

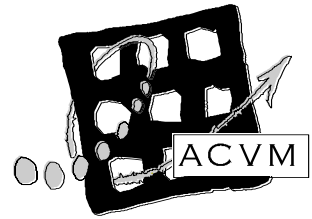
MR83 SUMMERLAND WAY

**ADDITIONAL CROSSING OF THE
CLARENCE RIVER AT GRAFTON**

OPTION ASSESSMENT WORKSHOP

31st October 2012

Workshop Report



ABN 36 082 506 171

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Report

Background

The existing bridge over the Clarence River was completed in 1932 and since that time has served as the major link across the river between Grafton and South Grafton. Increasing traffic volumes, coupled with the “kinks” on the existing bridge have led to congestion, delays and increased safety concerns.

A public meeting in May 2002 led the State Government to commission Roads and Maritime Services, RMS (formerly the Roads and Traffic Authority, RTA) to undertake a feasibility study and determine strategic locations for an additional crossing to service Grafton and the surrounding communities. Investigations were deferred in September 2005 and restarted in 2009.

In December 2010, RMS announced a revised approach to engage more effectively with the community and stakeholders in identifying a preferred route for an additional crossing.

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

In January 2012, a short list of six options was announced. Additional design refinements were then undertaken on the six short listed options and further field and technical investigations were also carried out. The results were documented in the *Route Options Development Report* (RMS, September 2012).

A Value Management (VM) Workshop was held on 23-24 October 2012 in Grafton attended by a wide range of stakeholders including community interest representatives, stakeholder groups, Clarence Valley Council, Government Agencies, RMS and Arup (technical project consultants). The purpose of the workshop was for participants to discuss the six route options and to gain a shared understanding of which option provides the best balance across functional, socio-economic and environmental issues, while also taking cost and value for money into consideration. Assessment criteria were developed based on the project objectives and what was considered important to the group, and these criteria were then consolidated and weighted. The short listed options were evaluated against the criteria and then compared with option costing and value for money data with a view to recommending a preferred option to progress the project.

The key findings of the VM workshop were that:

- Options E and C were recommended for further consideration by RMS as the preferred route option. The group found it difficult to decide between these two options
- Options A, 11, 14 & 15 were the least preferred options as they did not perform as well as Options E and C when assessed against the agreed and weighted selection criteria.

Subsequent to the VM workshop, an Option Assessment Workshop (the subject of this report) was held as part of the process to identify a recommended preferred route for the additional crossing.

The Option Assessment Workshop allowed the workshop participants to review the information discussed and generated in the VM workshop, reconsider and refine the assessment criteria and their weightings (if necessary) to ensure they fully reflect the project objectives and then re-evaluate the short listed options to determine a recommended preferred option. The Arup technical team also attended the workshop to provide advice and input to the process.

The Australian Centre for Value Management (ACVM) was commissioned to facilitate and report on the workshop which was held on **31st October 2012**.

A list of participants who attended the workshop can be found in **Appendix 1**.

Workshop Objectives

The objectives of the workshop, as presented to the participants, were to:

- *To review the work undertaken at the VM Workshop (23-24 October 2012) in particular the assessment criteria, their weightings and the route option evaluation*
- *Re-evaluate the route options and draw conclusions*

This report has been compiled by ACVM and seeks to provide an objective overview of the project aspects discussed and the outcomes formulated by the end of the workshop.

Workshop Activities

The workshop process builds on the perspectives as well as the detailed and specialist knowledge which resides with the workshop participants then structures the analysis and option review from a functional base (ie. review the project objectives, compare them to the assessment criteria used at the VM workshop, and then evaluate the six short listed options against these criteria to determine a preferred option).

During the workshop, background material was presented including a summary of planning undertaken to date, community feedback to the Route Option Development Report, RODR and a comparison of the project objectives with the assessment criteria generated at the VM workshop (**Appendices 3 & 4**).

The workshop group then reviewed the assessment criteria developed in the VM workshop against the project objectives and refined as well as re-weighted the criteria, as necessary (**Appendix 2**).

Presentation of the six options was made from the RODR information in terms of performance from a Functional; Socio-Economic; and Natural & Built Environment perspective (**Appendix 5**).

After each focused presentation, the participants conducted a comparative evaluation across all six options, by applying the refined and weighted assessment criteria. This task involved using both available quantitative data and qualitative assessments. It created considerable discussion and debate before consensus was reached.

When the relative rankings were clear under each of the three perspectives of the review (Functional; Socio-economic; and Natural & Built Environment) cost and value for money data was introduced (see **Appendix 2**). The cost comparator used was the strategic capital cost estimates. Benefit Cost Ratio (BCR) was used as the value for money comparator.

The subsequent workshop discussions on these results led the group to conclusions as outlined below.

Workshop Outcomes

By the end of the workshop, the participants had:

- **Confirmed** the assessment criteria used to evaluate the options at the VM workshop reflected the project objectives. The assessment criteria were refined to ensure the words clearly reflected the intent.

- **Agreed** with the assessment criteria used at the VM workshop for the three categories of *Functional, Socio Economic and Natural and Built Environment* except one criteria under the Natural and Built Environment criteria.
- **Agreed** to remove a criteria from Natural & Built Environment (ie “*minimise the surface/ground water impacts*”) as it was felt that regardless of the option, the current best practice and technical management processes would be put in place to address adverse impacts (eg. surface and groundwater impacts and acid sulfate soils, etc) and cost contingencies for this had been allowed for in the strategic cost estimates. The group agreed that as this criteria had been removed, the remaining criteria in the Natural and Built Environment category should be re-weighted.
- **Agreed** that the weightings assigned to the Functional and Socio-Economic categories of criteria developed at the VM workshop using the “paired comparison” approach were realistic and appropriate to adopt for the evaluation of options.
- **Reviewed** the short listed options which were as follows:
 - **Option E.** The additional crossing would be located west (upstream) of the existing bridge and southeast (downstream) of Susan Island and connect Cowan St, South Grafton to Villiers St, Grafton
 - **Option A.** The additional crossing would be located parallel to and immediately west (upstream) of the existing bridge and connect Bent St, South Grafton and Fitzroy St, Grafton
 - **Option C.** The additional crossing would be located about 70 metres east (downstream) of the existing bridge and connect the Junction of Pacific Hwy and Gwydir Hwy, South Grafton to Pound St, Grafton
 - **Option 11.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy north of South Grafton to Fry St, Grafton
 - **Option 14.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy at Centenary Drive to North St Grafton via Kirchner St
 - **Option 15.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy at Centenary Drive to Summerland Way north of Grafton, via Kirchner St.

- **Evaluated** the short listed options qualitatively against the assessment criteria in each category and ranked their performance. These rankings were also compared to the options' strategic cost estimates and BCRs.
- **Drew** the following conclusions as a result of their deliberations:
 - The same conclusion was reached as the workshop group who undertook the assessment of options at the VM workshop in Grafton the previous week, viz Options E and C were recommended for further consideration as the preferred route option.
 - It was difficult to decide between Options E and C, on the basis of the assessment criteria used which reflected the project objectives. The differences between these two options were very small. The separate assessment of the options ranked Options E & C virtually the same in terms of function and socio-economic performance within the sensitivity limitations of the assessment process adopted and with a difference between the two options environmentally (in favour of Option E). The strategic cost estimates and the BCR for both Options E & C could also be considered the same at this stage of project development.
 - Options A, 11, 14 & 15 are the least preferred options because they do not perform as well as Options E and C when evaluated against the assessment criteria and the project objectives.
 - Option C could become the preferred option if emphasis is placed on the long term benefits to Grafton's future growth areas since it is closer to the proposed development areas south and south east of the river and because of its connection to the Pacific Highway for heavy vehicles servicing the town. However, Option C requires additional consideration to mitigating the potential adverse natural and built environmental impacts cited including those associated with Aboriginal heritage during construction and the material fabric of the town.
- Option E could become the preferred option if the emphasis is placed on the need to link the South Grafton CBD and its existing residential areas with the Grafton CBD. Considerations need to include the realisation that the cost of providing the first stage of Option E is \$146M and is substantially less than Stage 1 cost of Option C (being \$182M). However, Option E does not cater for heavy vehicles servicing the Grafton CBD as well as Option C and additional consideration needs to be given to mitigating the adverse functional impacts associated with the traffic "pinch point" at the intersection of Villiers and Fitzroy Streets. There were also some concerns in terms of freight vehicles accessing the town and alternative routes in emergencies, transport efficiency across the network and relative safety aspects that would need to be addressed.
- The recommended next step was to convene another workshop which would consider only Options E and C in more specific detail with a sensitivity analysis to see if a clear recommendation can be achieved.

Appendix 1. List of Attendees

ADDITIONAL CROSSING OF THE CLARENCE RIVER AT GRAFTON OPTION ASSESSMENT WORKSHOP – LIST OF ATTENDEES

PARTICIPANTS:

Roads and Maritime Services

Bob Higgins

Steve Arnold

Chris Clark

Ed Scully

James Green

Craig Leckie

Alison Nash

Arup

Ben Schnitzerling

ADVISORS:

Roads and Maritime Services

Vicky Sisson

Joe Canceri

Adam Cameron

Arup

Kathryn Nation

Nicola Fleury

John Hamilton

Gerard Cavanagh

id Planning

Denise Wilson

Gina Newling

Clarence Valley Council

Dave Morrison

FACILITATORS (ACVM)

Ross Prestipino

Alan Butler

Appendix 2. Workshop Outputs

Workshop Outputs

The information presented in this Appendix is a consolidation of the general outputs and views expressed by the workshop participants as they reviewed the options for the Additional Crossing of the Clarence River at Grafton Project.

The workshop participants reviewed the assessment criteria generated at the VM workshop (attended by a wide range of stakeholders) and checked the criteria against the stated project objectives. The workshop participants also reviewed the weightings of the various assessment criteria assigned by the previous VM workshop group and refined them as necessary.

Finally the workshop participants re-evaluated the six short listed options against the refined assessment criteria and their estimated costs (strategic capital cost estimates) and value for money assessments (benefit cost ratios – BCRs) in order to recommend a preferred option to progress the project.

Context

The existing bridge over the Clarence River was completed in 1932 and since that time has served as the major link across the river between Grafton and South Grafton.

Increasing traffic volumes, coupled with the “kinks” on the bridge, have led to congestion, delays and increased safety concerns.

In 2001, a community campaign for an additional crossing of the Clarence River at Grafton commenced. A public meeting in May 2002 led the State Government to commission Roads and Maritime Services, RMS (formerly the Roads and Traffic Authority, RTA) to undertake a Feasibility Study and determine strategic locations for an additional crossing to service Grafton and the surrounding communities. Investigations were deferred in September 2005 and restarted in 2009.

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

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

In January 2012, a short list of six options was announced for further investigation. The short listed options and short listing process are documented in the Preliminary Route Options Report – Final (RMS, January 2012). Further design refinements were then undertaken on the six short listed options and further field and technical investigations were also carried out.

In September 2012, the design refinements on the six options and technical investigations were documented in the Route Options Development Report and placed on display for community comment.

Following the display of the six options, a Value Management (VM) workshop was held in Grafton on Tuesday 22 and Wednesday 23 October 2012. The purpose of the workshop was to consider the six options from a wide range of perspectives and evaluate the options against agreed and weighted criteria to determine which route option(s) could best provide a balance across social, environmental and functional issues while also taking cost and value for money into consideration.

The workshop included an independent facilitator, seven community participants, six community stakeholders including representatives from Clarence Valley Council, Department of Planning and Infrastructure, Grafton Chamber of Commerce, Grafton-Ngerrie LALC, the freight haulage industry and NSW Police and Emergency Services as well as five RMS representatives. Technical advisors were also present to assist the participants.

Assessment criteria were developed at the workshop based on the project objectives and what was considered important to the group, and these criteria were then consolidated and weighted. The short listed options were evaluated against the criteria and then compared with option costs and BCR data with a view to recommending a preferred option to progress the project.

The workshop participants agreed that Options A, 11, 14 and 15 were the least preferred options because they did not perform as well as Options E and C against the criteria developed at the workshop and the project objectives.

The workshop participants found it difficult to decide between Options E and C because:

- Option C was considered the best performing option assessed against functional criteria (safety and transport efficiency)
- Option E was considered the best performing option when assessed against potential impacts on the natural and built environment.
- Options E and C performed equally well against socio economic criteria
- The costs and BCRs of Options E and C were similar.

The group agreed that if either Option E or C was selected, further consideration would need to be given to further reducing the potential impacts of the options.

Subsequent to the VM workshop, an Option Assessment Workshop (the subject of this report) was held as part of the process to identify a recommended preferred route for the additional crossing. The Option Assessment Workshop allowed the participants to reconsider and refine the assessment criteria and their weightings generated in the VM workshop (if necessary) to ensure they fully reflect the project objectives and then re-evaluate the short listed options to determine a recommended preferred option. The Arup technical team also attended the workshop to provide advice and input to the process.

Overview Presentations

In order to provide a background to the project and the workshop and to familiarise participants who had not attended the VM Workshop in Grafton, the following presentations were made. These presentations can be found in **Appendix 3**.

- *Draft RODR community feedback report – Gina Newling, id Planning*
- *Presentation for Option Assessment Workshop Background Information (including what happened at the VM workshop 23-24 Oct 2012) – Chris Clark, Project Manager, RMS*

Reviewing the VM Workshop Assessment Criteria and their match to the Project Objectives

The workshop group was provided with a presentation which reviewed the VM workshop assessment criteria against the project objectives to determine if any project objectives which could help differentiate between the options should be added to the assessment criteria and/or whether the assessment criteria agreed to at the VM workshop should be refined.

The project objectives and supporting objectives for the Additional Crossing of the Clarence River at Grafton (as published for the project) were stated as:

Enhance road safety for all road users over the length of the project

- Reduce the potential for road crashes and injuries on the bridge and approaches including any intersections and connecting roads.
- Provide safe facilities for pedestrians and cyclists.

Improve traffic efficiency between and within Grafton and South Grafton

- Provide efficient access for a second crossing of the Clarence River and for the State road network.
- Provide a traffic management network which reduces delays between Grafton and South Grafton in peak periods to an acceptable level of service for 30 years after opening.
- Provide adequate vertical clearance for heavy vehicles.
- Consider demand management strategies to minimise delays to local and through traffic.

Support regional and local economic development

- Provide transport solutions that compliment existing and future land uses and support development opportunities.
- Provide improved opportunities for economic and tourist development for Grafton.
- Provide for commercial transport including B-doubles where required.
- Provide flood immunity for the bridge for a 1 in 100 year flood event, and for the approach roads for a 1 in 20 year flood event, where economically justified.
- Provide navigational clearance from the additional crossing for river users.

Involve all stakeholders and consider their interests

- Develop solutions that consider community expectations for the project.
- Satisfy the technical and procedural requirements of Roads and Maritime Services (formerly Roads and Traffic Authority) with respect to the planning and design of the project.
- Integrate input from the community into the development of the project through the implementation of a comprehensive program of community consultation and participation.

Provide value for money

- Achieve a justifiable benefit/cost ratio at an affordable cost.
- Develop a strategy to integrate future upgrades into the project.

Minimise impact on the environment

- Minimise the impact on the social and economic environment, including property impacts.
- Minimise the impact on residential amenity, including noise, vibration, air quality etc.
- Minimise the impact on heritage.
- Minimise impact on the natural environment.
- Provide a project that fits sensitively into the built, natural and community context.
- Minimise flooding impact caused by the project.

The presentation of the comparison of the project objectives with the VM assessment criteria (see **Appendix 4**) indicated that:

- There were a number of project objectives not considered as a differentiator between options in the RODR and not identified as an assessment criteria at the VM workshop
- There was one additional assessment criteria at the VM workshop which was not a project objective or supporting objective, being “minimise the surface/ground water impacts”
- There were two project objectives which were not fully considered as a criteria at the VM workshop being “provide transport solutions that complement existing and future land uses and support development opportunities” and “provide improved opportunities for economic and tourist development for Grafton”
- There was one project objective (being “minimise flood impacts caused by the project”) which was not considered as a criteria at the VM workshop.

The workshop group discussed the differences and concluded:

- Overall the project objectives that will assist in differentiating between the options have been reflected in the VM workshop assessment criteria. However the assessment criteria as stated at the workshop may need to be refined to ensure the words clearly reflect the intent.
- That the project objectives identified as non differentiators were considered as overall objectives to be met by any of the options should they be the preferred option or that they were related to “process” (ie. “satisfy technical and procedural requirements of the RMS with respect to the planning and design of the project”).
- That the criteria used in the Natural and Built Environment assessment category at the VM workshop, “minimise the surface/ground water impacts” should not be a criteria for assessment of the options. The reasons behind this recommendation included: (i) it is assumed that regardless of the option, current best practice and technical management processes would be put in place to address such adverse impacts (ie. surface and groundwater impacts, acid sulfate soil impacts, etc), and (ii) the strategic capital cost estimates include specific contingency allowances for these aspects.

