noise and vibration criteria for the proposal are contained in a number of policies and standards and apply to the construction stage and the operation of the road.

Construction noise guidance is provided in the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009). If predicted or actual noise levels exceed the construction noise management levels then all feasible and reasonable work practices must be implemented to reduce noise levels. The recommended noise management levels for receivers are shown in **Table 10**.

Table 10: Construction Noise Management Levels

Time of day	Noise Management Level
Residential	LAeq (15 mins)
Recommended standard hours:	Noise affected - RBL + 10dB
<ul style="list-style-type: none"> • Monday – Friday 7.00am to 6.00pm • Saturday 8.00am to 1.00pm • No work on Sundays or public holidays 	Highly noise affected - 75bB(A)
Outside recommended standard hours	Noise affected - RBL +5dB
Other sensitive receivers	
School classrooms/ educational institutions	45 dB(A) – internal
Places of worship	45 dB(A) – internal
Active recreation areas	65 dB(A) – external
Passive recreation areas	60 dB(A) – external
Offices and retail outlets	70 dB(A) – external
Industrial premises	75 dB(A) – external

Note: RBL – Ratings Background Level – ambient background noise.

Source: *Interim Construction Noise Guideline* (DECC, 2009) Tables 2 & 3 & Section 4.1.3

The construction noise criteria for the proposal are based on noise catchment areas (NCAs), which typically group similar land uses. The noise assessment identified 14 NCAs for the proposal, 8 for the road and bridge works and 6 for the flood mitigation works. Each NCA is assigned a noise management level, based on the Ratings Background Level (the background noise level).

Typical construction noise levels are predicted to be around 70-75 dB(A)_{L_{max}} at a distance of 50m from the construction zone and 45-55 dB(A)_{L_{max}} at a distance of 150m. Construction activities associated with the road and bridge works are predicted to have the greatest noise impacts on sensitive receivers in NCAs 3, 4, 5 and 6 in Grafton, as shown in **Figure 11**.

The construction noise assessment predicted road works, drainage, earthworks and finishing works would have relatively high noise impacts, with a number of residences expected to receive noise levels above 75 dB(A). The ICNG considers receivers with exposure to noise levels of 75 dB(A) to be highly noise affected, and that such levels may result in strong community reaction to noise. The number of receivers in these NCAs predicted to have noise levels of 75 dB(A) and above are shown in **Table 11**.

Table 11: Number of receivers highly noise affected in NCAs 3, 4, 5 and 6

NCA	Total No of Receivers in NCA	No of receivers Predicted to be Highly Noise Affected (75dB(A) and above)				
		Road works	Earthmoving	Drainage	Finishing works	Piling
3	42	-	13	-	-	14
4	33	3	6	6	4	-
5	70	7	13	13	3	47
6	70	-	2	2	-	42

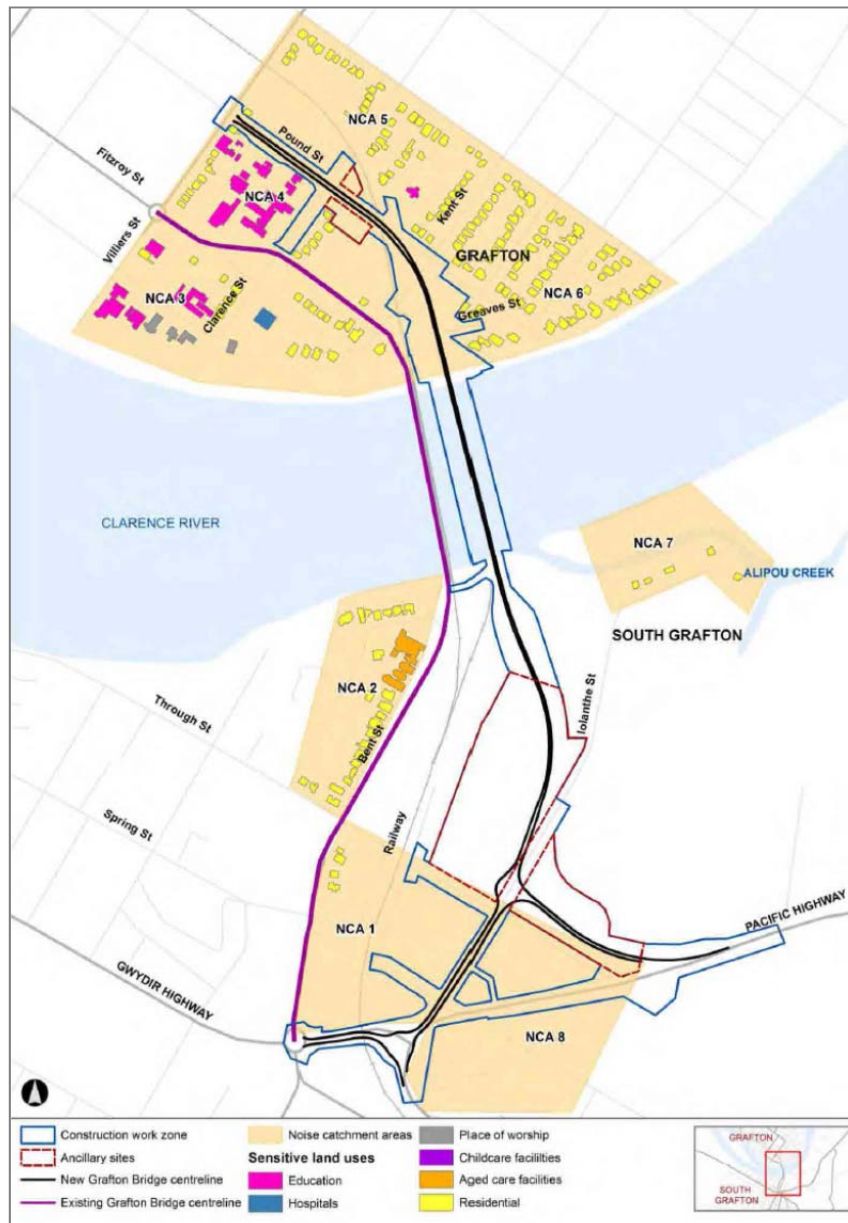


Figure 11: Sensitive land uses in Grafton and South Grafton (RMS 2014)

The Proponent has identified a range of ancillary facilities which would be required during the construction of the project. These include site compounds, a concrete batching plant, stockpile areas, precast facilities, and flood mitigation stockpile sites.

Potential ancillary sites have been identified, four for the bridge construction and eight for the levee mitigation work. The main ancillary site is likely to be located in South Grafton (between Iolanthe Street and the Northern Railway) and a smaller compound in Grafton to support the construction of the northern abutment, Pound Street viaduct and road upgrades. Stockpile sites are also required for the temporary storage of fill, spoil and mulch from the levee mitigation works. The concrete batch plant and precast facility (if required) are expected to be co-located with the site compound in South Grafton. The actual location and layout of ancillary facilities and stockpile sites would be determined by the construction contractor.

Operation of the Grafton and South Grafton ancillary sites for the bridge and road upgrade during the daytime period are predicted to be compliant with the noise management levels, except for 1 receiver in NCA 4 which is predicted to be highly noise affected. However, evening and night time operation are predicted to exceed the noise management levels in Grafton (NCAs 3, 4, 5 and 6). The assessment predicted the operation of the South Grafton ancillary site would result in exceedance of the evening and night time management levels at all receivers in NCA 1 and the night time levels in NCA 2. It is noted that the residential receivers in both NCAs are close to Bent Street (Summerland Way) and therefore are subject to traffic noise.

Operation of the stockpile sites for the levee mitigation works are predicted to comply with the daytime noise management levels. The assessment predicted exceedances of the noise management levels should the stockpile sites be operated in the evening and night time in residential areas.

The proposed working hours for the proposal are the standard construction hours in the *Interim Construction Noise Guideline*: 7.00am to 6.00pm Monday to Friday; 8.00am to 1.00pm on Saturdays; and no work on Sundays and public holidays. However, certain activities would need to be carried out outside these standard construction hours, including:

- Delivery of outsize plant and large construction equipment;
- Upgrading local roads to minimise impacts on traffic;
- Building the new bridge (lifting and setting of bridge elements);
- Replacement of the Pound Street rail viaduct;
- Tie-in with the Pacific Highway;
- Traffic switches;
- Utilities relocation; and
- Ancillary facilities to support out of hours work.

In addition, the Proponent has identified three specific activities, which for technical reasons, need to be carried out during out of hours work. These are concrete paving, concrete saw cutting and concrete batch plant operation, which are time, temperature and weather dependant.

The Proponent has undertaken an assessment of impacts on sensitive receivers during out of hours work. The *Interim Construction Noise Guideline* recommends for work outside standard construction hours, a noise management level equivalent to the background noise level plus 5 dB(A). The assessment predicted all receivers in NCAs 3, 4, 5 and 6 would be subject to noise levels from road works and bridge works which were above the evening and night-time noise management levels. The majority of receivers are predicted to receive

exceedances of the noise management levels of up to 10 dB(A) and a relatively large number of receivers are predicted to exceed the management levels by 20 dB(A).

The criteria for construction vibration impacts on human comfort are provided in *Assessing Vibration: A Technical Guideline* (DEC, 2006). The guideline recommends preferred and maximum values for continuous vibration (such as steady road traffic and continuous construction activity), impulsive vibration and intermittent vibration (heavy vehicle passing, pile driving and intermittent construction). Vibration limits for building damage are based on the *British Standard 7385: Part 2 Evaluation and measurement of vibration in buildings*. The guideline recommends levels at which cosmetic, minor and major damage to buildings may occur. The guideline values for vibration impacts on heritage structures and other sensitive structures are derived from the German *Standard DIN 4150 – Part 3 – Structural Vibration in Buildings – Effects on Structures*.

The main source of construction vibration is expected to be generated by piling in the river bed and banks, excavation, grading of roads and vibratory compaction of new road surfaces. An assessment of the impacts on nearby non-Aboriginal heritage items and residential receivers has been undertaken. The assessment noted that the nearest heritage item is the existing Grafton Bridge at about 50m from the piling zone. At that distance vibration from piling works will be below the vibration limits for the proposal. The Proponent has committed to provide construction vibration management measures in the Construction Noise and Vibration Management Plan for the proposal.

The assessment of operational noise impacts was undertaken in accordance with the *NSW Road Noise Policy* (OEH, 2011) and assessed day and night time noise levels for the year of opening of the project and the design year of the project for the “build” and the “no build” scenarios. The build scenario models the noise levels should the project proceed whilst the no build scenario models the road traffic noise levels had the project not proceeded (this scenario takes into account changes in road noise levels associated with changes in traffic volume over time).

The *Road Noise Policy* provides road noise criteria for residential and non-residential land uses and classifies road development as “new road” or “redevelopment of an existing road”. **Table 12** lists the relevant operational noise criteria for the proposal. The Proponent has adopted the new road criteria for the assessment of operational noise impacts.

Table 12: Operational traffic noise criteria (DECCW NSW Road Noise Policy 2011)

Road Category	Type of Project / Land Use	Assessment Criteria (dB(A))	
		Day (7.00am-10.00pm)	Night (10.00pm-7.00am)
Freeway/arterial road	New freeway/arterial road - residential	L _{Aeq} (15 hour) 55	L _{Aeq} (9 hour) 50
	School classrooms	L _{Aeq} (1 hour) 40 (internal)	-
	Places of worship	L _{Aeq} (1 hour) 40 (internal)	L _{Aeq} (1 hour) 40 (internal)
	Open space (active)	L _{Aeq} (15 hour) 60 (external)	-
	Open space (passive)	L _{Aeq} (15 hour) 55 (external)	-

Based on the concept design, 93 properties were identified by the noise assessment as exceeding the noise trigger levels in the *Road Noise Policy* or exceeding the ENMM acute noise levels. Following consideration of the existing and predicted noise levels for the no build and build scenarios, 47 of the noise affected properties would require noise mitigation. These are 34 residential properties in Grafton and three in South Grafton, nine buildings within the TAFE site and one pre-school. Further noise modelling would be undertaken

during detailed design to confirm the extent of noise affected properties and the level of mitigation required.

In accordance with the *Road Noise Policy* and the ENMM, the Proponent undertook an assessment of feasible and reasonable mitigation measures to address compliance with the operational noise goals for the proposal, including source, path and receiver measures. The provision of sound barriers has been considered for the residences in the noise catchment around Pound Street, Kent Street and Greaves Street which exceed the *Road Noise Policy* noise goals and the ENMM's acute noise levels. Barriers located on the bridge and embankment were evaluated and the assessment considered the night time noise goal of 50 dB(A) could not be met with a barrier less than 8m in height. Practice Note IV of the ENMM states that a barrier greater than 5m in height to be feasible and reasonable, it must provide a least 10 dB(A) attenuation. Therefore, in accordance with the ENMM, a barrier height of 8m or higher was not considered to be feasible and reasonable.

The assessment analysed the effectiveness of barriers at a number of heights. The analysis concluded a 2 dB(A) noise reduction could be achieved at the most affected property with a 3m high barrier. The proposed barrier would extend approximately 310m along the embankment from the Pound Street rail viaduct to the bank of the Clarence River. Refer to **Figure 12**.