- That although not explicitly stated, the project objectives being “*provide transport solutions that complement existing and future land uses and support development opportunities*” and “*provide improved opportunities for economic and tourist development for Grafton*”, **are implicit** in the assessment criteria “*minimise the impact on the operation of the existing businesses and provide for economic growth*” and “*promote better connectivity between Grafton and South Grafton for social, commercial and industrial users*”. These two assessment criteria should be further refined to more clearly reflect these matters.
- The project objective “*minimise flood impacts caused by the project*” was not considered as a selection criteria at the VM workshop. This was because flood protection had been examined and the differences in flood management works for each option have been incorporated into the strategic capital cost estimates – so, to avoid double counting, flood impacts did not need to be a separate assessment criteria.

Refining the VM Workshop Assessment Criteria and their Weightings

The workshop group reviewed the VM workshop assessment criteria in more detail to ensure they clearly reflected the intent expressed at the workshop while also addressing the project objectives. Below are comments on the three non-price assessment categories (being functional, socio economic and natural and built environment) used to cluster the criteria for later evaluation of options.

Functional Criteria

As indicated above, the workshop group made no change to the assessment criteria used. However, some clarification to the words used to explain the criteria was made to make the intent clearer. These are shown below. Extra clarifying words are shown in *italics*.

Also, the group reviewed the weightings and confirmed that the weightings developed at the VM workshop using the “paired comparison” approach were realistic and appropriate to adopt for the evaluation of options.

The assessment criteria and their weightings are shown below.

No.	Assessment Criteria	Raw Score	Relative Weight
A.	Improve the overall efficiency of the road network including am and pm peaks	11	33%
B	Enhance safety for all road users (<i>pedestrians, cyclists, vehicles, etc</i>)	6	18%
C.	Optimise the efficiency of <i>road</i> freight movement	5	15%
D.	Improve bicycle and pedestrian linkages	6	18%
E.	Provide an effective alternate route during incidents <i>and maintenance activities</i>	5	15%
F.	<i>Minimise navigation restrictions on river users</i>	-	-
	Total	33	99

Key points raised in discussion of the Functional Criteria and their weightings included:

- The wording of some criteria was altered. These included:
 - “*Enhance safety for all road users*”, needs to clearly demonstrate the breadth of what it encompasses. This is because the current bridge has limited functionality for some categories of road user. The adjustment was made by adding words as follows: “*Enhance safety for all road users (pedestrians, cyclists, vehicles, etc)*”.
 - “*Optimise the efficiency of freight movements*” needs to be adjusted to ensure it specifically related to road freight, avoiding any confusion with regards to rail freight. The revision reads: “*Optimise the efficiency of road freight movement*”.

- With “*Provide an effective alternate route during incidents*”, the addition of a new bridge for Grafton essentially provides another river crossing, but differentiation between options is possible because the location of the incidents may impact the accessibility and travel distances involved in using the alternate route. It was also acknowledged that maintenance works on the existing bridge will be easier to implement once the new bridge is open, but may require diversion of all traffic onto the new bridge. Consequently the words were adjusted slightly. The revision reads: “*Provide an effective alternate route during incidents and maintenance activities*”.
- The original wording of the criteria “*Maintain navigable bridge clearances for river users*” reflected just the navigation clearances for the new bridge. It was acknowledged that there may be a difference between options beyond the navigation clearances and that other potential impacts on river users should be considered when assessing options. The revision made was from “*Maintain navigable bridge clearances for river users*” as worded at the VM Workshop to “*Minimise navigation restrictions on river users*” at this workshop.
- It was noted that the criteria “*minimise navigation restrictions on river users*” although important was not considered as important as the other criteria to be used in the evaluation of options when compared in pairs and so did not receive a score.

Socio Economic Criteria

Again, the workshop group made no change to the assessment criteria used. However, some clarification to the words used to explain the criteria was made to make the intent clearer. These are shown below. Extra clarifying words are shown in *italics*.

Also the group reviewed the weightings and confirmed that the weightings developed at the VM workshop using the “paired comparison” approach were realistic and appropriate to adopt for the evaluation of options.

The assessment criteria and their weightings are shown below.

No.	Assessment Criteria	Raw Score	Relative Weight
A.	Minimise the impact on the operation of the existing businesses (<i>including tourism</i>), provide for economic growth <i>and support Grafton as a regional centre</i>	3	17%
B.	Promote better connectivity <i>either side of the river</i> for social, commercial and industrial users	8	44%
C.	Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas <i>and community facilities</i> (noise, air quality)	5	28%
D.	Minimise acquisition of properties – rural, residential, business & community	2	11%
E.	Maintain the relationship of the town to the river eg views and river users	-	-
	Total	18	100

Key points raised in discussion of the Socio Economic Criteria and their weightings included:

- The first criteria was interpreted by the group as the potential for the additional crossing to support the continued development of the broader Grafton area as a regional centre. For this to occur the additional crossing should support businesses (including tourism) and encourage the overall economic growth of Grafton. To better reflect this intent, the original wording of “Minimise the impact on the operation of the existing businesses and provide for economic growth” was amended to read: “*Minimise the impact on the operation of existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre*”.

- The second criteria originally focused on the links between the two CBDs of South Grafton and Grafton. The group felt that the wording should reflect the functionality and connectivity of cross-river linkages for the broader Grafton and South Grafton areas including the identified growth areas such as Junction Hill; Waterview Heights and Clarenza, To better reflect this intent, the original wording of “*Promote better connectivity between Grafton and South Grafton for social, commercial and industrial users*” was amended to read: “*Provide better connectivity either side of the river for social, commercial and industrial users*”
- The third criteria was seen to need to address amenity impacts on other “non-business” community facilities in addition to residences. The original words were “*Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas, noise, air quality*”. Community facilities like the Convent and schools, risk being missed in considering amenity impacts because they may not be seen as non-business or sensitive. There was also some discussion on whether “air quality” was a real concern or differentiator but in the end it was left in the descriptor. The revision to reflect the agreed intent is: “*Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas and community facilities, especially in terms of noise and air quality*”
- The fourth criteria related to acquisition of properties of all sorts (ie. rural farming, rural businesses; residential; commercial; business and community facilities - parks and building). Concerns were raised about impact of options on the “affordable” housing stock, particularly in South Grafton. Some participants felt that a loss of low cost housing in a regional centre such as Grafton where stock is limited could result in a shortage of this type of accommodation. The wording was not altered but the participants agreed to keep this consideration in mind when scoring against this criteria
- The existing criteria “*Maintain the relationship of the town to the river, eg views and river users*” was seen to be unrelated to the views of the existing bridge as that was captured in the Natural & Built Environment assessment criteria. Rather, this criteria relates to the impact a new bridge option might have on the town’s relationship to the river from traditional and current key points within the town area, including physical access and cultural association. The wording was not altered but the participants agreed to keep this intent in mind.
- It was also noted that the criteria “*Maintain the relationship of the town to the river eg views and river users*” although important was not considered as important as the other criteria to be used in the evaluation of options when compared in pairs and did not receive a score

Natural and Built Environmental Criteria

The workshop group discussed these assessment criteria and agreed with the original criteria developed in the VM workshop except for the criteria “*minimise the surface/ground water impacts*”. It was felt that this criteria was not necessary since, regardless of the option, current best practice and technical management processes would be put in place to address potential adverse impacts (ie. surface and groundwater impacts, acid sulfate soils, etc) and in addition the cost estimates includes cost contingencies for these items.

The group agreed that this criteria should be omitted and the remaining criteria re-weighted. Also, some clarification to the words used was made to make the intent clearer. These are shown below. Extra clarifying words are shown in *italics*.

The re-weighting was undertaken using the “paired comparison” approach with the workings and findings by the group shown below.

No.	Assessment Criteria	Raw Score	Relative Weight
A.	Minimise Non Aboriginal heritage impacts	4	24%
B	Maintain the material fabric and character of Grafton (Urban landscape, <i>character and streetscape</i>)	7	41%
C.	Maintain the visual experience of the existing bridge (<i>to and from the bridge</i>)	0	0
D.	Minimise impact on Aboriginal cultural heritage	5	29%
E.	Minimise ecological impacts – (EEC, Fauna, Flora, Aquatic, etc)	1	6%
	Total	17	100

Key points raised in discussion of the Natural and Built Environmental Criteria and their weightings included:

- It was noted that the indicators in the RODR for non-Aboriginal heritage included a number of quite diverse components. They included listed buildings or structures as well as scheduled or listed individual trees. The wording was not altered but the participants noted that the diverse indicators may complicate the scoring against this criteria.
- The second criteria addressed the extent to which an option affected the “Essence of Grafton”. The original wording was: “*Maintain the material fabric and character of Grafton (Urban landscape)*”. This was discussed at length and the aspects comprising the intent were elaborated on. There were zones and areas within Grafton which were seen as comprising its essence that residents and visitors cherished. The wording was adjusted slightly to reflect the intent as: “*Maintain the material fabric and character of Grafton (Urban landscape, character and streetscape)*”.
- Discussion on the third criteria clarified that it included views of the existing bridge and views from the existing bridge. It was noted that the existing rail bridge level had pedestrian pathways on either side of the structure. Further it was noted that views of the bridge varied from option to option as:
 - Some options (such as Options A and C) block views of the existing bridge from one side or the other
 - Other options (such as Options 14 and 15) preserve the view of the existing bridge from either side but would not enable a distant view of the existing bridge from the new river crossing
 - Options such as E and 11 preserved the view of the bridge from either side whilst also enabling a distant view of the existing bridge from the new river crossingThe wording was adjusted slightly to read: “*Maintain the visual experience of the existing bridge (to and from the existing bridge)*”.
- The fourth and fifth criteria were not reworded. They remained: “*Minimise impact on Aboriginal cultural heritage*” and “*Minimise ecological impacts – (EEC, Fauna, Flora, Aquatic, etc)*”. Discussion in terms of Aboriginal cultural heritage noted potential challenges in dealing with longer term impacts against potential impacts during the construction phase which might be mitigated. Both areas (Aboriginal cultural heritage and Ecology) were seen to have been degraded over time in this urbanised setting. It was noted that at the VM workshop, the LALC representative acknowledged that viewlines to the islands have already been compromised to some extent by the existing bridge, however, there are a number of known Aboriginal cultural heritage sites that are located close to some of the options. It was also noted that while some of the Ecological communities in the Grafton area are already degraded, this did not mean that further impacts should not be considered important – in some respects the remnant communities become even more important to preserve.
- The participants omitted the sixth selection criteria, “*Minimise the surface/ground water impacts*”. It was felt that regardless of the option, current best practice and technical management processes would be put in place to address potential adverse impacts (ie. surface and groundwater impacts, acid sulfate soils, etc) and cost contingencies for this had been allowed in the strategic cost estimates.
- As mentioned earlier, the group re-weighted the remaining five criteria and as a result:
 1. Generally maintained a similar relativity to the weightings assigned by the VM workshop group
 2. Placed a lower weighting on “*Minimising ecological impacts*” (ie. 6% as against 20%)
 3. Placed a higher weighting on “*Maintain the material fabric and character of Grafton (Urban landscape, character and streetscape)*” (ie. 41% as against 30%)
 4. Weightings for *Minimising impacts on non-Aboriginal heritage and Aboriginal cultural heritage* remained essentially the same.
- It was noted in the criteria weighting process, that the criteria “*Maintain the visual experience of the existing bridge (to and from the existing bridge)*” although important was not considered as important as the other criteria to be used in the evaluation of options when compared in pairs and it did not receive a score.

Scoring Matrix - Natural and Built Environmental Criteria

The paired comparison process used for re-scoring and re-weighting the modified criteria was the same as adopted at the VM workshop. The workings for the relative assessment of the Natural and Built Environment criteria is shown below:

	B	C	D	E
A	2B	2A	A/D	1A
	B	2B	D/B	2B
		C	2D	1E
			D	1D
				E

How Important

- 3 Major Preference
- 2 Medium Preference
- 1 Minor Preference

Summary of Criteria and Weightings

A summary of the weightings of the assessment criteria within the three categories as reviewed and refined by the group appears below.

Assessment Criteria					
Functional		Socio Economic		Natural and Built Environmental	
Criteria	Wt	Criteria	Wt	Criteria	Wt
Improve the overall efficiency of the road network including am and pm peaks	33%	Minimise the impact on the operation of the existing businesses (<i>including tourism</i>), provide for economic growth <i>and support Grafton as a regional centre</i>	17%	Minimise Non Aboriginal heritage impacts	24%
Enhance safety for all road users (<i>pedestrians, cyclists, vehicles, etc</i>)	18%	Promote better connectivity <i>either side of the river</i> for social, commercial and industrial users	44%	Maintain the material fabric and character of Grafton (Urban landscape, <i>character and streetscape</i>)	41%
Optimise the efficiency of <i>road</i> freight movement	15%	Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas <i>and community facilities</i> (noise, air quality)	28%	Maintain the visual experience of the existing bridge (<i>to and from the bridge</i>)	0%
Improve bicycle and pedestrian linkages	18%	Minimise acquisition of properties – rural, residential, business & community	11%	Minimise impact on Aboriginal cultural heritage	29%
Provide an effective alternate route during incidents <i>and maintenance events</i>	15%	Maintain the relationship of the town to the river eg views and river users	0%	Minimise ecological impacts – (EEC, Fauna, Flora, Aquatic, etc)	6%
<i>Minimise navigation restrictions on river users</i>	0%				

These revised weighted assessment criteria were used to re-evaluate the various short listed options for the project.

Assumptions

As the workshop group discussed and clarified the assessment criteria, the following assumptions became apparent and were recorded:

- The assessment of the options using the criteria was undertaken within the context of assessing the current situation as well as in the future (until 2049)
- The assessment of options was undertaken for the whole route option and not just the bridge component
- The existing bridge will remain and therefore its height and clearance above the river remains as a navigation constraint
- Regardless of the option, current best practice, technical management processes and cost contingencies will be put in place to address potential adverse impacts (ie. surface and groundwater impacts, acid sulfate soils, etc)
- Flood protection has been examined and the differences to provide mitigation measures for each option has been incorporated into the strategic capital cost estimates
- Demand management techniques would not be a differentiator in option assessment

Review of Options

Presentations were made by the Arup technical advice team on the six short listed options. The team presented key features and then each option from a functional, socio economic and natural and built environment perspective to assist the workshop group undertake the evaluation of options.

The six options discussed were:

- **Option E.** The additional crossing would be located west (upstream) of the existing bridge and southeast (downstream) of Susan Island and connect Cowan St, South Grafton to Villiers St, Grafton
- **Option A.** The additional crossing would be located parallel to and immediately west (upstream) of the existing bridge and connect Bent St, South Grafton and Fitzroy St, Grafton
- **Option C.** The additional crossing would be located about 70 metres east (downstream) of the existing bridge and connect the junction of Pacific Hwy and Gwydir Hwy, South Grafton to Pound St, Grafton
- **Option 11.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy north of South Grafton to Fry St, Grafton
- **Option 14.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy at Centenary Drive to North St Grafton via Kirchner St
- **Option 15.** The additional crossing would be located northeast (downstream) of the existing bridge and connect the existing Pacific Hwy at Centenary Drive to the Summerland Way north of Grafton, via Kirchner St

The presentation material to assist in the evaluation of the options can be found in **Appendix 5**.

A summary table comparing the details for each option as contained in the Community Newsletter to assist the workshop group is reproduced below.