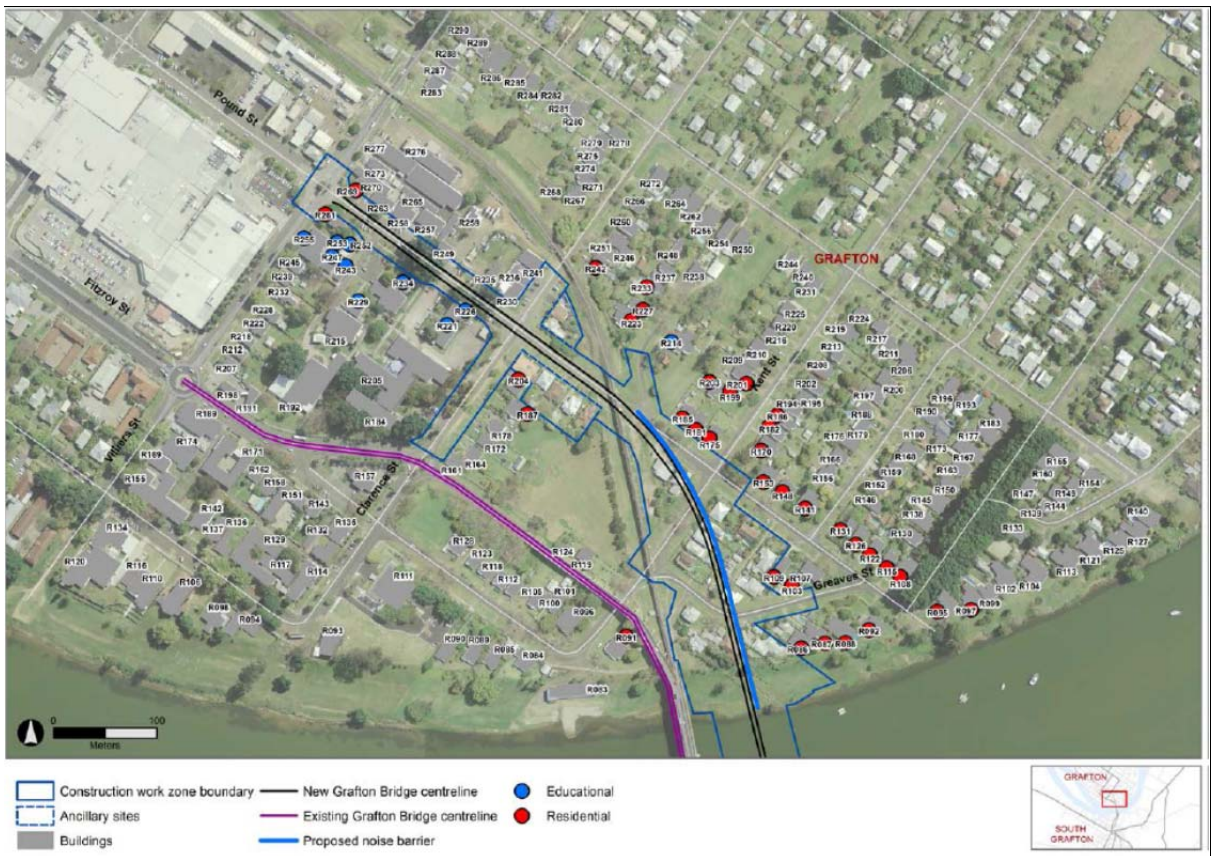


Figure 12: Proposed mitigation measures Grafton (RMS 2014)

At receiver mitigation, such as architectural treatment, would be considered where source or path treatment is not feasible and reasonable, or the residences are in groups of three or less. The provision of such measures could achieve reductions in internal noise levels of up to 10dB(A) below the external noise goals and therefore would enable compliance with the noise criteria at isolated and less closely spaced residences. The combination of proposed noise barriers and architectural treatment measures would enable compliance with the noise goals for the cluster of residences in Pound Street, Kent Street and Greaves Street.

An assessment of rail noise from the replacement of the existing concrete bridge over Pound Street with a steel-concrete composite bridge was undertaken. The proposed bridge structure has the potential to result in marginally increased noise emissions at residences close to the rail viaduct. The Proponent undertook an assessment of potential rail noise impacts from the new bridge in accordance with the *Rail Infrastructure Noise Guideline* (EPA 2013). The assessment predicted the overall increase in rail noise from the new viaduct is approximately 1.8dB(A), which is within the maximum allowable increase. Sensitive receivers near the rail viaduct have been identified for road traffic noise mitigation as shown in **Figure 12**. Consequently the provision of mitigation measures would also provide attenuation in terms of trains using the rail viaduct.

Submissions

Submissions raised concerns about the impact of construction noise and vibration on residential properties. The EPA recommended a revised noise assessment following detailed design and that a Construction Noise and Vibration Management Plan be prepared for the proposal. The Proponent has committed to prepare and implement a Construction Noise and Vibration Management Plan for the proposal. The Plan would further confirm construction impacts following more detailed design and detail the mitigation strategies for noise affected receivers.

Submissions commented on operational noise impacts, including the need for acoustic treatment to property to alleviate road traffic noise, and extension of the noise wall to the railway viaduct to reduce noise impacts on Bridge Street properties.

Consideration

The Department acknowledges that construction of the proposal has direct noise impacts on nearby sensitive receivers and that high construction noise impacts are unavoidable.

The noise assessment modelled the unmitigated impacts of the typical construction activities and plant and equipment. The assessment predicted significant exceedances of the noise management levels at sensitive receivers, particularly in Grafton. The Proponent has committed to prepare a Construction Noise and Vibration Management Sub Plan to identify and manage noise and vibration impacts. The Department considers that impacts from the construction of the bridge are likely to be experienced by nearby sensitive receivers for the majority of the construction period, which is expected to be up to three years. The operation of compound sites is also likely to result in high noise impacts for the duration of the bridge construction.

Notwithstanding, the Department is satisfied that construction noise impacts could be appropriately managed through the implementation of mitigation and management measures and the Department has recommended conditions which require the Proponent to:

- prepare and implement a Construction Noise and Vibration Management Plan that details how construction and vibration impacts would be minimised and managed during the construction of the proposal, including timing, duration, management and mitigation, out-of-hours work, monitoring and complaints handling;
- investigate alternative piling techniques, where conditions allow, and implement management measures to minimise the impact of piling on sensitive receivers; and
- restrict high noise impact activities (such as impact piling) to the hours of 8.00am to 6.00pm Monday to Friday and 8.00am to 1.00pm on Saturdays, and in continuous blocks of no more than 3 hours, with a minimum 1 hour respite period between blocks.

The Department notes that the establishment and use of ancillary facilities during the construction period is critical to delivery of the project and that the operation of some ancillary sites outside the standard hours is necessary to support out of hours work. The Department accepts that the Proponent has committed to the implementation of noise management and mitigation measures to minimise impacts at sensitive receivers. Where

additional ancillary sites are required that were not assessed in the EIS, and where such facilities are located within 200 metres (300 metres for batch plants) from the nearest sensitive receiver, the approval of the Secretary is required.

The EPA recommended that work outside standard hours be considered after adequate assessment, justification and consultation with the community and key agencies. The Proponent has committed to undertake out of hours work in accordance with section 2.3 of the *Interim Construction Noise Guideline*. Section 2.3 identifies the categories of work that might be undertaken outside standard hours, including:

- Delivery of oversized plant or structures;
- Emergency work to prevent loss of life, damage to property or to prevent environmental harm;
- Maintenance and repair of public infrastructure;
- Public infrastructure works that shorten the life of the project and are supported by the affected community; and
- Works where a proponent demonstrates and justifies a need to operate outside the standard hours.

For the latter two categories clear justification must be provided, other than for convenience. The Department accepts that out of hours work is required for technical, operational or safety reasons and that such work needs to be justified. However, consultation with sensitive receivers, Council and EPA must occur prior to the out of hours work proceeding. The Department is satisfied an appropriate assessment of out of hours work has been undertaken and recommends the Environmental Representative be given the authority to approve out of hours work, where that work is justified and the community, Council and EPA have been consulted and concerns addressed.

The proposal includes the replacement of the rail viaduct over Pound Street. The construction of the replacement viaduct would be coordinated with ARTC's closure of the railway line. It is expected that full closure of the line would be for a limited period to minimise disruption to rail services. Consequently, out of hours construction may be required during the track closure period. Work during this period would need to be assessed and carried out under the terms of the out of hours work procedure in the Construction Noise and Vibration Management Plan.

The operation of the project will change the noise environment for residents in the Pound Street/Kent Street/Greaves Street area with bridge traffic closer to residences and therefore exposed to operational traffic noise impacts. The Proponent has assessed the proposal in terms of the traffic noise criteria in the RNP. The assessment predicted 93 properties would be exposed to noise levels which exceed the RNP's new road criteria. Following an assessment of feasible and reasonable mitigation measures, 43 properties are identified as requiring noise mitigation. The Proponent has committed to provide a noise barrier in the abovementioned residential area. The installation of the barrier and the provision of architectural treatment of residences would ensure that compliance with the operational noise criteria could be achieved.

The Department is satisfied that feasible and reasonable operational noise mitigation measures have been considered for the proposal in accordance with the RNP and the *Environmental Noise Management Manual*. The Proponent must undertake further noise assessment at the detailed design stage of the proposal to confirm the effectiveness of the proposed mitigation measures. This is an appropriate approach and consistent with the approach taken for other road projects.

The Department recommends a two-stage approach to operational noise, with the submission of a review of the mitigation measures within six months of the commencement of construction, and a review of operational noise compliance within twelve months of the commencement of operation. The operational noise review would assess compliance with

the predicted noise levels and any additional mitigation measures that may be required to address non-compliances.

Conclusion

The Department notes that the nature of bridge and road construction in close proximity to residential and other sensitive receivers will result in periods of high noise levels. The Proponent has identified measures which would be implemented to address potential construction noise impacts. The Department concludes that these measures are appropriate and that construction impacts are temporary for the duration of construction of the project. The recommended conditions include the management of construction noise impacts through a Construction Noise and Vibration Management Plan and a process for the consideration of construction work outside the standard construction hours.

The Proponent has adopted the operational noise criteria for a new road, 50 dB(A) during the night time period, and identified 47 sensitive receivers (34 residential and 13 non-residential) which would require noise mitigation measures. The Proponent has committed to provide a noise barrier along the embankment between the Pound Street rail viaduct and the northern bank of the river to reduce traffic noise levels to residences in the Greaves Street/Pound Street/Kent Street area. The Department considers the implementation of these measures would ensure that compliance with the operational noise criteria can be achieved. The Department has recommended conditions of approval which require the Proponent to review operational noise mitigation measures following detailed design of the project and undertake noise monitoring within 12 months of operation commencing to confirm predicted noise levels.

5.5 Visual Amenity and Urban Design

Issues

A visual assessment was undertaken to establish the visual impact of the proposal considering both the magnitude of visual modification (i.e. the contrast in scale, form and type against the visual context) and the visual sensitivity of the surrounding areas for eight landscape character zones (five for the bridge and three for the levee raising works). From this, three landscape character zones were assessed as having a high impact from the bridge including:

LCZ1 - Grafton town centre and established residential - this zone is generally a transitional area between the residential areas and the urban core;

LCZ2 - Grafton established residential - this zone is strongly defined by the street grid pattern, wide streets and single-storey dwellings; and

LCZ3 - Clarence River and foreshore - in this zone, the bridge is the dominant visual feature on the river and strongly defines the landscape character.

The levee raising works would have a low to negligible impact on landscape character zones and have not been considered further in this assessment.

A total of 12 viewpoints were selected to capture the extent of visual impacts associated with the proposal, 4 in South Grafton, 6 in Grafton, 1 from the River and 1 from the existing bridge. In addition, the visual impact of the levee raising works was assessed from three viewpoints. The impact assessment was based on the magnitude of the change to existing views and the sensitivity of the viewer. Views to the bridge generally had a moderate to high visual impact. Views to the levee generally had a negligible to moderate visual impact.

Mitigation measures have been incorporated into the concept design in order to reduce the visual impact of the project and enhance the visual character of the local area. These measures create new landscaped open spaces, distinctive town entry points, landscaped parking arrangements and include:

- plantings to provide visual landmarks and to enhance visual identity;
- plantings to compensate for tree loss and to help reduce the visual scale of the proposal;

- plantings to reduce the visual dominance of road infrastructure and the noise wall;
- site specific finishings on the proposed retaining wall; and
- revegetating the foreshores to help integrate the scour protection works.

Submissions

The community raised concerns in relation to the need to reduce the overall appearance of the proposal and potential security and privacy issues associated with property acquisition. Clarence Valley Council raised concern over the potential for landscape treatments to compromise the structural integrity of the levee and place significant additional maintenance requirements on Council. Consequently, the Proponent has indicated that it would consult with Council regarding the design and potential staging of flood mitigation works.

Consideration

In the case of LCZ1, the project would impact on a number of wide, tree-lined streets by increasing pavement widths and removing existing mature trees. The dominance of vehicle parking and pavement would change the appearance of the area which would become an additional arrival point into Grafton as shown in **Figures 13** and **14**.



Figure 13: Existing view of the intersection of Pound and Clarence Streets



Figure 14: Intersection of Pound and Clarence Streets at the year of opening

In LCZ2, the proposal would result in the removal of houses in Greaves and Kent Streets and their replacement by a new elevated road and a section of noise wall on a large embankment

as it approaches the bridge. In order to screen the road and noise wall, new native tree plantings would be provided on the approach road embankments.

In regards to LCZ3 the high impact is due to the high sensitivity of the historic river setting, its value to the community and generally low ability to absorb change. The new bridge, with its proximity to the existing bridge, increases the scale of infrastructure on the river. Although views of the existing bridge from upstream areas would not be affected, they would be obstructed on the downstream side of the river, as shown in **Figures 15 and 16**.



Figure 15: Existing view looking upstream



Figure 16: Artists impression looking upstream at year of opening

The Department acknowledges that the proposed bridge structure has been kept as low as possible over the river to allow the existing bridge to take visual precedence and to minimise the loss of views to the existing bridge. Notwithstanding, the height of the proposed bridge is also governed by the need to:

- allow for two navigation channels, 9.1 metre clearance at mean high water spring;
- tie in with the alignment of Pound Street in Grafton; and
- minimise impacts on the existing sugar-loading facility in South Grafton.

In order to reduce the visual impact of the proposed bridge and ensure that the existing bridge retains its visual precedence, the following design measures have been adopted:

- bridge piers would align as closely as possible with the piers of the existing bridge;
- the existing bridge truss structure would remain visible;
- the bridge would have a simple, streamlined and contemporary appearance that respects and retains the visual integrity of the existing bridge;
- a haunched superstructure (curved base between piers) to minimise the visual bulk of the proposed bridge; and
- keeping the exposed pile caps on the piers of the proposed bridge similar to the pile cap detailing on the existing bridge.

The Proponent has also indicated that opportunities to further streamline the appearance of the bridge would be investigated during detailed design, including tapering of the piers.

Landscaping

The project's urban design principles are in keeping with the desired future landscape and urban design character detailed in the *Clarence River Way Masterplan* (Clarence Valley Council, 2009) which sets out a strategic intent to improve local transport networks to connect communities and access to the Clarence River from a tourism perspective, and the *Grafton Waterfront Precinct Masterplan* (Clarence Valley Council, 2011) which addresses the proposed revitalisation of the Clarence River waterfront.

Landscape concept plans have been prepared to supplement the urban design recommendations. The Department considers that the combination of bridge design features, urban design recommendations and proposed landscape treatments would minimise the overall bulk and scale of the project. Notwithstanding, to ensure that landscape details are captured and resolved, the Department has recommended a condition requiring the preparation of an Urban Design and Landscape Management Plan, in consultation with the Clarence Valley Council, which adopts the mitigation measures recommended in the EIS.

Conclusion

While the proposed new bridge is considered to be a significant structure, the Department notes that the new bridge would have a similar visual catchment to the existing bridge and considers that the design of the proposed bridge keeps it visually subservient to the existing historic Grafton Bridge. The Department also accepts that while the levee raising works will have a low to negligible impact on visual amenity, the proposed bridge and associated road works will have a moderate to high visual impact.

Notwithstanding, the Department is satisfied that the proposed landscaping works and recommended condition requiring the Proponent to prepare an Urban Design and Landscape Management Plan would effectively reduce the visual impact of the road works. Further, the Department is satisfied that the Proponent has designed the bridge to minimise its visual impact and to complement the existing bridge.

5.6 Other Issues

The Department has also considered the following issues in its assessment of the proposal.

Property and Land Use

Construction of the project would require acquisition of 48 lots (18 partially and 30 totally). Of these, 37 are in private ownership, 6 are owned by the Council, 1 is owned by TAFE NSW and 4 are owned by ARTC. Twenty three residential properties would be acquired totally and one partially. The acquisition of 23 residential properties would result in a potential relocation of up to 60 residents in the Dovedale area of Grafton.

Two rural properties in South Grafton identified as containing regionally significant farmland would be partially affected (about 6.8 hectares). However, the farmland represents only a small overall percentage of regionally significant farmland within the mid-north coast. The Department supports the Proponent's commitment to develop an excess land strategy and investigate opportunities to return regionally significant farmland after the project is completed as a means of minimising loss of viable land.