Comparing the Options						
	Option E	Option A	Option C	Option 11	Option 14	Option 15
Traffic – Bridge utilisation Traffic volumes for 2 hour AM peak period (7am-9am) (both ways): Number of vehicles using the additional crossing (approximate % of total vehicles crossing the river) ¹ <ul style="list-style-type: none"> • 2019 • 2049 	2697 (66%) 5231 (65%)	3188 (78%) 5919 (74%)	2808 (67%) 5431 (68%)	1296 (32%) 3515 (45%)	936 (23%) 2673 (36%)	921 (22%) 2578 (35%)
Traffic – Reducing delays Average travel time between the Bent Street/Gwydir Highway intersection, South Grafton and Prince Street/Pound Street intersection, Grafton using the existing bridge, 30 years after opening (2049) in morning (AM) peak period (minutes) ²	7	8	7	8	14	14
Heavy vehicles Travel between the Pacific Highway/Tyson Street intersection, South Grafton and Summerland Way/Butterfactory Lane intersection, Grafton using the additional crossing: <ul style="list-style-type: none"> • Travel distance(km). • Travel time 30 years after opening (2049) in morning (AM) peak period (minutes). 	9.1 15	8.7 14	8.4 13	10 11	10.5 10	10.3 10
Road Safety Number of issues identified in road safety audit: <ul style="list-style-type: none"> • High priority. • Medium priority. • Low priority. 	2 9 7	3 13 7	1 10 4	3 8 4	2 7 5	2 7 5
Property impacts Number of potentially directly affected properties: <ul style="list-style-type: none"> • Residential • Businesses • Rural • Community • Total 	16 7 0 8 31	21 21 0 15 57	24 4 2 12 42	22 1 2 5 30	6 2 7 5 20	1 1 14 6 22

Noise impacts 10 years after opening (2029) (without mitigation measures). Number of residential properties where noise levels ³ : • Are more than 50dBA at night ⁴ • Increase by 12dB or more at night	461 11	448 0	462 1	505 51	477 30	415 21
Aboriginal cultural heritage Impact on areas of Aboriginal cultural heritage.	None	None	Impact on the aesthetic value of 1 site – Golden Eel	None	Direct impact on 1 site – Great Marlow	Direct impact on 1 site – Great Marlow
Non-Aboriginal heritage Direct impact on non-Aboriginal heritage items and archaeological sites: • Items of State heritage significance (No.). • Other items (No.).	0 21	2 25	0 24	0 12	0 10	0 10
Environmental Potential direct impact on identified Endangered Ecological Communities (EEC) m2	100	550	1,450	14,250	22,000	37,500
Landscape and urban character	Maintains visual integrity of existing bridge. Would not fragment existing urban settlement patterns.	Impacts on views to, and visual character of, existing bridge. Would fragment existing urban settlement patterns.	Impacts on views to, and visual character of, existing bridge. Would significantly fragment existing urban settlement patterns.	Maintains visual integrity of existing bridge. Would significantly fragment existing urban settlement patterns.	Maintains visual integrity of existing bridge. Would fragment existing urban settlement patterns.	Maintains visual integrity of existing bridge. Would fragment existing urban settlement patterns.
Flooding Length of levees upstream of additional crossing that will need to be raised to retain existing flood protection (km) ⁵ .	11.75	16.70	18.10	19.50	16.50	16.50
Cost • Route option strategic cost estimates (\$M) (all upgrades at 2012) • Benefit cost ratio over 30 years from 2019 based on strategic cost estimates ⁶	215 1.6	231 1.3	231 1.6	210 1.7	304 1.0	340 0.9

1. For Option A the new bridge would be two lanes northbound and one lane southbound, and the existing bridge would become one lane southbound only. For the other five options, the new bridge would be one lane northbound and one lane southbound, and the existing bridge would remain as one lane northbound and one lane southbound.
2. Typical recorded travel times between the Bent Street/Gwydir Highway intersection South Grafton and Prince Street/Pound Street intersection Grafton in the morning (AM) peak earlier in 2012 were between 8 and 10 minutes.
3. Only included receivers identified in the Noise Assessment Technical Paper (September 2012)
4. Includes 468 properties that would exceed 50 dBA at night if no additional crossing was built
5. Maximum required levee bank height increase for all options is less than or equal to 0.1 metre. For Option C, drainage mitigation measures would be required to provide the required flood immunity for the bridge approach on Pound Street where it passes underneath the railway viaduct between Kent and Clarence Streets
6. A benefit cost ratio (BCR) that is greater than one indicates that the road user benefits exceed the cost.

Evaluation of Options

Having reviewed the options and the various studies and investigations undertaken, the group was in a position to evaluate the options against the weighted assessment criteria as refined earlier in the workshop.

The group evaluated the six short listed options using the weighted assessment criteria in each of the three categories/themes being functional criteria, socio economic criteria and the natural and built environment criteria, separately.

The options were judged on a qualitative basis of how well each option met each category's assessment criteria relatively on a scale of Excellent (**E**) with a corresponding numerical value of 5, Very Good (**VG**) with a corresponding numerical value of 4, Good (**G**) with a corresponding numerical value of 3, Fair (**F**) with a corresponding numerical value of 2 or Poor (**P**) with a corresponding numerical value of 1.

At times the group reverted to the numerical basis for differentiating the options (ie a score of 1 was allocated to the worst option and score of 5 allocated to the best option against a criteria) because the terminology such as "Excellent", "Very Good", etc did not apply.

In this same vein, there were times when to get the relative and comparative spread of performance perceived by the group and to reflect the range, the group chose to cluster options on a single score or separate options by more than a score of one point or, at times, chose to place the best option at less than the available maximum score of 5.

Once the qualitative evaluation was completed, each option was scored using the weightings for each criteria and a ranking established for each option within each category.

Key points of discussion when evaluating options against criteria for each theme were recorded and are noted below under each of the categories.

Evaluation of Options against Functional Criteria

Assessment Criteria		Improve the overall efficiency of the road network including am and pm peaks	Enhance safety for all road users (pedestrians, cyclists, vehicles etc)	Optimise the efficiency of road freight movement	Improve bicycle and pedestrian linkages	Provide an effective alternate route during incidents & maintenance events	
Weighting		33%	18%	15%	18%	15%	
Option E	5	E	E	E	E	E	Rank 1
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		132	72	60	90	75	429
Option A	5	E	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		99	54	60	72	30	315
Option C	5	E	E	E	E	E	Rank 1
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		165	72	75	72	75	459
Option 11	5	E	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		66	54	60	36	75	291
Option 14	5	E	E	E	E	E	Rank 5
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		33	54	30	18	60	195
Option 15	5	E	E	E	E	E	Rank 5
	4	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		33	54	30	18	60	195

Key points made during the evaluation discussion included:

- For the Criteria - Improve the overall efficiency of the road network including am and pm peaks :
 - Option C rated better than Option E because traffic is split on the north side of the river rather than directed through one intersection (Villiers/Fitzroy Street)

- Options 14 & 15 perform the worst because they do not attract enough traffic away from the existing bridge, and by the year 2049 delays on the existing bridge corridor would be worse than they are today
- Option 11 was rated better than Options 14 & 15 because it attracts more traffic to the new bridge and is therefore better at reducing delays on the existing bridge
- Option A sits just below Options C & E because of concerns on both sides of the river where traffic is funnelled into the same corridors as the existing bridge at Bent Street, South Grafton and Fitzroy Street, Grafton.
- For the Criteria - Enhance safety for all road users (pedestrians, cyclists, vehicles etc):
 - Initial consideration was given to Option A as the best as it is the only 3 lane option and because it enables the existing bridge to be converted to one lane (southbound), it seemed to provide a safer solution with regards to the “kinks”
 - Further consideration of the modelling and figures for all road users (ie. heavy vehicles, bicycles, etc) saw a revised order appear, with some adverse characteristics of Option A not being able to be “designed out” such as potential conflict points between pedestrians, cyclists and vehicles
 - After detailed discussions, Options A, 11, 14 & 15 were considered to be approximately equal under this criteria whilst Options C & E were considered a little better
- For the Criteria - Optimise the efficiency of road freight movement:
 - The patterns of road freight were discussed and freight traffic from/to areas external to Grafton will primarily be from/to the existing Pacific Highway (from north and south) with lesser volumes from the Gwydir Highway and Armidale Road. The modelling indicates that most trucks are servicing the township
 - The new bridge should not be seen primarily as a Grafton by-pass, however with regards to access to and from the Summerland Way to the north of Grafton, Options 14 & 15 perform best
 - Options E, A, C, & 11 generally have similar performance in terms of road freight
 - Option E would be better for Gwydir Highway traffic
 - Option C would be better for Pacific Highway traffic. It was rated slightly better than Options 11, E & A because it provides convenient access into central Grafton for Pacific Highway freight traffic while still performing quite well for through freight traffic.
- For the Criteria - Improve bicycle and pedestrian linkages:
 - Options E, A & C are very similar in terms of providing good bicycle and pedestrian linkages. However, Option E creates a slightly better and more direct access between the two CBDs and it opens up an identifiable pedestrian and cycle loop with the existing bridge
 - Option C & 11 may be preferable for access to Clarenza schools for cyclists, with Option C being a slightly more convenient route
 - Options 14 & 15 are both less attractive due to the distances involved and the fact that they culminate at the existing Pacific Highway where there is unlikely to be safe passageways for either pedestrians or cyclists
- For the Criteria - Provide an effective alternate route during incidents & maintenance events:
 - A considerable degree of discussion centred on this criteria because provision of an additional bridge does provide an alternate route in each option, but the differentiator related to this being both effective and available in a range of incidents and emergency situations
 - The issues centred on the ease of maintaining access to at least one bridge in the event of an incident or maintenance affecting the other bridge, and the way in which the approach roads and intersection layouts for each option could function during such an event.
 - Option A was seen as the worst under this criteria because it shared corridors and intersections with the existing bridge on both sides
 - Options 14 & 15 were considered very good because they split traffic movements widely, although the downside of this is the extra distance of travel needed (particularly if the incident related to maintenance of the existing bridge – a task which could involve extended blocks of time with substantial impacts on travel time and distances)
 - Options C, E & 11 were seen, in the end, to perform the best

Evaluation of Options against Socio Economic Assessment Criteria

Assessment Criteria		Minimise impact on operation of existing business, provide for economic growth & support Grafton as a regional centre	Promote better connectivity either side of the river for social, commercial & industrial users	Minimise adverse amenity impacts of traffic on residential areas & community facilities (noise, air quality)	Minimise acquisition of properties – rural, residential, business & community	
Weighting		17%	44%	28%	11%	
Option E	5	E	E	E	E	Rank 1
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		68	176	56	33	333
Option A	5	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		51	132	84	11	278
Option C	5	E	E	E	E	Rank 1
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		85	176	84	22	367
Option 11	5	E	E	E	E	Rank 4
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		51	88	28	33	200
Option 14	5	E	E	E	E	Rank 4
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		34	44	56	44	178
Option 15	5	E	E	E	E	Rank 4
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		34	44	56	44	178

Key points made during the evaluation discussion included:

- For the Criteria - Minimise impact on operation of existing business, provide for economic growth & support Grafton as a regional centre:

- Options C & E were rated very similar and the best of the options. However, Option C was scored slightly ahead of Option E because it affects fewer existing businesses and improves access to the commercial area adjacent to Iolanthe Street.
- Option A impacted on many existing business operations along Bent Street and Option 11 was also rated lower because access to the central area of Grafton would be less direct. It would therefore contribute less to economic growth and to the support of Grafton as a regional centre
- Options 14 & 15 would cater well for the small proportion of through vehicles but would not provide good linkages to the centre of Grafton and would contribute less to the growth of Grafton as a regional centre.
- For the Criteria - Promote better connectivity either side of the river for social, commercial & industrial users:
 - The participants found it hard to differentiate between Options C & E. Option E connects the two CBDs best, while Option C connects best to the future growth areas of Clarenza and South Grafton
 - Option A retains the status quo
 - Option 11 & Option A were rated similar, however Option 11 was scored slightly lower than Option A because the southern side connection for Option 11 is onto the Pacific Highway out of town
 - Options 14 & 15 do least for improving connectivity to existing areas. The group considered that while connectivity to some future growth areas such as Clarenza would be improved by these options, a much longer planning horizon would be required for these options to rate well. Considering current development and currently identified growth areas, Options 14 and 15 were rated lowest
- For the Criteria - Minimise adverse amenity impacts of traffic on residential areas & community facilities (noise, air quality):
 - Discussion suggested that no option could score a “5” or an “excellent” rating for noise
 - Also, it was suggested that previous project studies had indicated that air quality impacts would not be substantial and should be similar across all options, and would therefore not be a differentiator
 - Option 11 scores the lowest because of the length and extent of impact on Fry Street, particularly in the morning peak period. Comments received from the EPA affirm this perspective
 - Options 14 and 15 score slightly better than Option 11 although they would introduce new noise into existing quiet rural communities
 - Option E was scored similarly to Options 14 & 15 because it has a noise impact on the Convent at the southern end of Villiers Street and the elevated approach to the bridge would have noise impacts on the heritage precinct of Victoria Street
 - Option A & C scored the “best” because they were essentially following the same corridor as the existing bridge traffic and pass through areas that are already noise-affected
- For the Criteria - Minimise acquisition of properties – rural, residential, business & community:
 - Community halls and churches were reviewed closely and it was noted that acquisition impacts on these properties generally involved only small areas at each site, enabling the current functions to remain unchanged
 - Some viewed the loss of residences as possibly more important than acquisition of farmland
 - Others noted that there was a view that those who had their residence acquired were more fortunate as they could buy elsewhere and away from any perceived downsides of the new route, whilst those left behind had to “manage” in the changed environment with the introduction of the new road route and increased traffic and noise
 - Options 14 & 15 were rated overall best under this category as they affected mainly rural lands and fewer residences
 - Option A was seen as the worst as it had the highest number of properties acquired
 - Option C scored a little better than Option A because it takes fewer properties
 - Options E (because it takes few properties) and Option 11 (because Fry Street is quite wide and acquisitions are only needed at the bridge approaches and on a few corner sites where roundabouts are located) scored the best of the options

Evaluation of Options against Natural and Built Environment Criteria

Assessment Criteria		Minimise non Aboriginal heritage impacts	Maintain the material fabric and character of Grafton (urban landscape, character & streetscape)	Minimise impact on Aboriginal cultural heritage	Minimise ecological impacts (EEC, fauna, flora, aquatic etc)	
Weighting		24%	41%	29%	6%	
Option E	5	E	E	E	E	Rank 1
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		48	205	116	30	399
Option A	5	E	E	E	E	Rank 2
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		24	164	116	30	334
Option C	5	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		48	123	58	24	253
Option 11	5	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		72	82	116	18	288
Option 14	5	E	E	E	E	Rank 3
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		72	82	87	12	253
Option 15	5	E	E	E	E	Rank 6
	4	VG	VG	VG	VG	
	3	G	G	G	G	
	2	F	F	F	F	
	1	P	P	P	P	
Sub-total		96	82	58	6	242

Key points made during the evaluation discussion included:

- For the Criteria - Minimise non Aboriginal heritage impacts:
 - The group needed to balance the loss of heritage trees (with potential for re-growing) compared to the emotional impact of the loss of a heritage building which may have had a key relationship with Grafton's history. This created some discussion
 - Option 15 performed the best because it was further out of town and remained mostly on rural lands
 - Options 14 (because it was similar to Option 15 but has additional impacts on North Street), and Option 11 (greater impact on trees) were rated slightly less well
 - Options C & E have a comparatively higher impact than Options 11, 14 and 15, affecting more heritage houses and more of the heritage conservation area
 - Option A was rated the worst due to impacts on heritage houses and the heritage conservation area, as well as its proximity to the two items of State heritage significance (Grafton Rail and Road Bridge over the Clarence River and Grafton City Railway Station)
- For the Criteria - Maintain the material fabric and character of Grafton (urban landscape, character & streetscape):
 - Option E was considered to perform the best, requiring a lesser scale of works to establish the new bridge approaches in comparison to the other options. It essentially attaches to the end of Villiers Street
 - Options 11, 14 & 15 perform the worst because they require new approach roads through areas which have previously been quiet residential areas, and require intersections and road widening that would affect substantial numbers of Jacaranda trees
 - Option C is slightly better because the southern approaches pass through industrial lands and impacts on the residential streetscape and urban layout is limited to the northern side of the river
 - Option A was rated slightly better than Option C under this criteria because both the southern and northern bridge approaches follow the approaches to the existing bridge
- For the Criteria - Minimise impact on Aboriginal cultural heritage:
 - The discussion suggested this aspect may require further work to cover aesthetic impacts, management of construction impacts and clarification of the ownership details of the Aboriginal pre-school
 - Key aspects were mentioned such as potential impacts to a marriage tree at the Golden Eel site; the Aboriginal pre-school on Bridge St adjacent to Option C; key known Aboriginal cultural heritage areas, and view corridors and places
 - Option C (mouth of Alipou Creek with regards to the Golden Eel site) and Option 15 (Tracker Robinson and Great Marlow site) were considered to perform the worst
 - Option 14 traverses a number of potentially important heritage areas but avoids known sites. It scores slightly better than Options C & 15
 - Options 11, A & E all appear to be better than the other options in terms of this criteria and are about equal to one another
- For the Criteria - Minimise ecological impacts (EEC, fauna, flora, aquatic etc):
 - The RODR schedules a number of Endangered Ecological Communities (EECs) as well as other vegetation and habitat for threatened species. Although some felt that the existing ecology in the Grafton area was degraded to the point where suggesting there might be substantial ecological issues to address could be disputed, the view was also expressed that this degradation could make it even more important that the remaining areas should be retained
 - Detailed input was provided by the technical advisors to clarify the ecology and the extent of impacts for each option
 - Option E (because it has a small footprint on undeveloped areas) and Option A (because it followed beside the existing bridge alignment across developed areas) appeared to perform best and were rated highest
 - Option 15 performed worst because it traversed the greatest acreage of rural land where a number of EECs had been identified
 - The other three options in order of increasing performance (decreasing impact) were Option 14, followed by Option 11 and then Option C

Summary of Option Evaluation

A summary of the rankings of the options against the various assessment categories together with the strategic capital cost estimates and benefit cost ratios (BCR) appears below.