One submission raised a question regarding acquisition of neighbouring properties and associated urban design. The disposal of land surplus to the project would be undertaken in accordance with RMS' guidelines for the disposal of land. The Department recognises that property acquisition is unavoidable and notes that the Proponent will continue communications with affected residents on project timing and acquisition and provide compensation in accordance with the Land Acquisition (Just Terms Compensation) Act 1991.

The Department considers that the productive use of land not directly impacted would generally benefit from the improved overall access and connectivity provided by the project.

Further, the improved access and connectivity would potentially lead to increased economic activity, including land development, which would have a positive effect on Grafton's economy.

An issue raised in public submissions was the maintenance of access to properties during construction and operation of the project. The Proponent has undertaken to maintain access to partially acquired properties for the proposal and all businesses and residents during construction. The Department acknowledges that once operational, the project would alter established patterns of travel for some residents e.g. changes to property access along parts of Clarence, Pound and Iolanthe Streets. The Department accepts that these changes are unavoidable and necessary for access to and from the proposed bridge and for road safety reasons. Despite these changes, the Department considers that the project will still provide adequate access to the affected properties.

The loss of on-street parking in the vicinity of Pound and Clarence Streets during construction (temporarily) and once the project is operational was raised in submissions. The Proponent has committed to minimise parking disruptions during construction and provide a comparable level of parking once the bridge is operational. Further, the Proponent is committed to consulting with impacted residents and businesses regarding access and parking and has indicated that it would prepare and implement a community consultation strategy to inform the community of construction activities and consequent localised impacts and mitigation measures. The Department is satisfied that this will enable community members to have adequate information about the timing and scope of activities that may impact on access and parking, and recommended that the Proponent provide alternative parking prior to construction impacting formal on-street parking.

Based on the above, the Department is satisfied that the Proponent has appropriately minimised the land use and property impacts of the project.

Biodiversity

The proposal is located within the NSW North Coast Bioregion and the Northern Rivers Catchment Management Area. The majority of the project area has been extensively cleared due to historic and ongoing urbanisation, grazing and cropping, with isolated and fragmented areas of remnant vegetation.

Four vegetation communities were recorded within the study area including freshwater wetlands on coastal floodplains (poor condition); subtropical coastal floodplain forest (poor condition); native and exotic plantings; and weeds and exotics. The freshwater wetlands on coastal floodplains and the subtropical coastal floodplain forest are listed as endangered ecological communities (EEC) under the *Threatened Species Conservation Act 1995*.

The assessment of threatened species did not identify any threatened flora species within the project areas, however, there was potential habitat for the threatened species *Arthraxon hispidus* (Hairy-joint grass). Nine threatened fauna species were recorded in the study area, which also contained potential habitat for a further 9 threatened terrestrial fauna species, were identified.

Assessments of significance were conducted in accordance with the *Threatened Species Assessment Guideline – The Assessment of Significance* (Department of Environment and Climate Change, 2007) and concluded that the proposal is not likely to result in a significant impact on the two endangered ecological communities, recorded or potentially occurring threatened flora and fauna species, and threatened fish species.

The Proponent has identified that the proposal would require the clearing of approximately 36 hectares of vegetation, including an estimated 0.31 hectares of Subtropical Coastal Floodplain Forest and 0.1 hectares of Freshwater Wetlands. Although clearing will result in

the removal of EEC, the Department notes that the vegetation is highly modified and fragmented and not considered to be important for the long-term survival of the communities in the locality. Construction of the project would only add incrementally to existing fragmentation processes.

The proposal would also impact foraging and roosting/nesting habitat for microchiropteran bats, birds and Grey-headed Flying Foxes by the removal of a mature planted *Eucalyptus tereticornis*, a planted *Casuarina cunninghamia* and five mature planted Moreton Bay Figs along Pound Street, Grafton. No areas of critical fauna habitat or migratory bird breeding habitat are located within the project area.

The OEH has requested the Proponent offset all impacts to EEC. The Proponent argues that biodiversity offsets would not be required given the poor condition and small amount of the EEC to be cleared. This position is not supported by OEH who noted that offsetting principles require that all impacts which cannot be avoided or mitigated are to be offset regardless of extent and condition of the endangered ecological community. The Department concurs with OEH and considers that biodiversity impacts should be offset and has recommended a condition requiring the Proponent to submit a Biodiversity Offset Statement.

The Department also recommended that areas not accessed during the preparation of the EIS be surveyed prior to the commencement of construction and biodiversity offset requirements updated if threatened species, communities or habitat are identified.

The Department accepts that the likely impacts on flora are low and concurs with the Proponent's commitment to prepare a Construction Flora and Fauna Management Plan which sets out the mitigation measures for managing impacts to native vegetation. In addition, the Department is satisfied that the management measures proposed by the Proponent (including pre-clearing, awareness training, minimisation of clearing, revegetation, installation of nest boxes and roost structures, preparation of a threatened species find procedure) are generally adequate and that the likely impacts on fauna are low.

The Department concludes that proposal will not have a significant impact on biodiversity and that the proposed management and mitigation measures, including the recommended conditions of approval which require the offsetting of biodiversity impacts, will ensure that any adverse impacts are minimised and appropriately compensated.

Non-Aboriginal Heritage

The non-Aboriginal history of the area is characterised by freehold grazing and agricultural land and ship building activities since 1835. Development of early infrastructure in Grafton and South Grafton is dated at 1840-1910 during which time a number of locally significant heritage properties were built. The existing Grafton Bridge was constructed in 1932.

The findings of the non-Aboriginal heritage assessment include:

- no relics were found in the terrestrial or maritime archaeological test excavations;
- some land has moderate and high archaeological potential and moderate and high research potential associated with early settlement in the flood mitigation construction work zone. However, raising of the levee is unlikely to require extensive below ground disturbance and if any such disturbance is to occur, a program of archaeological monitoring would be implemented;
- remains of the steamship ferry *SS Induna* (FMW29) are located in the Clarence River approximately 250 metres upstream of the proposed new bridge. As this is located outside the work zones, a 'no go' area is appropriate to protect the item; and
- the following items were identified on heritage registers:
 - Grafton and South Grafton conservation areas are listed in the *Clarence Valley Local Environmental Plan 2011*, *North Coast Regional Environmental Plan 2008*, and the non-statutory *National Trust of Australia Register* and *Register of the National Estate*;

- The Grafton Rail and Road Bridge (CZB36) is listed on the *State Heritage Register, Section 170 Heritage and Conservation Register, Clarence Valley Local Environmental Plan 2011, North Coast Regional Environmental Plan 2008* and the non-statutory *National Trust of Australia Register*;
- Grafton City Railway Precinct in South Grafton is listed on the *State Heritage Register, Section 170 Heritage and Conservation Register* and *Clarence Valley Local Environmental Plan 2011*. This item is located outside the proposed construction work zone;
- Grafton's railway viaducts are architecturally significant and listed in the *Clarence Valley Local Environmental Plan 2011*; and
- 23 additional properties, comprising historical buildings, houses, park features and the Former Glyndon Private Hospital are listed in the *Clarence Valley Local Environmental Plan 2011*.

The non-Aboriginal heritage impact assessment identified partial impacts on six heritage properties and 11 contributory items.

The Proponent considers the proposal has a positive effect on the heritage value of the existing Grafton Rail and Road Bridge (CZB36). The new bridge would effectively reduce wear and tear on the existing bridge's fabric, provide a new vantage point to view the existing Grafton Bridge; and be designed to give precedence to the existing bridge in terms of its visual presence. Archival recording would be undertaken prior to the commencement of construction to document the existing Grafton Bridge in its visual environment.