It should be noted where the difference in score between options was not greater than the highest weighted criteria within that category, the options were equally ranked as the difference in score was not considered significant within the sensitivity of the assessment tool adopted.

<i>Rank</i>	<i>Functional</i>	<i>Socio Economic</i>	<i>Environmental</i>	<i>Capital Cost</i>	<i>BCR</i>
1	Options C & E (459, 429)	Option C & E (367, 333)	Option E (399)	Option 11 (\$210 M)	Option 11 (1.7)
2			Option A (334)	Option E (\$215 M)	Options E & C (1.6)
3	Options A & 11 (315, 291)	Option A (278)	Option 11, C & 14 (288, 253, 253)	Options A & C (\$231 M)	
4		Option 11, 14 & 15 (200, 178, 178)			Option A (1.3)
5	Option 14 & 15 (195, 195)			Option 14 (\$304 M)	Option 14 (1.0)
6			Option 15 (242)	Option 15 (\$340 M)	Option 15 (0.9)

Conclusion Drawn

At the completion of the workshop, the group drew conclusions from the deliberations and re-evaluation of the options. These were:

- The same conclusion was reached as the workshop group who undertook the assessment of options at the VM workshop in Grafton the previous week, viz Options E and C were recommended for further consideration as the preferred route option.
- It was difficult to decide between Options E & C, on the basis of the assessment criteria used which reflected the project objectives. The differences between these two options were very small. The separate assessment of the options ranked Options E & C virtually the same in terms of function and socio-economic performance within the sensitivity limitations of the assessment process adopted and with a difference between the two options environmentally (in favour of Option E). The strategic cost estimates and the BCR for both Options E & C could also be considered the same at this stage of project development.
- Options A, 11, 14 & 15 are the least preferred options because they do not perform as well as the Options E & C when evaluated against the assessment criteria and the project objectives.
- Option C may become the preferred option if emphasis is placed on the long term benefits to Grafton's future growth areas since it is closer to the proposed development areas south and south east of the river and its better connection to the Pacific Highway for heavy vehicles servicing the town. However, Option C requires additional consideration to mitigating the potential adverse natural and built environmental impacts cited including those associated with Aboriginal cultural heritage during construction, and impacts on the material fabric of the town.
- Option E may be the preferred option if the emphasis is placed on the need to link the South Grafton CBD and its existing residential areas with the Grafton CBD. Considerations need to include the realisation that the cost of providing the first stage of Option E is \$146M and is substantially less than Stage 1 of Option C (being \$182M). However, Option E does not cater for heavy vehicles servicing the Grafton CBD as well as Option C and additional consideration needs to be given to mitigating the adverse functional impacts associated with the traffic "pinch point" at the intersection of Villers and Fitzroy Streets. This raised some comment in terms of freight vehicles accessing the town and alternative routes in emergencies, transport efficiency across the network and relative safety aspects.
- The proposed next step is to convene another workshop which will consider only Options E & C in more detail and include a sensitivity analysis to see if a clear recommendation can be achieved.

Appendix 3. Overview Presentations

- *Draft RODR community feedback report – Gina Newling, id Planning*
- *Presentation for Option Assessment Workshop Background Information (including what happened at the VM workshop 23-24 Oct 2012) – Chris Clark, Project Manager, RMS*

Draft RODR Community Feedback Report



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What is valued?

Important considerations

Feedback on options

Community groups



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What is valued?



- Heritage items (Convent, bridge, dwellings)
- Sites of Aboriginal heritage significance
- Avenues and individual trees
- Community connectivity
- Affordable housing
- Agricultural properties
- Views



What is valued?

- Relationship of the town to the river
- Local amenities including Corcoran Park
- Flora and fauna, especially water birds
- Quiet, safe residential streets
- Community facilities
(pre-schools, nursing home, schools)



Important considerations

Protect the valued areas of Grafton

- Transport needs for growth and freight
- Relieve traffic congestion
- Minimise heavy traffic in CBD
- Avoid traffic in quiet areas - safety
- Access for emergency vehicles
- Address traffic study concerns



Important considerations

Protect the valued areas of Grafton

- Plan in regional and national context
- Enhance public transport and manage demand
- Protect against flooding
- Avoid damage to heritage items
- Consider local businesses
- Reach a decision and minimise cost

The Options

Agree the need to relieve traffic congestion

Disagree about how to do it

- Accept local traffic focus – support in town options (E, A, C, 11)
- Question local traffic focus – support out of town options (14 and 15)

The Options

Like about E,A, C, 11

Likely to be used

Cost effective

Like about E

Maintains bus viability

Direct access to CBD

Like about A

Avoids impact on Dovedale area



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The Options

Like about 14 and 15

Heavy vehicle bypass of CBD

Avoids fragmenting Grafton

Less noise impact

Less non-Aboriginal heritage impact

Cater for growth and freight

Alternative flood free access

The Options

Do not like about E,A,C, 11	Do not like about 14 and 15
Significant heritage impact	Poor cost benefit
Separate or isolate areas	Affects farmland
Noise impacts	Affects fauna
Safety – traffic in quiet streets	Affects recreation area
Disrupt community facilities	Would not relieve congestion
Remove views to and of bridge	Potential flooding impacts
Potential flooding impacts	Less effective in emergencies

The Options

Option	Number of submissions supporting option(s)
Single option supported	
E	12
A	9
C	8
11	8
14	3
15	18
More than one option supported	
E and C	1
E and 11	1
E, 11 and 15	1
E and 15	1
A modified	1
A and C	2
C modified	1
C, 11, 14 and 15	1
11, 14 and 15	2
14 and 15	24
14, 15 modified	1
15 modified	3
TOTAL	97

Overview of media reports

- Daily examiner reported community positions:
 - Chamber of commerce
 - New Bridge for Grafton Please
 - No Grafton Bridge Downstream
 - Grafton Concerned Citizens Group
 - Heavy vehicle industry (Robert Blanchard)

Chamber of Commerce

reported 25 October 2012

Option E

For	Against
Reduce traffic volumes on the existing bridge	Bottleneck at Fitzroy and Villiers Street
	Risks to children
	Destroy amenity of Ryan Street

Option A

For	Against
Would keep existing corridor and better flow	No faster trip
	Bottleneck at Fitzroy and Villiers
	No alternative route to cross river

Chamber of commerce

Option C

For	Against
Largest redirection of traffic from bridge	Substantial treatments in Pound Street
Would improve traffic flow	
Alternative routes without bottlenecks	

Option 11

For	Against
Smoother access to town for Clarenza etc	Redirects only 1/3 to 1/2 of traffic
Lower construction cost	Directs traffic to quiet residential area
Better cost-per-use ratio	Terminates at a T intersection

Options 14 and 15

Against
Fail to make any significant change on traffic
Little or no change to existing traffic patterns
Fails to meet purpose or expectations

New Bridge for Grafton Now Please

reported 20 September 2012 and 2 October 2012

- An out of town bridge would be underutilised
- Prefer options E and C
- RMS survey did not focus enough on South Grafton
- Traffic surveys show through traffic is only 3%
- Facebook page connected with young people

No Grafton Bridge Downstream

reported 20 September 2012 and 2 October 2012

Oppose options 14 and 15

- More expensive for half the usage
- Would fail to alleviate peak-hour traffic
- Fails to link Grafton and South Grafton
- Negative impact on tourism in Corcoran Park
- Would create flooding issues
- Greater environmental disturbance
- Could disturb acid sulphate soils and water quality
- Great Marlow has Aboriginal heritage significance

Grafton Concerned Citizens Group

reported 20 September 2012 and 2 October 2012

- Divert traffic from CBD and existing bridge
- New bridge and freight route should preserve amenity and lifestyle.
- Cater for increased traffic from the major growth areas.
- Within 30 years 50,000 vehicles per day will enter Grafton including 1,600 trucks.
- Support out of town options because they would:
 - avoid funnelling traffic into town.
 - reduce truck and traffic noise, pollution, vibration.
 - alleviate congestion and capacity issues, impacting on parking access, pedestrians and businesses.

Grafton Concerned Citizens Group

reported 20 September 2012 and 2 October 2012

- Support out of town options because they would:
 - Improve safety for all – residents, tourists.
 - Prevent fragmentation of town
 - Avoid detrimental heritage impacts (especially A, E and C).
 - Encourage tourism and amenity
 - Improve evacuation during flooding with less congestion.
 - Avoid Option C Pound Street works.

Heavy vehicle industry

Reported 10 October 2012

- 12% of heavy vehicles are through traffic
- 88% - origin/destination Grafton or South Grafton
- Heavy vehicles – will have no access to existing bridge
- Buses will have access
- A bridge outside the CBD would increase time
- This would increase cost to customers
- Through traffic would only divert to a quicker option
- Drivers need access to facilities:
 - breaks, fuel, maintenance and RMS logs all in CBD

Heavy vehicle industry

Reported 10 October 2012

- Drivers do not like routes via built up areas
- But will use these routes to access facilities
- South Grafton crossroads is vital for B-doubles
- Gwydir Hwy only approved B-double route east-west between south Brisbane and Upper Hunter
- Richmond region businesses rely on road transport
- Route adjoining existing - economic and beneficial
- Pacific Highway is already shorter (by 5km) and faster (by 15 mins) than Summerland Way for Lismore based companies travelling south
- After Pacific Highway upgrade fewer vehicles will travel north south via Grafton

Additional crossing of the Clarence River at Grafton

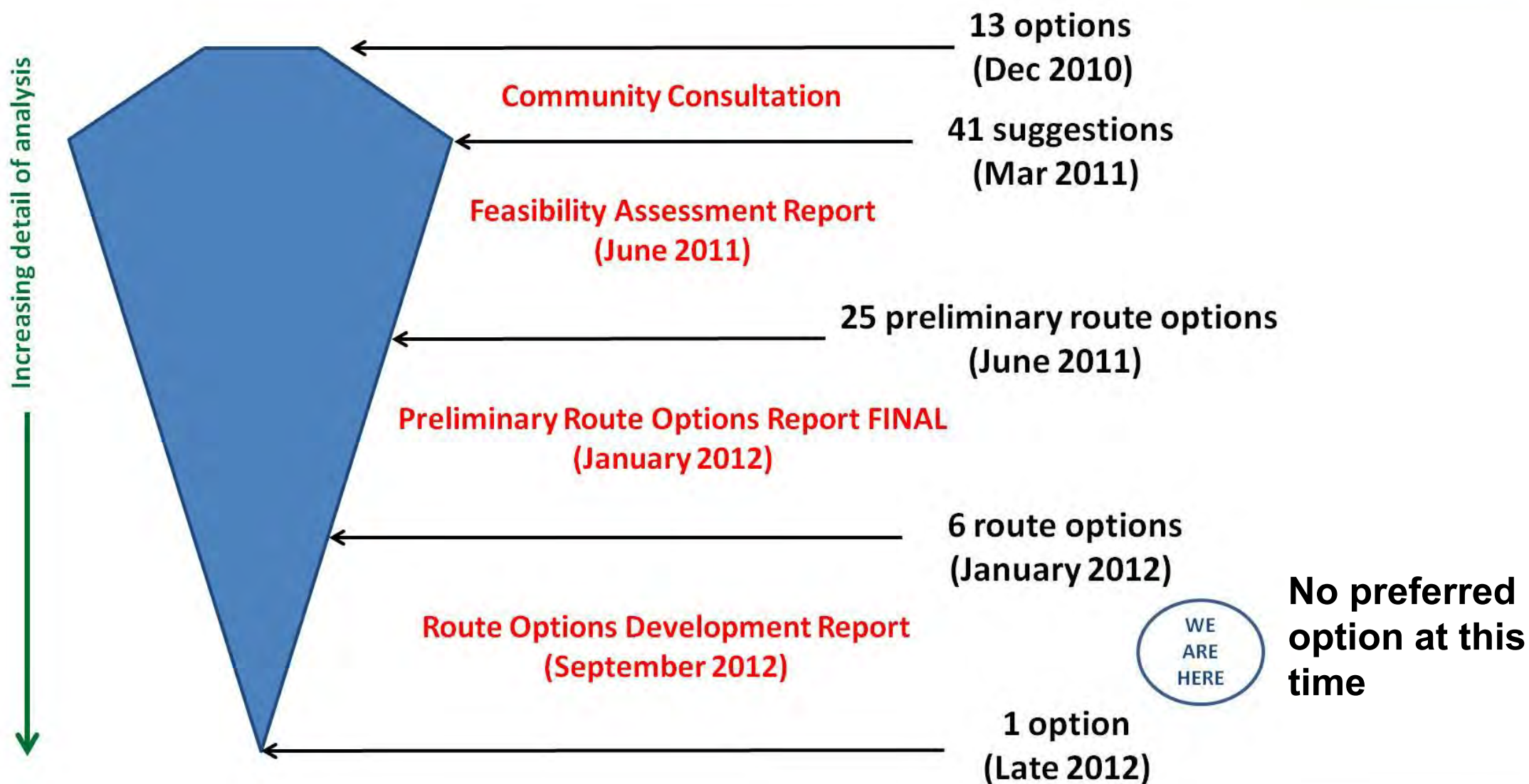


Transport
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Services

Presentation for Option Assessment Workshop Background Information

31 October 2012





Grafton location and topography



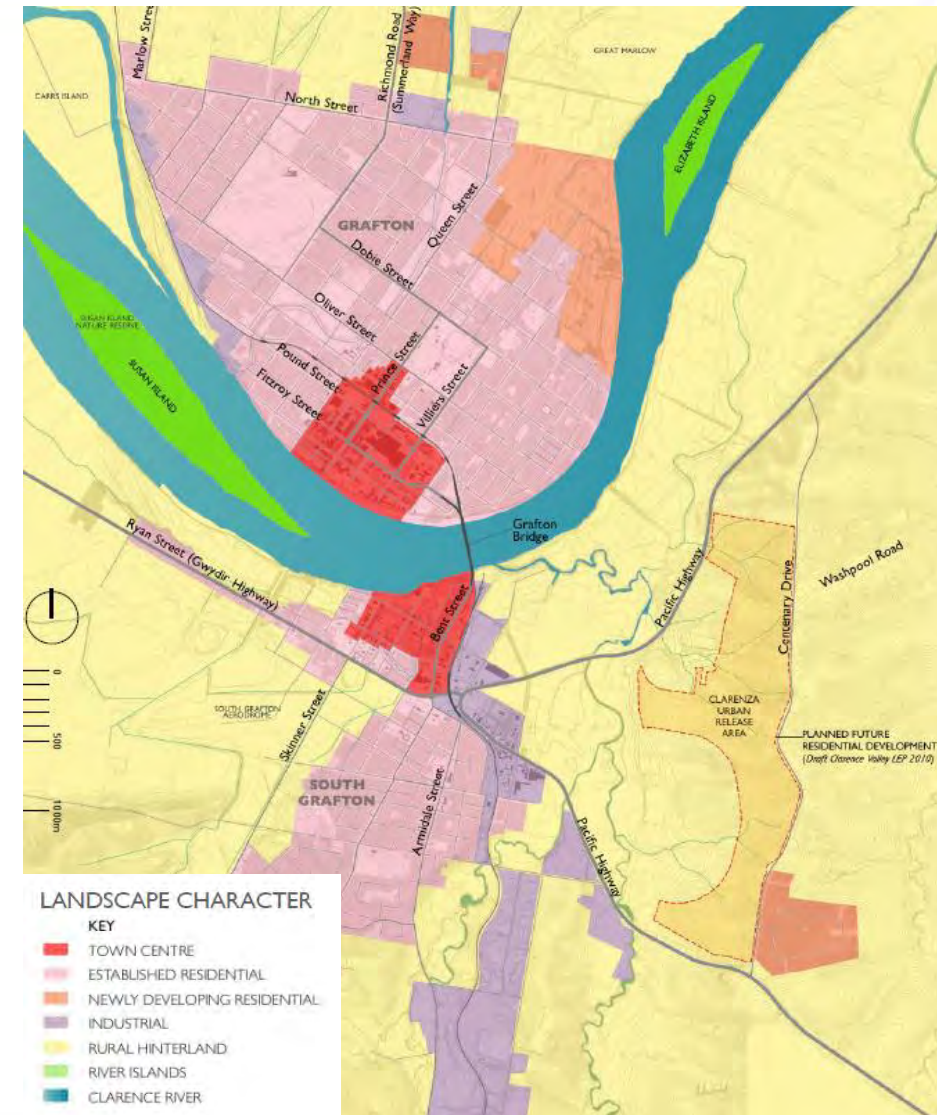
- Major regional centre in the Clarence Valley - includes commercial, industrial, institutional and administrative activities
- Located on a bend of the Clarence River
- Grafton and substantial parts of South Grafton located on the floodplain and therefore subject to frequent and extensive flooding
- Grafton and south Grafton currently protected by a series of levees that provide flood immunity approx. equivalent to a 1 in 20 year flood event

Grafton urban areas



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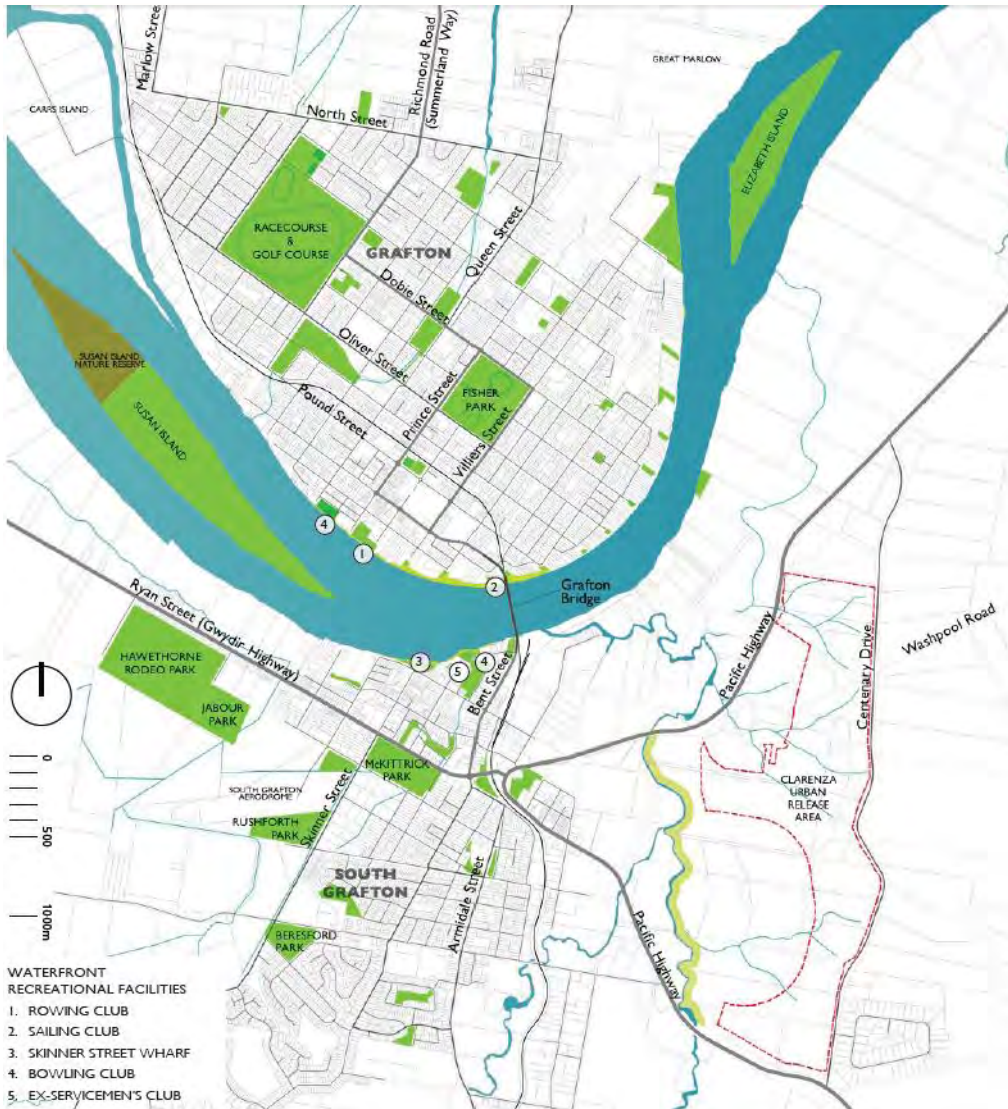
- Clarence River divides Grafton into two separate urban areas:
 - Grafton (north of the river) – has primary commercial activity along Prince St
 - South Grafton (south of the river) – has primary commercial activity along Skinner St
- Industrial areas, generally situated along primary regional transport routes and on the outskirts of town, particularly in South Grafton
- Established residential areas connected to the town centres, with housing stock of varying ages
- Newly developing residential areas on the outskirts of town, including the Clarenza Urban Release Area
- Rural hinterland, consisting of low-lying river floodplain and rolling hills, with intermittent buildings in the landscape



Grafton recreation



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- Range of recreation spaces including public parks and recreation facilities such as the Fisher Park and also a large number of water-based activities (eg. water skiing, fishing and sailing)
- Two large undeveloped islands of cultural significance to the Aboriginal community:
 - Susan Island
 - Elizabeth Island

Non-Aboriginal heritage



Transport
Roads & Maritime
Services

- 2 Conservation areas
- 11+ Archaeological sites
- 14 Residential groups
- 500+ Heritage items
- Urban streetscape that demonstrates the historical development of the area

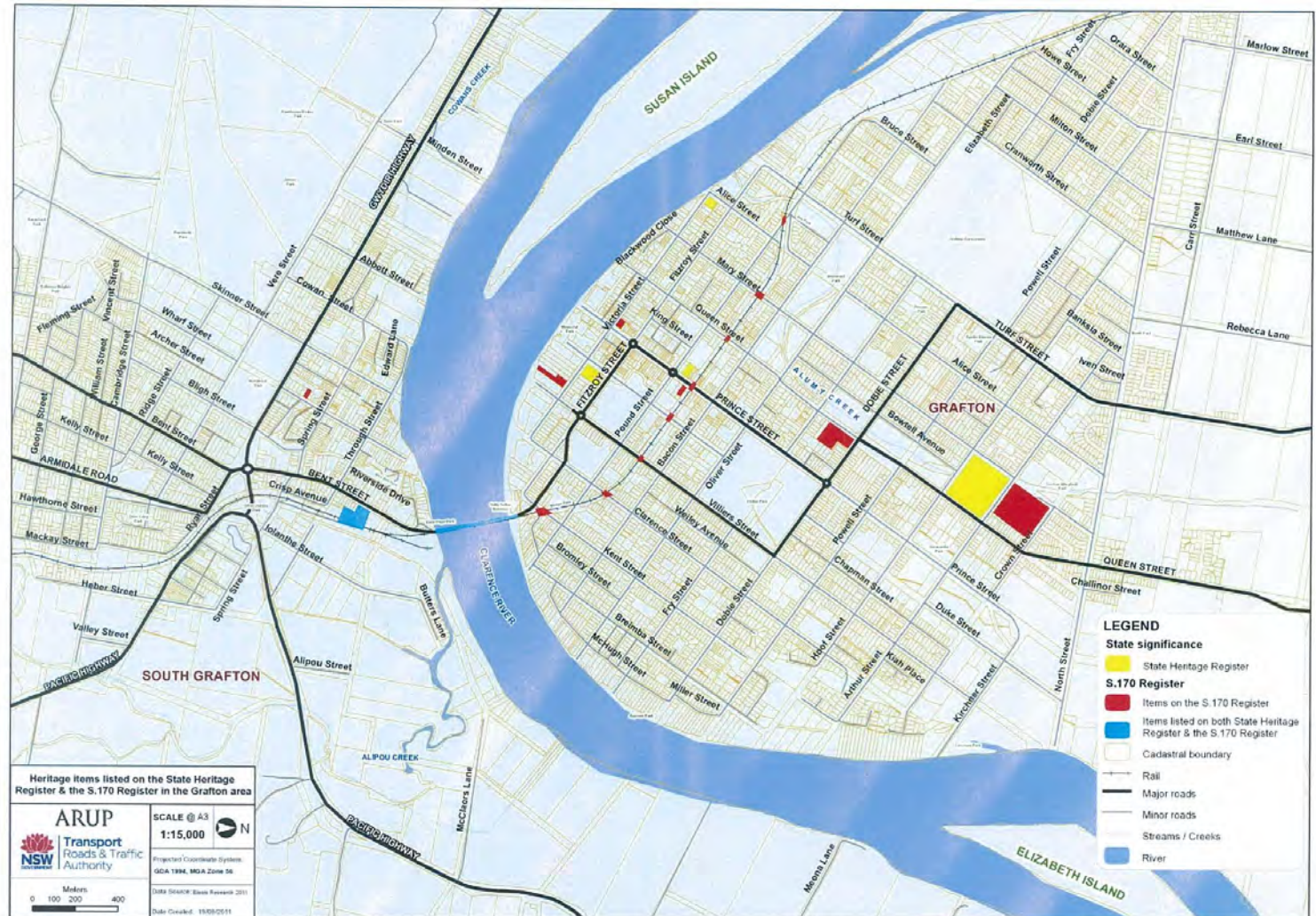


Figure 31: Items in the Grafton area listed on the State Heritage Register and the Section 170 Register.

Grafton Road Network



Transport
Roads & Maritime
Services

- State controlled roads in the Grafton area include:
 - Pacific Highway
 - Gwydir Highway
 - Summerland Way
- Junction of Pacific Hwy and Gwydir Hwy located in South Grafton
- The current Pacific Hwy passes through the edge of South Grafton
- The route for the Pacific Hwy upgrade is from Glenugie to Tyndale
- Summerland Way runs from the Gwydir Highway over the existing bridge to Casino and southern Queensland



Existing Grafton Bridge

- Metal truss span bridge with a bascule span opened to traffic in 1932
- North Coast Railway line and utility services situated on the lower deck, the Summerland Way road is situated on the upper deck
- Only crossing of the Clarence River in the Grafton area
- Safety implications, traffic delays and congestion due to the shape of the existing bridge (the “kinks”)
- Freight movement is restricted by B-Double/articulated vehicle ban in peak periods



Existing Bridge – current traffic situation

Congestion and traffic delays over the existing bridge and approach roads, particularly during morning and afternoon peak hours.

- 1360 vehicles per hour in the northbound direction for the AM peak
- 1330 vehicles per hour in the southbound direction for the PM peak
- Theoretical capacity of the bridge in the range of 900-1400 vehicles per lane per hour

Therefore the peak hour traffic flows across the bridge are at, or very close to, the practical capacity of the bridge.

It is likely that future traffic growth will add to the existing congestion in peak hours, which in turn will decrease the average travel speed and increase travel times. This scenario will result in a reduced level of service on the existing bridge.

All trips between Grafton and South Grafton including local and through trips use the existing bridge as there is no practical alternative.

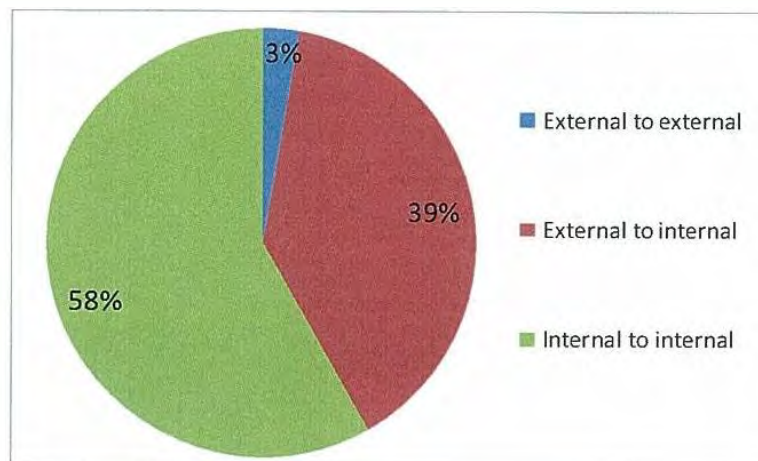
Traffic studies show that the majority of traffic that uses the existing bridge is traffic with an origin and/or destination in Grafton or South Grafton.

Definitions

- Internal to Internal trips - Trips between Grafton and South Grafton
- External to Internal trips - Trips crossing the Grafton Bridge that have an origin and/or destination in Grafton or South Grafton
- External to External trips - Trips crossing the Grafton Bridge that do not have an origin and/or destination in Grafton or South Grafton

Traffic data – Grafton Bridge

All vehicles

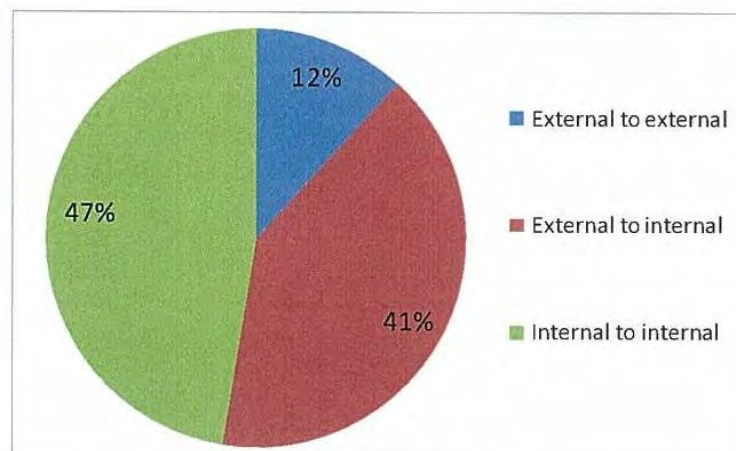


Vehicle trip types crossing Grafton Bridge on 19 August 2010 (5 am - 7 pm).

Trip type	No. of vehicles	% of vehicles
Internal to internal	15,466	58
External to internal	10,360	39
External to external	728	3
Total	26,554	100

Traffic data – Grafton Bridge

Heavy vehicles (5% of all vehicles)



Vehicle trip types crossing Grafton Bridge on 19 August 2010 (5 am - 7 pm).

Trip type	No. of vehicles	% of vehicles
Internal to internal	658	47
External to internal	567	41
External to external	163	12
Total	1,388	100

Traffic data – Villiers Street Grafton and Pacific Highway

Villiers Street between Fitzroy and Pound Streets, Grafton (June 2011)

Vehicle type	No. of vehicles	% of total vehicles
Light vehicles	10,730	92
Heavy vehicles		
•Rigid heavy vehicles	750	6
•Articulated heavy vehicles	240	2
Total	11,720	100

Pacific Highway north of Centenary Drive, South Grafton (August 2010)

Vehicle type	No. of vehicles	% of total vehicles
Light vehicles	8,025	78
Heavy vehicles		
•Rigid heavy vehicles	730	7
•Articulated heavy vehicles	1,520	15
Total	10,275	100



Transport
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2011 AM & PM PEAK

TRAFFIC
SIMULATIONS

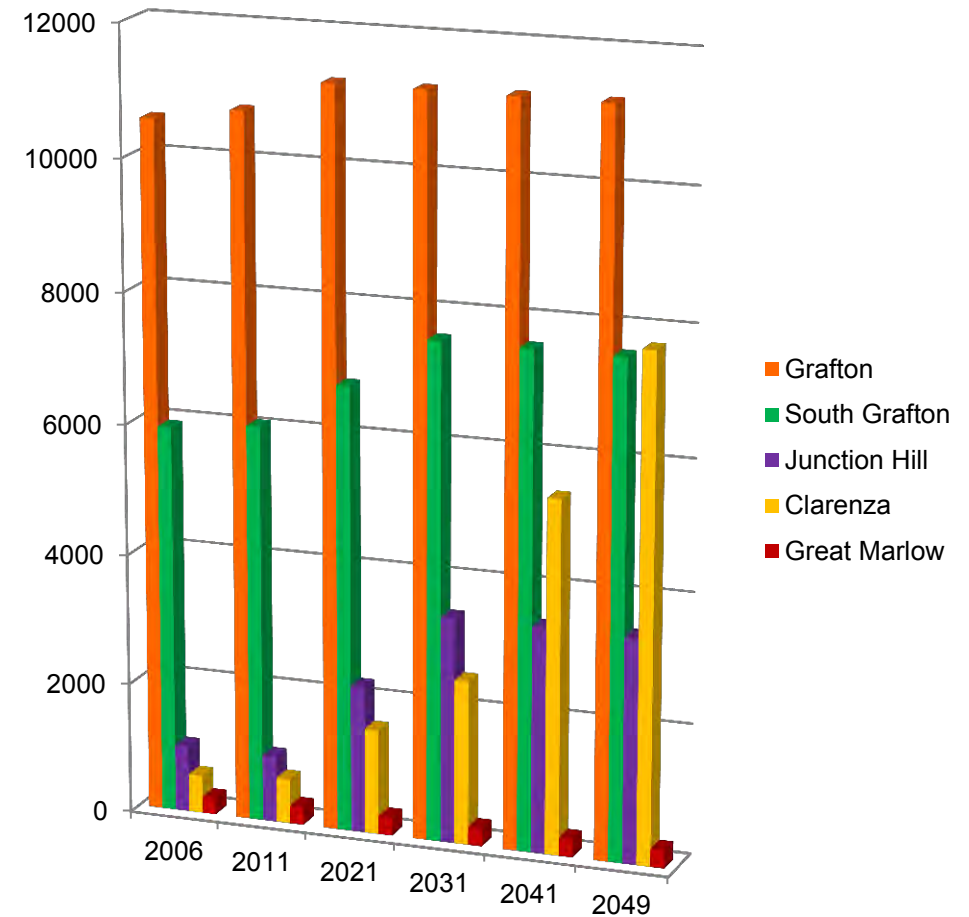


Future Population Growth



Transport
Roads & Maritime
Services

- Mid North Coast Strategy – identified Grafton as a key centre
- Clarence Valley Council – available land, sequencing, focused on development in Junction Hill, Clarenza, Waterview Heights
- Population increases from 18,803 (2011) to 30,330 (2049)
- As capacity reached development accelerates in areas with spare capacity
- Population allocated to each zone in the model
- Trips estimated based on the change in population within each zone



➤ **Project purpose** - To identify an additional crossing of the Clarence River at Grafton to address short-term and long-term transport needs.