In addition, the proposed raising of the levee for flood mitigation purposes is expected to partially impact 27 heritage items of local significance in Grafton and 11 heritage items in South Grafton due to the removal of gardens and cultural plantings associated with the heritage items and visual impacts on existing views of the heritage items. The Proponent has committed to conducting levee raising work in a sympathetic manner that prevents or minimises impacts on the aesthetic and heritage values of the conservation areas.

The assessment also identified the partial or total loss of 34 Jacaranda and 4 Ficus trees in the Grafton and South Grafton conservation areas. Notably, the removal of large, mature fig trees at the junction of Pound and Villiers streets would result in visual impacts to two local heritage items. In this regard, the Proponent proposes preparation of an interpretation plan to record, understand and appreciate the heritage items and values of the Grafton and South Grafton conservation areas. Further, landscaping for the project would need to ensure tree-planting programs are in keeping with the existing streetscapes.

The Department has considered the impacts on non-Aboriginal heritage particularly in relation to the preferred route and the constraints of the site and considers that the demolition of 10 local listed items and partial or indirect impact to additional local listed sites and a small portion of one State heritage listed site is an unavoidable but necessary consequence of the project. The extent of impact has been minimised via the route selection and project design.

The Department supports the primary mitigation strategy, which is based on the urban design plan and aims to minimise the visual impact of the proposal and use the existing heritage character to integrate the works into the conservation area. Accordingly the Department has recommended that the Urban Design and Landscape Management Plan incorporate heritage values as a design principle.

The Department notes that a suite of mitigation measures has been proposed by the Proponent for the protection of the heritage significance and measures to archive and record non-Aboriginal built heritage items. The Department supports these measures and has recommended conditions consistent with these measures.

Aboriginal Heritage

The Aboriginal cultural heritage assessment comprised desktop studies, archaeological field survey and subsurface test excavations to investigate areas of moderate and high potential for Aboriginal cultural material. The surveys and studies found no Aboriginal sites within the project area. No potential archaeological deposits were found within or close to the project area.

The Aboriginal heritage significance of the project area is limited to the identification of one site by representatives of the Grafton Ngerrie Local Aboriginal Land Council. This site, known as the Golden Eel site (AHIMS site number 12-6-0326), is a place of important cultural value to the local Aboriginal community due to its presence in a dreamtime story. The significant landscape feature is located at the confluence of the Alipou Creek and the Clarence River in South Grafton, outside the project area. However according to the Land Council, any construction or landscape impacts on Alipou Creek, downstream from the project area in South Grafton, would impact the intangible cultural value of the Golden Eel site and such impacts must be avoided.

Detailed design of the project would be conducted with careful consideration to avoid encroachment towards the Golden Eel dreaming site. Mitigation measures including temporary fencing between the construction area and the creek during construction, ongoing consultation with the Land Council, and preparation of an interpretive strategy to highlight the culturally significant site would be implemented to protect and enhance the Aboriginal cultural significance of the area. The interpretive strategy will be integrated with the non-Aboriginal heritage interpretation plan for the project.

Overall, while the project area contains low historic and scientific values due to the absence of tangible Aboriginal archaeological findings, the presence of the Golden Eel site provides a high intangible cultural value and therefore an overall high heritage significance of the project area in South Grafton. A Construction Heritage Management Plan with provisions for heritage induction training and an unexpected finds procedure would be prepared prior to the commencement of construction of the project.

The Department supports the Proponent's measures to protect and enhance the Aboriginal heritage value of the project area. To reinforce these measures, the Department has recommended that impacts to Aboriginal heritage be minimised to the greatest extent practicable through both detailed design and construction. Subject to the conditions of approval, the Department's assessment concluded that the project's impact on potential Aboriginal heritage is acceptable.

Socio-Economic Issues

The Clarence River supports a range of commercial and recreational uses including gravel and sand extraction near Susan Island, prawn trawling and fishing downstream of Grafton near Yamba, and ferry services. There are also major water events such as:

- the Rowathon between Iluka and Grafton;
- the Bridge to Bridge Water Ski Race;
- sailing and rowing club races and regattas; and
- cruising yachts, particularly for the annual Jacaranda Festival in November.

Community and Recreational Users

Construction would require some restrictions on navigation around the work areas thus restricting speed and navigation similar to roadworks zones. These would potentially affect the use of the river for rowing, sailing and special events.

The Clarence River Sailing Club has indicated that the proposed bridge would impact regattas as there would be additional bridge supports restricting navigation and

manoeuvrability. The Proponent states the bridge piers would be aligned with the existing piers to minimise impacts, so regattas could still be held on the present course and there is also potential to redesign or relocate the course to alternative locations. Operation of the bridge may also impact the Iluka to Grafton Rowing race course. The Proponent will, liaise with the clubs regarding impacts and options regarding rowing courses.

A large number of Grafton's community and recreation facilities are located near and along the Clarence River or the Summerland Way and include a pre-school, TAFE campus, Grafton showground, Basmar Hall, sporting grounds, reserves/ parks. The Department acknowledges that there will be impacts on some community facilities (e.g. slightly increased noise levels at the TAFE and a pre-school, minor impact on riverside parks, schools and recreational clubs due to levee raising works, loss of Basmar Hall and a minor reduction in the size of Silver Jubilee Park). However, in most cases these impacts would be minor and the Department is satisfied that the Proponent's proposed project design and management measures have been developed with the aim of minimising the degree of impact. In the case Basmar Hall, loss of this community resource will require users to find alternative facilities (e.g. council facilities, schools or other private facilities).

A number of boat moorings are located near the proposed bridge and would need to be relocated during construction. They would be reinstated after completion of the bridge, though some may be relocated away from the bridge. Consultation will be undertaken with Maritime Services and owners of the moorings during detailed design and before construction regarding relocation.

The Department recognises that the project would benefit the community by providing a shared pedestrian and cycleway across the new bridge. This would further facilitate the movement of people between the communities of Grafton and South Grafton.

Business

The project would add capacity to the transport network and reduce congestion and improve access and connectivity between Grafton and South Grafton. Improvements in access and connectivity would potentially provide economic benefits to businesses served by these connections, and social benefits to their employees (through reduced travel time) and benefit tourism.

The businesses on the main approaches to the proposed bridge and the existing bridge would experience changes in traffic volumes and accessibility for customers, staff and suppliers. In South Grafton there would be improved access and exposure to properties on Iolanthe Street (including currently undeveloped sites next to the project) and Spring Street. The reduction in traffic on Bent Street would reduce congestion which would be of benefit to the local businesses which rely on good access to the main road network for ease of customer access. However, some businesses such as accommodation and service stations could be impacted due to a reduction in passing traffic.

In Grafton, a gradual change in the nature of businesses is anticipated in the vicinity of Pound Street, potentially associated with property redevelopment. Fitzroy Street has traditionally been the main entry to Grafton and businesses may be adversely affected by the reduction in traffic along sections of Fitzroy Street. However, they would also benefit from a reduction in congestion with a consequential increase in ease of movement and a reduction in noise.

Industry

Operation of the Boral barge, which uses the Clarence River for transporting sand and gravel, would not be affected during construction, although it would need to negotiate construction equipment and work platforms erected in the waterway..

There is potential for some impact on the fishing industry during construction. The Proponent has advised that it would consult with commercial fishing licence holders to minimise impacts and address any access issues in and around the work site. However, no impacts are expected when the bridge is completed.

On balance, based on the above, the Department considers that the short-term social and economic impact of construction of the proposal would be overall outweighed by the long-term socio-economic benefits of the project.

Air Quality

The Proponent has undertaken a qualitative assessment of the potential air quality impacts on sensitive receptors and identified that impacts would largely result from particulate emissions generated during earthworks and other road and bridge construction activities. One submission on the EIS raised concern about potential dust generation from construction activities.