➤ **Project objectives:**

- 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
- Minimise impact on the environment

- Planning for the additional crossing provides for semi-trailers and B-doubles to use the new crossing in preference to the existing bridge.
- It is not the intention of the new crossing to provide an additional freight corridor or to attract more heavy vehicles onto the Summerland Way.
- The Pacific Highway will continue to be the priority designated freight route for heavy vehicles travelling between Sydney and Brisbane.

- Assumed date of opening to traffic – 2019
- Upgrade of the Pacific Highway between Glenugie and Tyndale (which bypasses South Grafton) assumed to be open to traffic before the new bridge is open to traffic (ie by 2019)
- Options designed to cater for predicted traffic 30 years after assumed date of opening (ie 2049)
- Construction of preferred option likely to be staged. Indicative Stage 1 construction included in report

Assessment criteria

➤ Non-cost:

- Functional
- Socio-economic
- Natural and built Environment

➤ Cost:

- Strategic estimate
- Value for money (BCR)

➤ Weighting of assessment criteria – Paired comparison method

Functional Criteria

No.	Criteria	Raw Score	Relative Weight
A.	Improve the overall efficiency of the road network including am and pm peaks	11	33
B	Enhance safety for all road users	6	18
C.	Optimise the efficiency of freight movement	5	15
D.	Improve bicycle and pedestrian linkages	6	18
E.	Provide an effective alternate route during incidents	5	15
F.	Maintain navigable bridge clearances for river uses	0	
	Total	33	99

Socio Economic Criteria

No.	Criteria	Raw Score	Relative Weight
A.	Minimise the impact on the operation of the existing businesses and provide for economic growth	3	17
B	Promote better connectivity between Grafton and South Grafton for social, commercial and industrial users	8	44
C.	Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas, noise, air quality	5	28
D.	Minimise acquisition of properties – rural, residential, business & community	2	11
E.	Maintain the relationship of the town to the river eg views and river users	-	0
	Total	18	100

Natural And Built Environmental Criteria

No.	Criteria	Raw Score	Relative Weight
A.	Minimise Non Aboriginal heritage impacts	6	20
B	Maintain the material fabric and character of Grafton (Urban landscape)	9	30
C.	Maintain the visual experience of the existing bridge	2	7
D.	Minimise impact on Aboriginal cultural heritage	7	23
E.	Minimise ecological impacts – (EEC, Fauna, Flora, Aquatic, etc)	6	20
F.	Minimise the surface/ground water impacts	-	0
	Total	30	100

Value Management Workshop
23 / 24 October 2012



Transport
Roads & Maritime
Services

Value Management Workshop outcomes

Option Ranking

Rank	Functional	Socio Economic	Environmental	Capital Cost	BCR
1	Option C (378)	Option E & C (360, 350)	Option E (406)	Option 11 (\$210 M)	Option 11 (1.7)
2	Options E & 11 (300, 294)		Option A (362)	Option E (\$215 M)	Options E & C (1.6)
3		Option A (305)	Option 11 (290)	Options A & C (\$231 M)	
4	Option A (234)	Option 11 & 15 (183, 161)	Option 15 & 14 (211, 214)		Option A (1.3)
5	Options 14 & 15 (198)			Option 14 (\$304 M)	Option 14 (1.0)
6		Option 14 (133)	Option C (190)	Option 15 (\$340 M)	Option 15 (0.9)

Outcomes

Unanimously expressed preference for either Option C or Option E.

Supporting arguments for Option C included:-

- Option C offers an alternative corridor and does not concentrate traffic at the one point
- On balance Option C offers a better functional outcome than Option E and, being a down river option, would provide a better transport outcome for Grafton
- Option C links to the South Grafton industrial area.
- Option C works well from a functional perspective.
- Option C uses space that wouldn't be otherwise be used.
- Option C keeps infrastructure in a similar corridor to the current bridge.

Outcomes

Supporting arguments for Option E included:

- Option E is the most direct link between Grafton and South Grafton CBDs.
- Provides good connectivity between CBDs and has the potential to promote economic growth in South Grafton area.
- Has less environmental impacts than Option C.
- Is considered more pedestrian/cyclist friendly than Option C
- Has minimal property acquisition.
- Provides a good loop between the two bridges and the river precinct.
- On balance option E was considered to perform best based on the process undertaken in the workshop and the project objectives and ranked in top two for each of the areas of functional, socio economic, and natural and built environmental, capital cost and BCR (including ranked 1 twice) used for assessing the options.
- Satisfies each of the project objectives.
- Existing businesses will continue to secure existing trade.

Conclusions

Conclusions identified by participants were:-

- All four focus groups expressed preferences for either Option C or Option E or were unable to decide between Option E or Option C
- All four focus groups concluded that Options A, 11, 14 & 15 were the least preferred options because they do not perform as well as the Options E & C when assessed against the option selection criteria and the project objectives
- It was difficult to decide between Options E & C because
 - Option C is the best performing option assessed against function criteria
 - Option E is the best performing option assessed against Natural and built environment criteria
 - Options E & C performed equally well against Socio Economic criteria
 - The capital cost and cost benefit ratios for E & C were similar

Conclusions

Additional conclusions identified by participants were:-

- If Option C is adopted, additional consideration needs to be given to mitigating the adverse environmental impacts associated with Aboriginal heritage during construction, the impact on the material fabric of the town, visual experience of the bridge and the ecological impacts.
- If Option E is adopted, additional consideration needs to be given to mitigating the adverse functional impacts associated with the pinch point at Villers Street (freight movement through the town and the alternative route in emergencies), transport efficiency across the network and safety aspects.

Appendix 4. Comparison of Project Objectives with VM Assessment Criteria

RODR		Value Management Workshop	
Project Objectives and Supporting Objectives		Criteria Grouping	Criteria as identified at the VMW
RODR 6.2	Project objective: Enhance road safety for all road users over the length of the project		
RODR 6.2.1	Reduce the potential for road crashes and injuries on the bridge and approaches including any intersections and connecting roads	Functional	Enhance safety for all road users
RODR 6.2.2	Provide safe facilities for pedestrians and cyclists	Functional	Enhance safety for all road users
RODR 6.3	Project objective: Improve traffic efficiency between and within Grafton and South Grafton		
RODR 6.3.1	Provide efficient access for a second crossing of the Clarence River and for the State road network	Functional	Improve the overall efficiency of the road network including am and pm peaks
		Functional	Improve bicycle and pedestrian linkages
		Functional	Provide an effective alternate route during incidents
RODR 6.3.2	Provide a traffic management network which reduces delays between Grafton and South Grafton in peak periods to an acceptable level of service for 30 years after opening	Functional	Improve the overall efficiency of the road network including am and pm peaks
RODR 6.3.3	Provide adequate vertical clearance for heavy vehicles		
RODR 6.3.4	Consider demand management strategies to minimise delays to local and through traffic		
RODR 6.4	Project objective: Support regional and local economic development		
RODR 6.4.1	Provide transport solutions that complement existing and future land uses and support development opportunities.	Socio-Economic	Promote better connectivity between Grafton and South Grafton for social, commercial and industrial users
RODR 6.4.2	Provide improved opportunities for economic and tourist development for Grafton	Socio-Economic	Minimise the impact on the operation of the existing businesses and provide for economic growth
RODR 6.4.3	Provide for commercial transport including B-doubles where required.	Functional	Optimise the efficiency of freight movement
RODR 6.4.4	Provide flood immunity for the bridge for a 1 in 100 year flood event, and for the approach roads for a 1 in 20 year flood event, where economically justified		
RODR 6.4.5	Provide navigational clearances from the additional crossing for river users	Functional	Maintain navigable bridge clearances for river uses
RODR 6.5	Project objective: Involve all stakeholders and consider their interests		
	Develop solutions that consider community expectations for the project.		
	Satisfy the technical and procedural requirements of the RTA with respect to the planning and design of the project		
	Integrate input from the community into the development of the project through the implementation of comprehensive program of community consultation and participation.		
RODR 6.6	Project objective: Provide value for money		
RODR 6.6.1	Achieve a justifiable benefit-cost ratio at an affordable cost	Assessed separately	
RODR 6.6.2	Develop a strategy to integrate future upgrades into the project		
RODR 6.7	Project objective: Minimise impact on the environment		
RODR 6.7.1	Minimise the impact on the social and economic environment, including property impacts.	Socio-Economic	Minimise acquisition of properties - rural, residential, business & community
		Socio-Economic	Minimise the impact on the operation of the existing businesses and provide for economic growth
RODR 6.7.2	Minimise the impact on residential amenity, including noise, vibration and air quality etc	Socio-Economic	Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas, noise, air quality
RODR 6.7.3	Minimise the impact on heritage	Environmental	Minimise impact on Aboriginal cultural heritage
RODR 6.7.4		Environmental	Minimise Non Aboriginal heritage impacts
RODR 6.7.5	Minimise impact on the natural environment.	Environmental	Minimise ecological impacts - (EEC, Fauna, Flora, Aquatic, etc)
		Environmental	Minimise the surface/ground water impacts
RODR 6.7.6	Provide a project that fits sensitively into the built, natural and community context.	Environmental	Maintain the material fabric and character of Grafton (Urban landscape)
		Socio-Economic	Promote better connectivity between Grafton and South Grafton for social, commercial and industrial users
		Socio-Economic	Maintain the relationship of the town to the river eg views and river users
		Environmental	Maintain the visual experience of the existing bridge
RODR 6.7.7	Minimise flooding impact caused by the project.		

KEY

Supporting Objective not assessed as a differentiator in RODR and not identified as a criteria in VMW
Supporting Objective not considered in RODR but included as an additional criteria at VMW
Assessed in RODR but not fully considered as a criteria at VMW
Assessed in RODR but not considered at all as a criteria at VMW

Appendix 5. Presentation of Options

Route options



Transport
Roads & Maritime
Services

E Cowan St South Grafton to Villiers St, Grafton.

A New bridge parallel to and immediately upstream of the existing bridge connecting Bent St, South Grafton and Fitzroy St, Grafton.

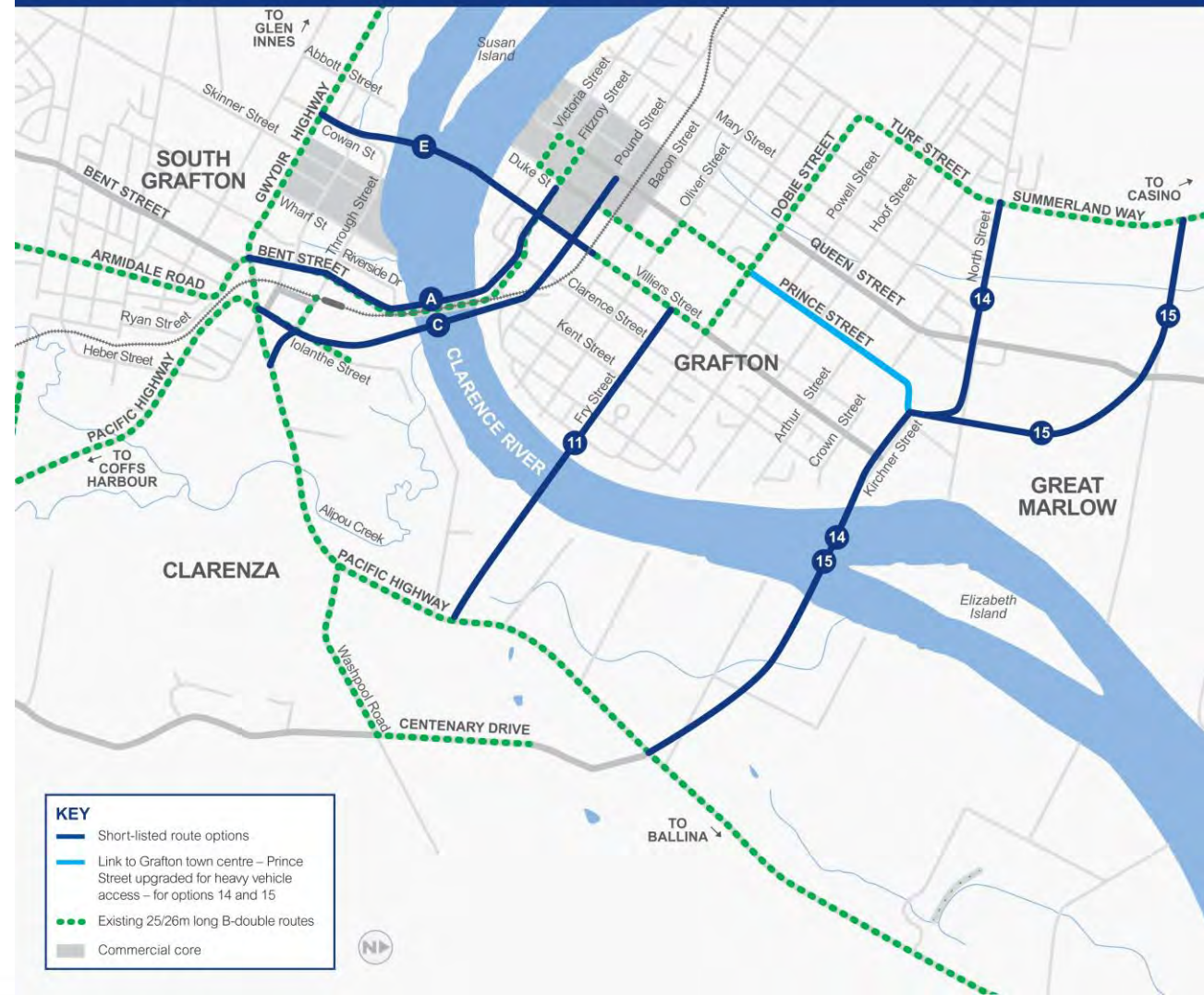
C Junction of Pacific Hwy and Gwydir Hwy, South Grafton to Pound St, Grafton.

11 Existing Pacific Hwy north of South Grafton to Fry St, Grafton.

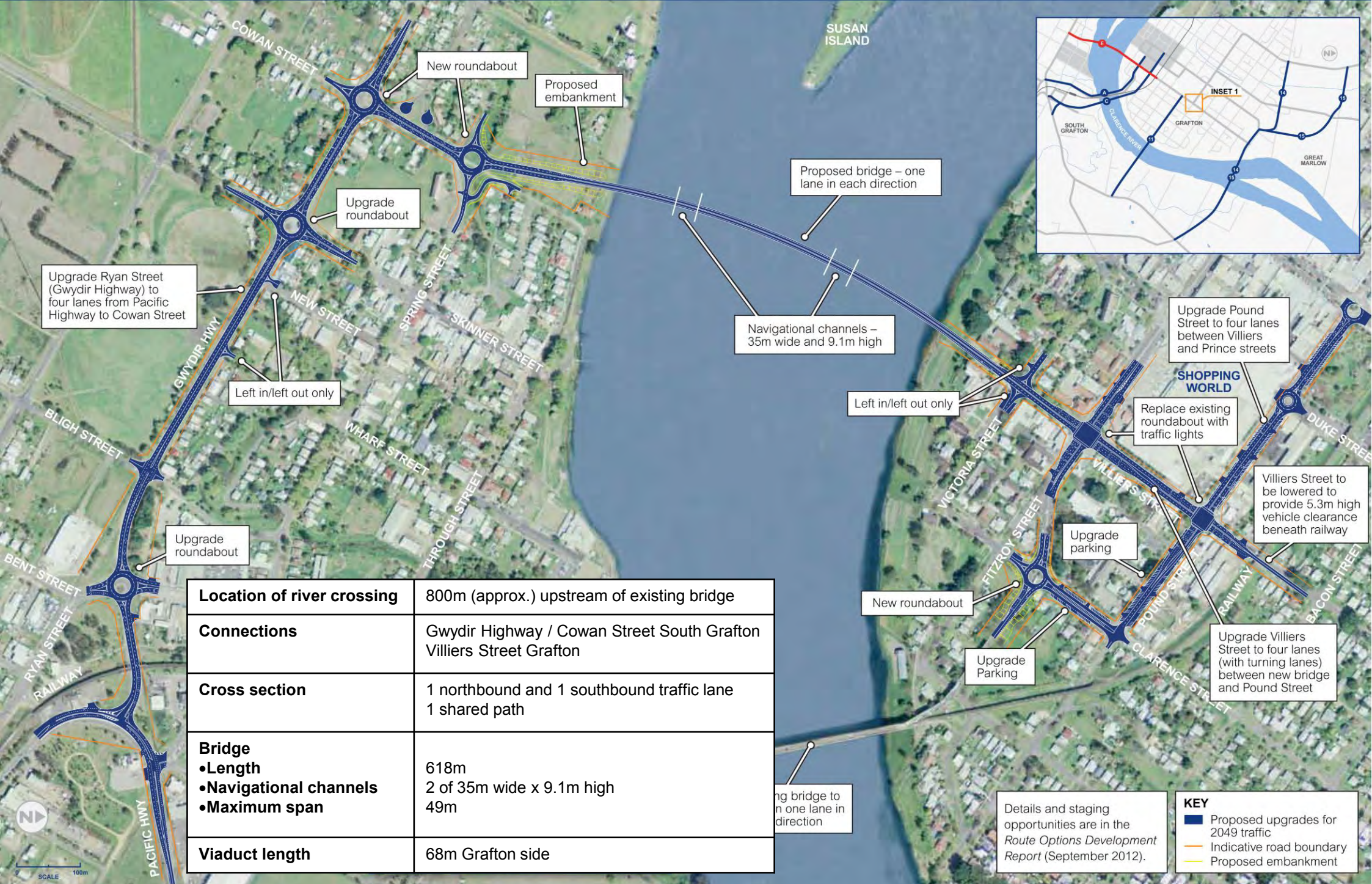
14 Existing Pacific Hwy north of South Grafton to North St Grafton via Kirchner St.