Construction Impacts

The Proponent has committed to developing an "Air Quality Management Plan" as part of the Construction Environmental Management Plan. The Plan would describe the mitigation measures to be implemented to manage dust emissions during construction, including contingency measures in the event of non-compliances and/or dust complaints. Notwithstanding, the Department considers that the Proponent should also undertake all works with the objective of preventing visible dust emissions has recommended a condition to this effect.

The Proponent has indicated that a concrete batching plant may be required and has advised that control measures would be incorporated into the design and operation of the batching plant to control dust generation. Notwithstanding, the Department has recommended a condition requiring the Proponent to detail the measures for controlling dust generation from the batching plant.

The Department considers that through implementation of the Proponent's mitigation measures and the recommended conditions, the project can be managed to minimise fugitive dust and emissions from construction vehicles, plant and equipment, and consequently minimise impacts on air quality.

Operational Impacts

The Proponent has assessed the local operational air quality impacts of the project consistent with the *Approved Methods and Guidelines for the Modelling and Assessment of Air Pollutants in New South Wales* (Department of Environment and Conservation, 2005). The assessment focused on the key pollutants associated with road traffic – carbon monoxide, nitrogen dioxide, and particulate matter less than 10 microns (PM₁₀) – and involved dispersion modelling using the AUSROADS V1.0 model.

The modelling predicted the worst-case short-term (hourly average) concentrations for nitrogen dioxide and carbon monoxide and 24-hour and annual average concentrations PM₁₀ across 13 sensitive receptors. Concentration levels were assessed against the relevant Department of Environment and Conservation (2005) ground-level concentration goals. The modelling predicted emission concentrations at year of opening (2019) and ten years thereafter (2029) with and without the project proceeding, and assumed no improvement in vehicle emissions in the future.

The Department acknowledges that the Proponent did not carry out air quality monitoring for the project. The Department considers the use of data from Korora (air quality monitoring site adjacent to the Pacific Highway near Coffs Harbour) a reasonable approach as Korora has a higher pollution potential due to the comparatively higher traffic volumes (average daily traffic

of around 19,700 compared to maximum daily traffic of 17,000 vehicles at Grafton Bridge) and therefore provides more conservative worst-case background concentrations.

The results of the modelling indicate that should the project proceed, the worst-case emission concentration levels would not exceed the ground-level concentration goals at sensitive receptors for all of the modelled air pollutants.

When compared to the "no build" solution, there would be a decrease in pollutant levels at the majority of modelled sensitive receptors as the operation of the new bridge would result in traffic being spread out over two routes and hence increased dispersion of air pollutants.

The Department is satisfied that the Proponent has undertaken a robust and conservative assessment of potential operational air quality impacts, including assessment of worst-case meteorological scenarios. Based on the outcomes of the assessment, the Department is satisfied that the project would not lead to unacceptable air quality (or associated health impacts).

Greenhouse Gases

The assessment identified that a total of 55,641 tonnes of carbon dioxide equivalent gas would be released as a result of construction of the project. Embodied emissions and construction equipment contribute to the majority of the total greenhouse gas emissions (about 75 %).

As forecasted operational traffic volumes would be similar with or without the project, the project is unlikely to generate additional greenhouse gas emissions during operation.

The Proponent has identified a number of measures to minimise greenhouse gas emissions.

The Department is satisfied with the greenhouse gas assessment of the project and supports the Proponent's actions for reducing the generation of greenhouse gas emissions during construction and operation of the proposal.

Contamination

A preliminary soil contamination assessment was undertaken to identify the potential for soil contamination within the project area. The assessment indicated that in Grafton, there is potential for land contamination where there is, or has been, land uses such as automotive uses and agriculture. There is a risk of asbestos in buildings to be demolished due to the age of most dwellings. There is no known groundwater contamination in the project area.

In South Grafton, there is potential for soil contamination due to existing and former industrial, automotive and agricultural land uses. The ARTC land occupied by the former locomotive depot is known to be contaminated.

Bulk earthworks and demolition of dwellings, old railway tracks and other structures has the potential to expose contaminated soils. The Proponent has committed to undertaking a detailed site investigation in areas of potential contamination to determine the type, extent and level of contamination, if any. If the results of the investigation indicate remediation is necessary, a remedial action plan would be prepared and implemented. The Department has recommended that the Construction Soil and Water Quality Management Plan detail the outcomes of the investigations and proposed remedial measures. The Department has also recommended that:

- in the event that remediation is required, a suitably qualified contaminated land consultant be engaged to prepare a Validation Report upon completion of remediation;
- an accredited NSW Site Auditor be engaged to prepare a Site Audit Report and Site Audit Statement to determine the land use suitability; and

- the Construction Soil and Water Quality Management Plan detail the contingency measures that would be implemented in the event of the discovery of previously unidentified contaminated material.

The Proponent has indicated that an asbestos survey would be conducted for all structures to be demolished. The Department has recommended that measures for managing asbestos waste be included in the Construction Environmental Management Plan. Subject to the recommended conditions of approval, the Department's assessment concluded that potential contamination can be appropriately managed.

Erosion and Sedimentation and Acid Sulfate Soils

Construction of the project include a range of works have the potential to result in erosion and sedimentation and exposure of acid sulfate soils. The Proponent has indicated that the following measures would be undertaken to minimise erosion and sedimentation and ensure the effective handling, treatment, and disposal and/or reuse of acid sulfate soils:

- implementation of standard erosion and sediment controls consistent with the principles set out in Landcom's *Managing Urban Stormwater: Soils and Construction*;
- preparation of a Construction Soil and Water Quality Management Plan;
- potential installation of a sedimentation basin at the South Grafton ancillary site to intercept sediment-laden runoff from the ancillary site;
- installation of scour protection around the river;
- all works near waterways would be carried out in accordance with best practice and appropriate NOW guidelines for controlled activities (as recommended by the DPI in its submission); and
- manage acid sulfate soils consistent with the *Acid Sulfate Soils Assessment Guidelines* (Ahern et al, 1998) and *Acid Sulfate Soils Manual* (Acid Sulfate Soils Management Advisory Committee, 1998).

The Department's assessment concludes that implementation of the proposed mitigation measures would minimise the potential for the construction of the project to have an unacceptable level of impact with regards to erosion and sedimentation and exposure of acid sulphate soils.

Surface Water and Groundwater Hydrology

The project is located within the Lower Clarence catchment area and would cross the Clarence River and be located immediately upstream of Alipou Creek, which includes a number of sensitive receiving environments, including:

- Susan Island Natural Reserve;
- moderately sensitive key fish habitat;
- two endangered ecological communities associated with aquatic ecosystems; and
- potential habitats for threatened fish species.

Water quality sampling and analyses undertaken by the Proponent in early 2014 indicate that pH, turbidity and conductivity levels in the Clarence River are above the ANZECC/ARMCANZ guideline values for the protection of aquatic ecosystems. However, dissolved oxygen levels are below the guideline level. Both the Clarence River and Alipou Creek at Grafton are not considered suitable recreational swimming areas due to high enterococci levels.

To minimise potential water quality impacts arising from the use of temporary working platforms on the Clarence River and from piling activities, working platforms would be designed in accordance with the following principles:

- be constructed of durable rock free of fine particles;
- allow for effective clean-up of any sediment and spills;
- minimise the re-suspension of sediments and substrates; and
- be protected by anti-pollution booms and heavy duty silt curtains.

The main potential impact on water quality during operation is stormwater runoff from the bridge. The project will include an operational stormwater management system. In both Grafton and South Grafton, the proposed drainage strategy would be designed to replicate the existing situation as closely as possible and the existing drainage networks modified and reused (where possible). In South Grafton, stormwater runoff would be directed through a series of grass-lined open channels and culverts, eventually discharging through a culvert in the flood levee. The stormwater would receive some water quality treatment in the grass-lined channels. From here the water would disperse over the floodplain and ultimately discharge into Alipou Creek. In Grafton, stormwater drainage would ultimately drain into the Clarence River, similar to the existing situation.