15 Existing Pacific Hwy north of South Grafton to Summerland Way north of Grafton, via Kirchner St.

Six route options over the Clarence River, Grafton



OPTION E



Upgrade Ryan Street (Gwydir Highway) to four lanes from Pacific Highway to Cowan Street

Left in/left out only

Upgrade roundabout

New roundabout

Proposed embankment

Upgrade roundabout

Proposed bridge – one lane in each direction

Navigational channels – 35m wide and 9.1m high

Left in/left out only

Upgrade Pound Street to four lanes between Villiers and Prince streets

Replace existing roundabout with traffic lights

Upgrade parking

Villiers Street to be lowered to provide 5.3m high vehicle clearance beneath railway

New roundabout

Upgrade Parking

Upgrade Villiers Street to four lanes (with turning lanes) between new bridge and Pound Street

Location of river crossing	800m (approx.) upstream of existing bridge
Connections	Gwydir Highway / Cowan Street South Grafton Villiers Street Grafton
Cross section	1 northbound and 1 southbound traffic lane 1 shared path
Bridge	
•Length	618m
•Navigational channels	2 of 35m wide x 9.1m high
•Maximum span	49m
Viaduct length	68m Grafton side

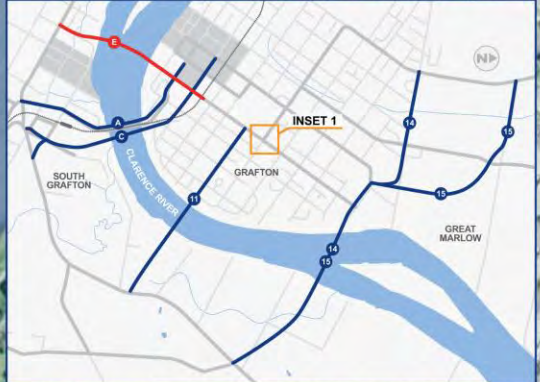
Details and staging opportunities are in the *Route Options Development Report* (September 2012).

KEY

- Proposed upgrades for 2049 traffic
- Indicative road boundary
- Proposed embankment



Existing bridge to be replaced with one lane in each direction

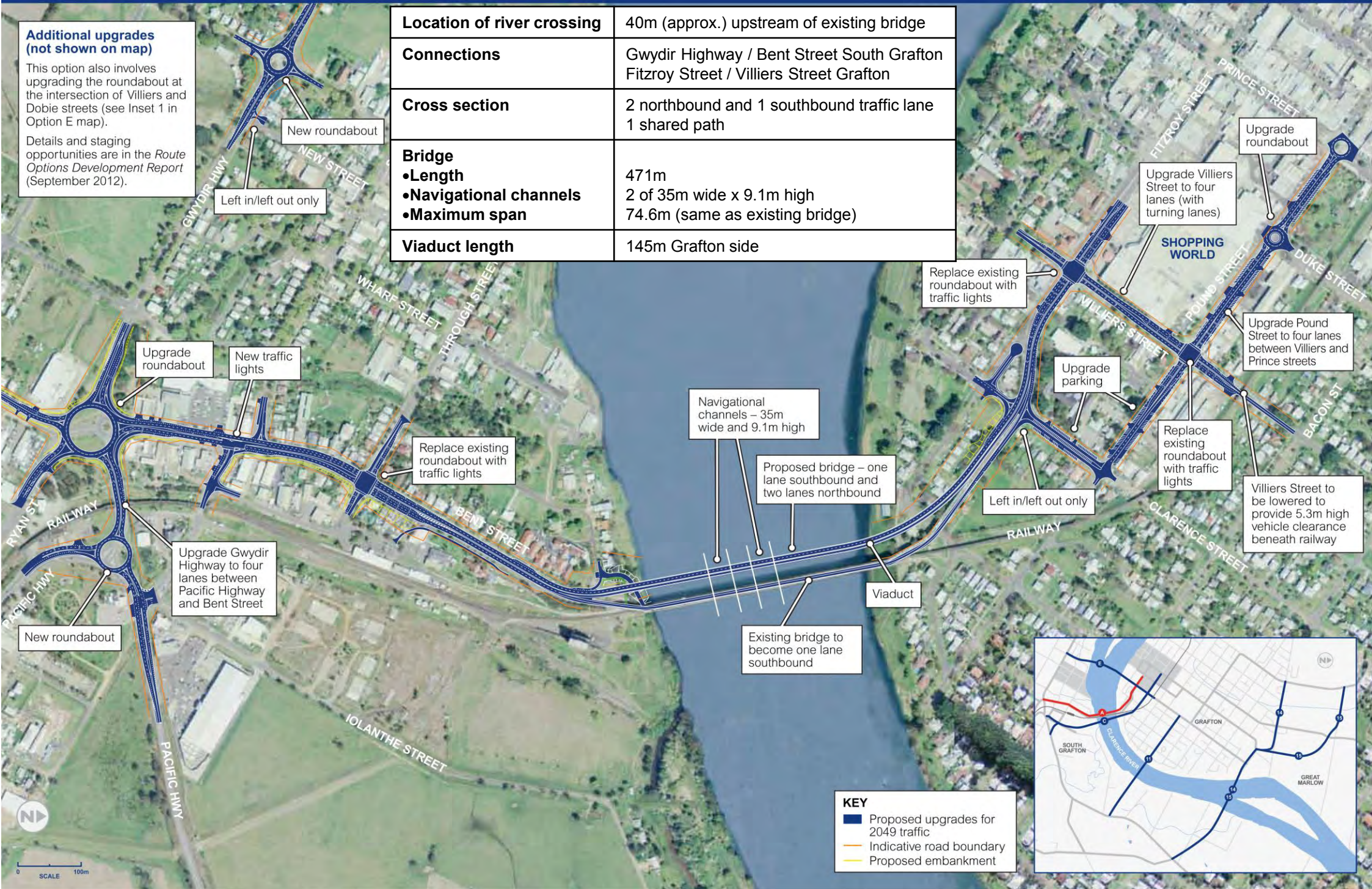


OPTION A

Additional upgrades (not shown on map)

This option also involves upgrading the roundabout at the intersection of Villiers and Dobie streets (see Inset 1 in Option E map). Details and staging opportunities are in the *Route Options Development Report* (September 2012).

Location of river crossing	40m (approx.) upstream of existing bridge
Connections	Gwydir Highway / Bent Street South Grafton Fitzroy Street / Villiers Street Grafton
Cross section	2 northbound and 1 southbound traffic lane 1 shared path
Bridge	
•Length	471m
•Navigational channels	2 of 35m wide x 9.1m high
•Maximum span	74.6m (same as existing bridge)
Viaduct length	145m Grafton side



KEY

- Proposed upgrades for 2049 traffic
- Indicative road boundary
- Proposed embankment

OPTION C

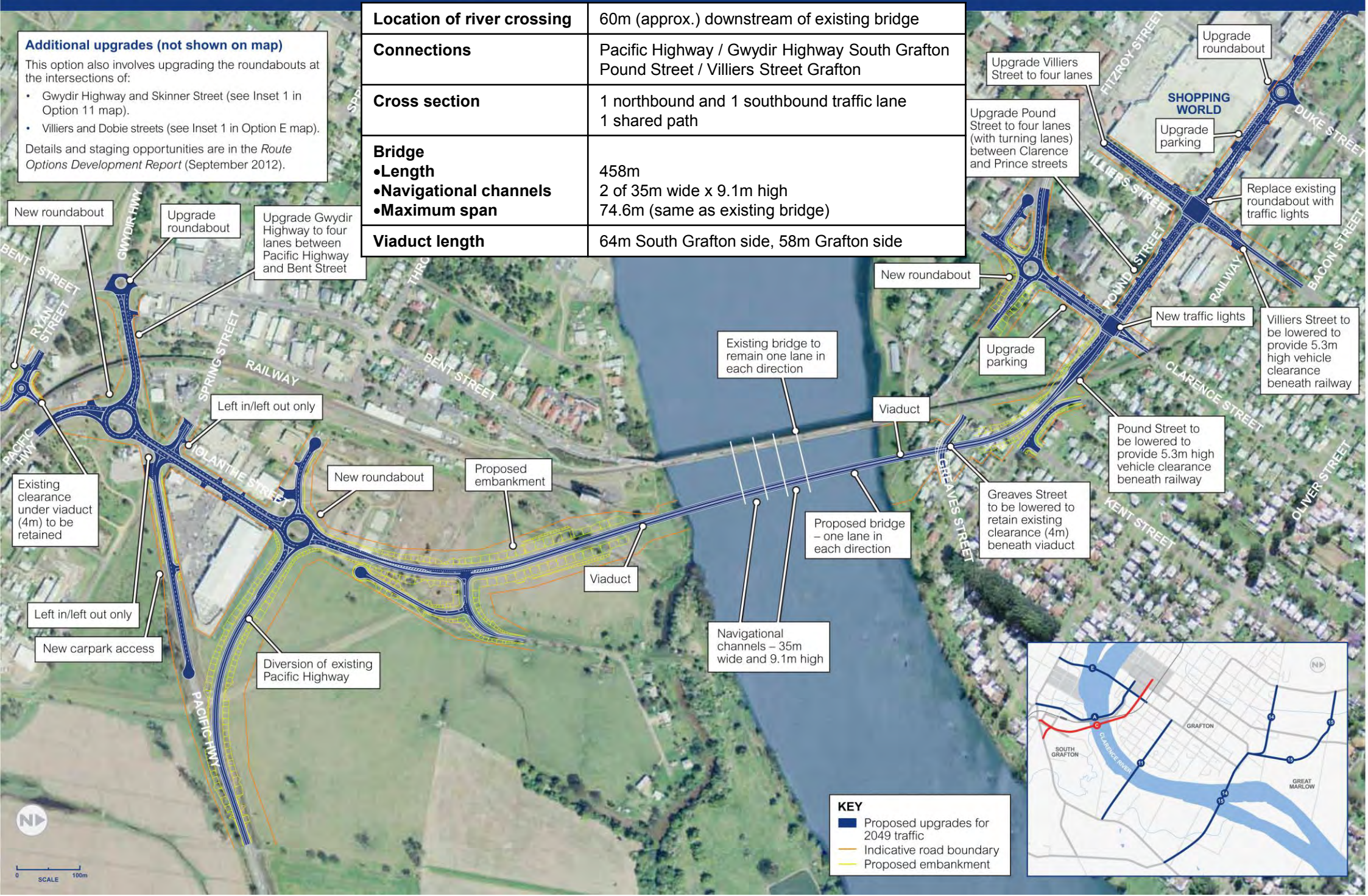
Additional upgrades (not shown on map)

This option also involves upgrading the roundabouts at the intersections of:

- Gwydir Highway and Skinner Street (see Inset 1 in Option 11 map).
- Villiers and Dobie streets (see Inset 1 in Option E map).

Details and staging opportunities are in the *Route Options Development Report* (September 2012).

Location of river crossing	60m (approx.) downstream of existing bridge
Connections	Pacific Highway / Gwydir Highway South Grafton Pound Street / Villiers Street Grafton
Cross section	1 northbound and 1 southbound traffic lane 1 shared path
Bridge	
•Length	458m
•Navigational channels	2 of 35m wide x 9.1m high
•Maximum span	74.6m (same as existing bridge)
Viaduct length	64m South Grafton side, 58m Grafton side



New roundabout
Upgrade roundabout
Upgrade Gwydir Highway to four lanes between Pacific Highway and Bent Street

Existing clearance under viaduct (4m) to be retained
Left in/left out only

Left in/left out only
New carpark access
Diversion of existing Pacific Highway

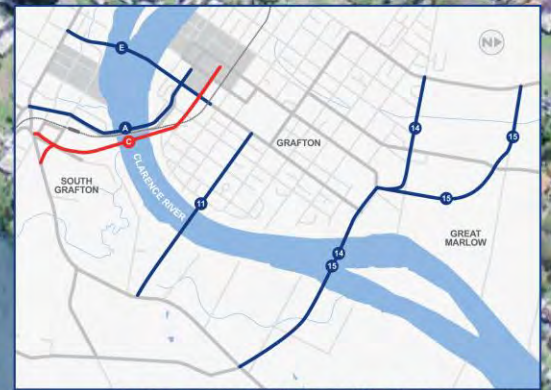
Left in/left out only
New roundabout
Proposed embankment

Viaduct
Existing bridge to remain one lane in each direction
Proposed bridge – one lane in each direction
Navigational channels – 35m wide and 9.1m high

New roundabout
Upgrade parking
Villiers Street to be lowered to provide 5.3m high vehicle clearance beneath railway
Pound Street to be lowered to provide 5.3m high vehicle clearance beneath railway
Greaves Street to be lowered to retain existing clearance (4m) beneath viaduct
Upgrade Villiers Street to four lanes
Upgrade Pound Street to four lanes (with turning lanes) between Clarence and Prince streets
Replace existing roundabout with traffic lights
New traffic lights

KEY

- Proposed upgrades for 2049 traffic
- Indicative road boundary
- Proposed embankment



0 SCALE 100m

Option 14



Transport
Roads & Maritime
Services

Location of river crossing	2,700m (approx.) downstream of existing bridge
Connections	Pacific Highway / Centenary Drive South Grafton North Street / Turf Street Grafton
Cross section	1 northbound and 1 southbound traffic lane 1 shared path
Bridge	
•Length	617m
•Navigational channels	2 of 35m wide x 17m high
•Maximum span	53m
Viaduct length	782m South Grafton side, 136m Grafton side

OPTION 14

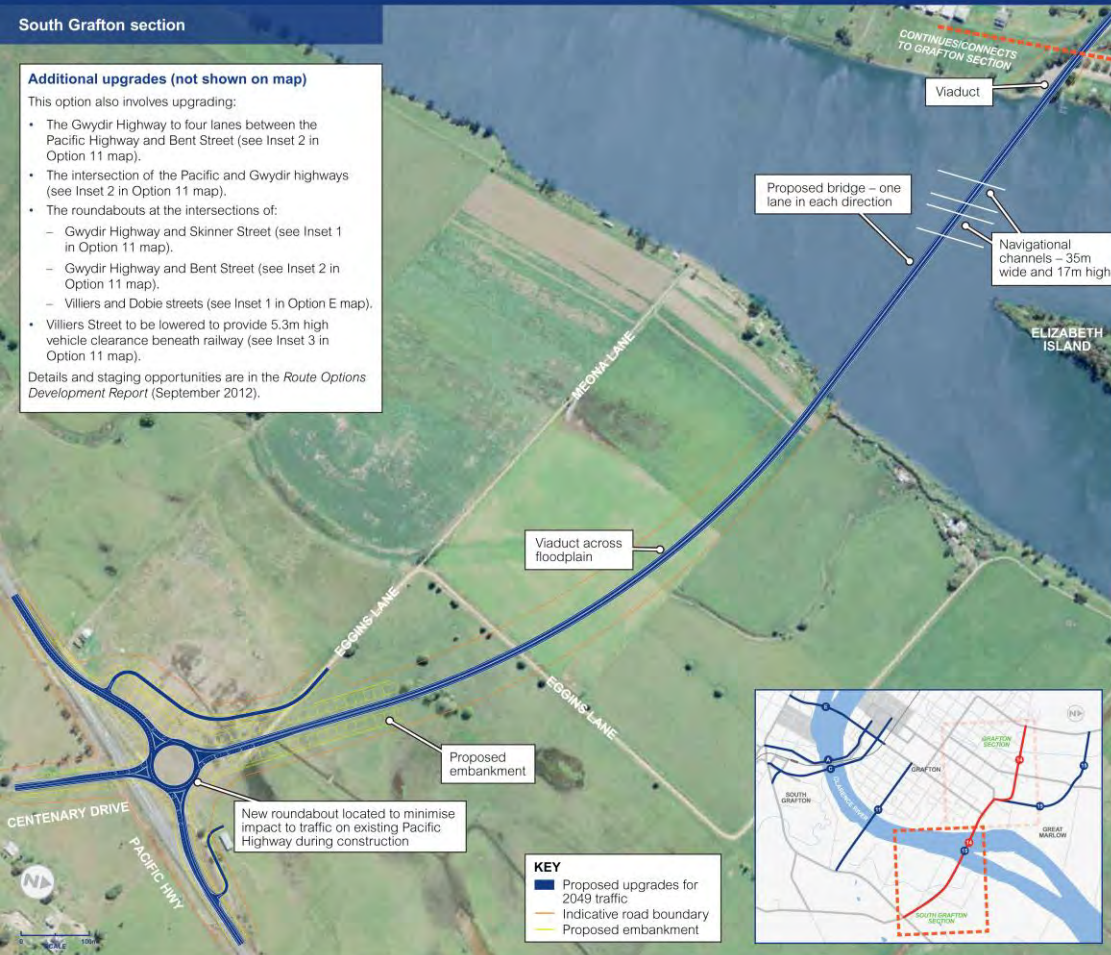
South Grafton section

Additional upgrades (not shown on map)

This option also involves upgrading:

- The Gwydir Highway to four lanes between the Pacific Highway and Bent Street (see Inset 2 in Option 11 map).
- The intersection of the Pacific and Gwydir highways (see Inset 2 in Option 11 map).
- The roundabouts at the intersections of:
 - Gwydir Highway and Skinner Street (see Inset 1 in Option 11 map).
 - Gwydir Highway and Bent Street (see Inset 2 in Option 11 map).
 - Villiers and Dobie streets (see Inset 1 in Option E map).
- Villiers Street to be lowered to provide 5.3m high vehicle clearance beneath railway (see Inset 3 in Option 11 map).