Over the bridge deck, the drainage network would extend along the bridge approaches, with stormwater runoff discharged into the existing drainage network. The need to provide measures to manage emergency spills would be evaluated during detailed design.

In its submission, the EPA recommended that the proposed measures for managing stormwater be documented. NSW Fisheries recommended that the management of spills be addressed. The Department agrees with these recommendations and has addressed them in the conditions of approval.

The EPA also recommended that the Proponent conduct a comprehensive risk assessment of the potential impacts on water quality and hydrological processes posed by the proposed bridge construction methods. The Proponent has adopted this recommendation in its Submission Report and indicated that the risk assessment would be undertaken as part of the Soil and Water Management Plan. This has been reinforced in the Department's recommended conditions of approval.

To alleviate ponding at Pound Street for flood events up to the 1 in 20 year average recurrence interval, the Proponent will construct a series of culverts below the street which connect to a detention basin to be located at south of the street. A pump station will be installed to extract water from the detention basin and convey it to the Clarence River downstream of the proposed bridge. Both Clarence Valley Council and one public submission questioned the capacity of the Pound Street drainage system. In its Submission Report, the Proponent advised that the system capacity has been based on a the strategic flood model for the site with the size of the detention basin and pump station based on the volume of water that would need to be pumped over the levee to provide flood immunity for a 1 in 20 year flood event. The Department considers this justification as reasonable. To ensure that the Council is satisfied with the final drainage system, the Proponent has committed to consulting with Council during detailed design.

The Department's assessment concludes that the Proponent's proposed mitigation measures and Department's recommended condition as appropriate measures for ensuring that impacts on water quality are adequately managed.

6 CONCLUSIONS AND RECOMMENDATIONS

Need and justification

The existing Grafton Bridge provides an important road and rail crossing of the Clarence River in Grafton. However, as a road traffic bridge, its shortcomings in terms of safety, capacity and traffic flow are well documented. The need for an additional crossing of the Clarence River in Grafton was identified in 2002 and investigations progressed in 2009. The development of key project objectives provided a clear understanding of the project requirements. A detailed route option selection process was conducted in 2010-2012 and included comprehensive community consultation.

The proposed new road traffic bridge over the Clarence River in Grafton located 70 meters downstream of the existing bridge will provide one traffic lane per direction and a shared pedestrian/cycle path. The project also includes early works being the upgrade to the Gwydir Highway in South Grafton, and associated construction work on approach roads and intersections. Important elements of the project are raising of the flood levee to maintain current flood immunity for affected properties and raising of a section of the rail viaduct to the north of the Clarence River.

The proposal meets the key project objectives and also provides improved traffic, pedestrian and cycle flows in the local area while safety for all road users would be improved. The project design has considered drainage and stormwater, flooding and property access during construction and operation of the new bridge.

The Department considers that the project is justified and is in the public interest because it is necessary to deliver a vital piece of public infrastructure which is the key to the ongoing and future development of the Grafton region. The adverse consequences of not proceeding with the project would be significant in the short and long term, in terms of the capacity and congestion of the existing bridge and level of safety due to its kinks. Benefits for cyclists and pedestrians are also of paramount importance.

The proposal is consistent with key strategic and transport planning policies including the *State Infrastructure Strategy* and the *Mid North Coast Regional Strategy*.

The *State Infrastructure Strategy* aims to improve access to employment, connect people and communities, and improve local transport networks. The project would help to achieve these objectives by improving traffic capacity and providing for important access by vehicles, pedestrians and cyclists and relieving congestion across the Clarence River.

The Project is also consistent with the *Mid North Coast Regional Strategy* as it would improve access and transport efficiency, which would enhance the ability of Grafton to fulfil its function as a major regional centre.

Key Biophysical, Economic and Social Considerations

The Department has carefully considered all environmental, social and economic impacts of the proposal, in accordance with the requirements of the *Environmental Planning and Assessment Act, 1979*. It has undertaken an extensive consultation process with Government agencies and other relevant stakeholders. Following a detailed assessment of the Proponent's EIS, Response to Submissions Report, and the submissions received from agencies and the local Council and the public during the exhibition period for the project, the Department is satisfied that the residual impacts of the project can be appropriately mitigated or managed to within acceptable levels. Based on the submissions and the Department's assessment, the key issues surrounding the project are:

- route selection process and consideration of the different route options;
- flooding, for which an independent review was commissioned by the Department;
- traffic and transport including traffic congestion on the surrounding road network through construction and operation; and
- noise and vibration.

The recommended conditions for the project provide for the mitigation and management of key impacts associated with the project. These include specific environmental performance and construction environment management conditions for traffic and transport; noise and vibration; flooding, drainage and stormwater; urban design; visual quality and landscape character; and heritage.

Importantly, the Department's assessment concluded that the proposal would result in a number of key benefits including:

- Relieving current and future traffic congestion on the existing bridge (the current bridge is at capacity during peak periods which impacts on road safety and efficient operation of the road network);
- Support regional and local economic development, by improving access and freight distribution efficiency by reducing congestion and providing an alternative crossing over the Clarence River for large, heavy vehicles;
- Improving safety for motorists by providing a bridge that meets contemporary design standards;
- Improving safety for pedestrians and cyclists travelling across the river by providing purpose designed pedestrian and cycle paths;
- Improving the level of flood immunity of the surrounding approach roads, providing greater access and movement during flood events; and
- Providing a direct \$200 million investment into transport infrastructure for the region and up to 90 construction jobs over three years.

Conclusions

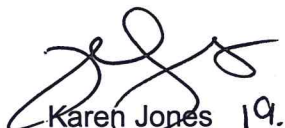
The Department believes that the recommended requirements would provide for the implementation of best management practices during detailed design, construction and operation of the project, and would ensure that the impacts of the project on the surrounding environment and the amenity of local residents, workers and commuters are managed to acceptable levels.


The Department has carefully considered the key areas of concern, including flooding, traffic and transport, noise and vibration and historic heritage impacts, against the significant transport and socio-economic benefits of the proposal. The proposal represents a vital infrastructure which will provide significant benefits and is in the public interest.

Recommendations

It is recommended that the proposal be approved subject to the recommended conditions of approval. The key recommendations are:

- the need to undertake a review of flood modelling and mitigation measures, and the preparation of a Hydrological Mitigation Report.
- Archival recording for impacted local heritage items and the preparation of an Urban Design and Landscape Management Plan, which requires the identification of heritage value design principles and responses.
- the preparation of a Construction Traffic and Access Management Plan to manage construction traffic and access impacts of the project.
- The preparation of a Construction Noise and Vibration Management Plan to manage and mitigate construction noise and vibration impacts on sensitive receivers and review of operational noise mitigation measures following the detailed design of the proposal.


Karen Jones 19.12.14
**Director
Infrastructure Projects**


19.12.14
Chris Wilson
**Executive Director
Infrastructure and Industry Assessments**

APPENDIX A ENVIRONMENTAL ASSESSMENT

See the Department's website at www.planning.nsw.gov.au.

APPENDIX B SUBMISSIONS

See the Department's website at www.planning.nsw.gov.au.

APPENDIX C PROPONENT'S RESPONSE TO SUBMISSIONS

See the Department's website at www.planning.nsw.gov.au.

APPENDIX D INDEPENDENT EXPERT REVIEW HYDROLOGY AND FLOODING

See the Department's website at www.planning.nsw.gov.au.

APPENDIX E RECOMMENDED CONDITIONS OF APPROVAL