Details and staging opportunities are in the *Route Options Development Report* (September 2012).



Grafton section



Option 15

Location of river crossing	2,700m (approx.) downstream of existing bridge
Connections	Pacific Highway / Centenary Drive South Grafton Summerland Way Grafton
Cross section	1 northbound and 1 southbound traffic lane 1 shared path
Bridge	
•Length	617m
•Navigational channels	2 of 35m wide x 17m high
•Maximum span	53m
Viaduct length	782m South Grafton side, 136m Grafton side



Transport
Roads & Maritime
Services

OPTION 15

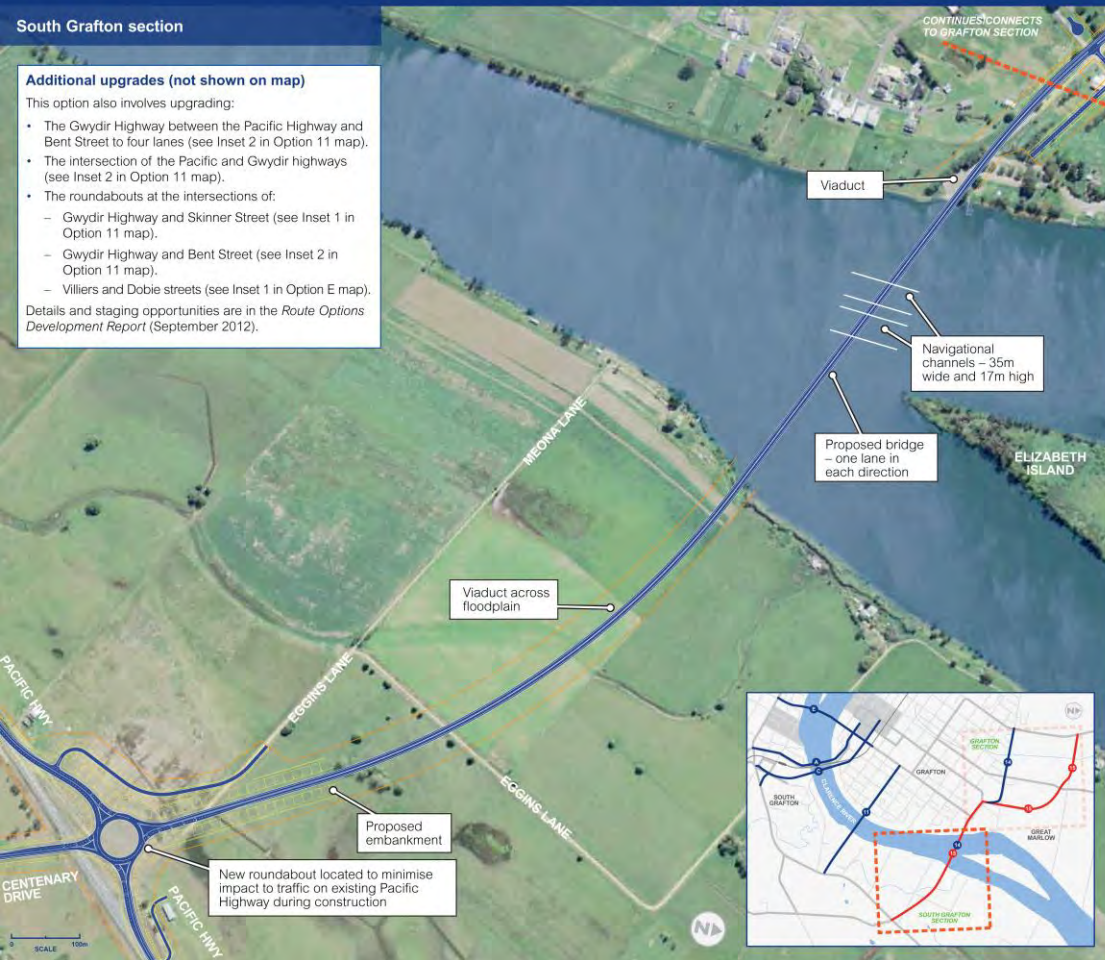
South Grafton section

Additional upgrades (not shown on map)

This option also involves upgrading:

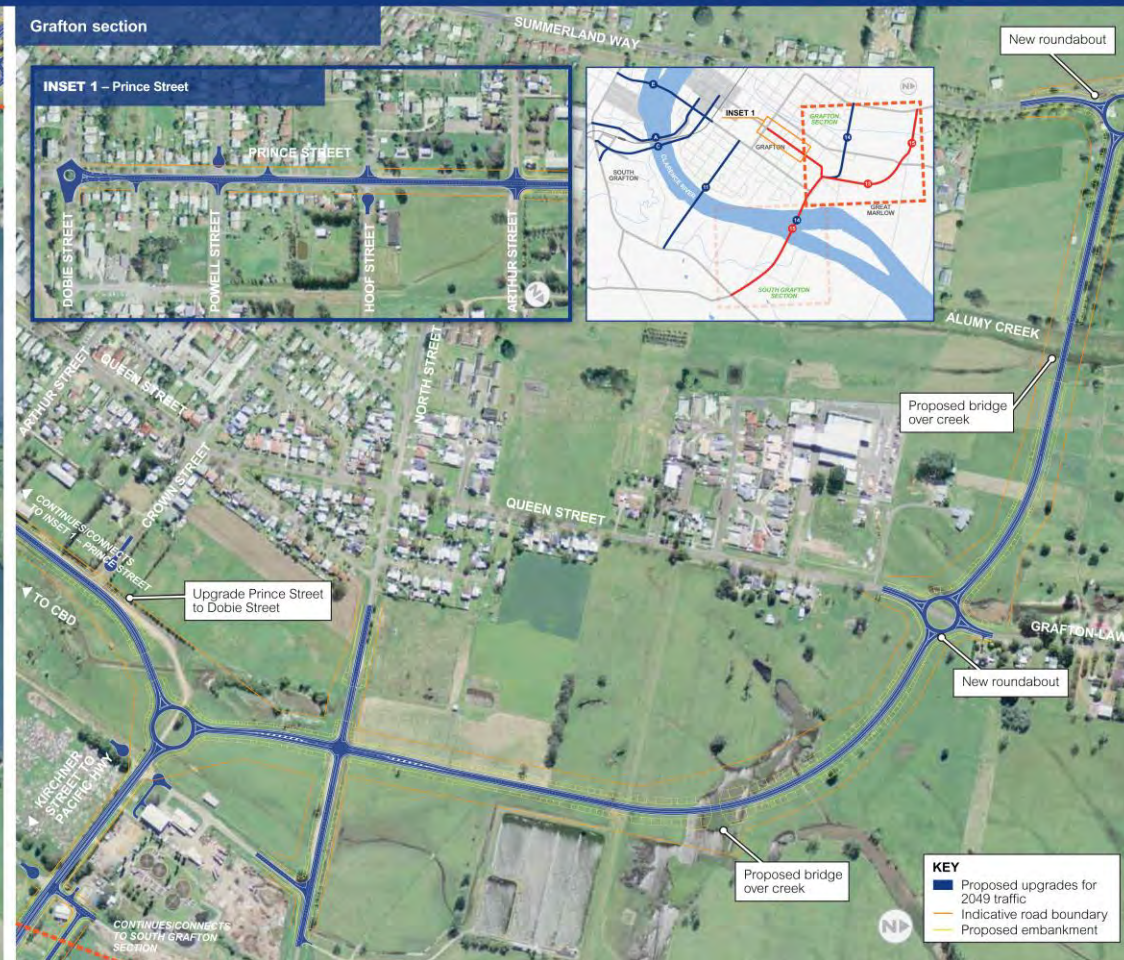
- The Gwydir Highway between the Pacific Highway and Bent Street to four lanes (see Inset 2 in Option 11 map).
- The intersection of the Pacific and Gwydir highways (see Inset 2 in Option 11 map).
- The roundabouts at the intersections of:
 - Gwydir Highway and Skinner Street (see Inset 1 in Option 11 map).
 - Gwydir Highway and Bent Street (see Inset 2 in Option 11 map).
 - Villiers and Dobie streets (see Inset 1 in Option E map).

Details and staging opportunities are in the *Route Options Development Report* (September 2012).



Grafton section

INSET 1 - Prince Street





Transport
Roads & Maritime
Services

FUNCTIONAL

- Traffic investigation have involved strategic and micro-simulation traffic modelling
- Traffic modelling has been informed by
 - Origin/ destination surveys in 2009 and 2010
 - A combination of tube, video and intersection counts at approximately 68 sites
 - Travel time surveys
 - Observation of queuing traffic
- Micro-simulation modelling used to assess the 6 shortlisted options

Functional -Traffic



Transport
Roads & Maritime
Services

Project objective: Improve traffic efficiency between and within Grafton and South Grafton

Supporting objective: Provide efficient access for a second crossing of the Clarence River and for the State road network.

Supporting objective: Provide a traffic management network which reduces delays between Grafton and South Grafton in peak periods to an acceptable level of service for 30 years after opening.

Functional – Key Outcomes Bridge Volumes 2hr AM Peak



- Cross river traffic in AM peak
 - 2019 – 4,086 trips
 - 2049 – 8,048 trips

- Options E,A and C capture similar proportion of cross-river traffic in 2019 and 2049

- Dominant travel into the existing Grafton central area

- Option 11 increases to 45% of cross river traffic at 2049 as the Clarenza development approaches capacity

- Options 14 and 15 lower proportion of travel in 2019 as OD's of demand & distance to the bridge

- Options 14 and 15 at 2049 attracts greater proportion of cross – river trips due to change in OD's and delays elsewhere

Option	Forecast Year	
	2019	2049
E	2,697 (66%)	5,231 (65%)
A	3,188 (78%)	5,919 (74%)
C	2,808 (67%)	5,431 (68%)
11	1,296 (32%)	3,515 (45%)
14	936 (23%)	2,673 (36%)
15	921 (22%)	2,578 (35%)

Functional – Key Outcomes Reducing Delay (2049 AM Peak)



Option	Travel Time
E	7 min
A	8 min
C	7 min
11	8 min
14	14 min
15	14 min

- Option E, A, C and 11 similar effect
- Option 14 and 15 are similar but do not reduce travel time on the existing bridge



Transport
Roads & Maritime
Services

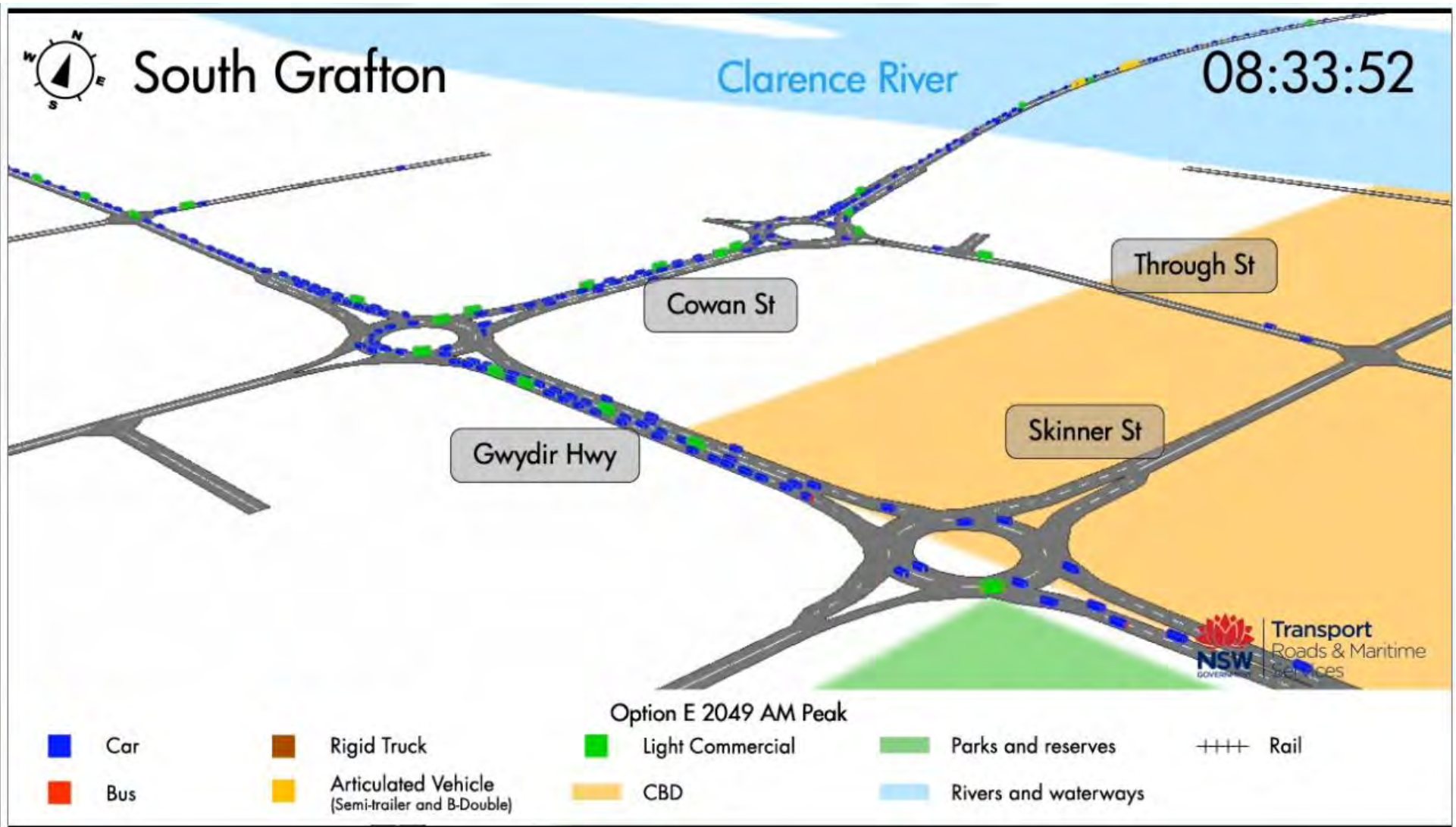
A photograph of a busy road with a traffic jam. A white bus with "busways" and "MAN" branding is prominent in the center. Other vehicles include a blue car, a silver car, and a white truck. A sign for "BENT ST CAR MART" is visible in the background. The scene is set in a suburban area with houses and trees under a clear sky.

2049 AM PEAK TRAFFIC SIMULATIONS

Option E - 2049



Transport
Roads & Maritime
Services



Option A - 2049



08:36:26

Clarence River

Proposed Bridge (Option A)
Number of vehicles crossing the new bridge in the AM peak in 2049 = 5919

Existing Bridge
Number of vehicles crossing the existing bridge in the AM peak in 2049 = 2137

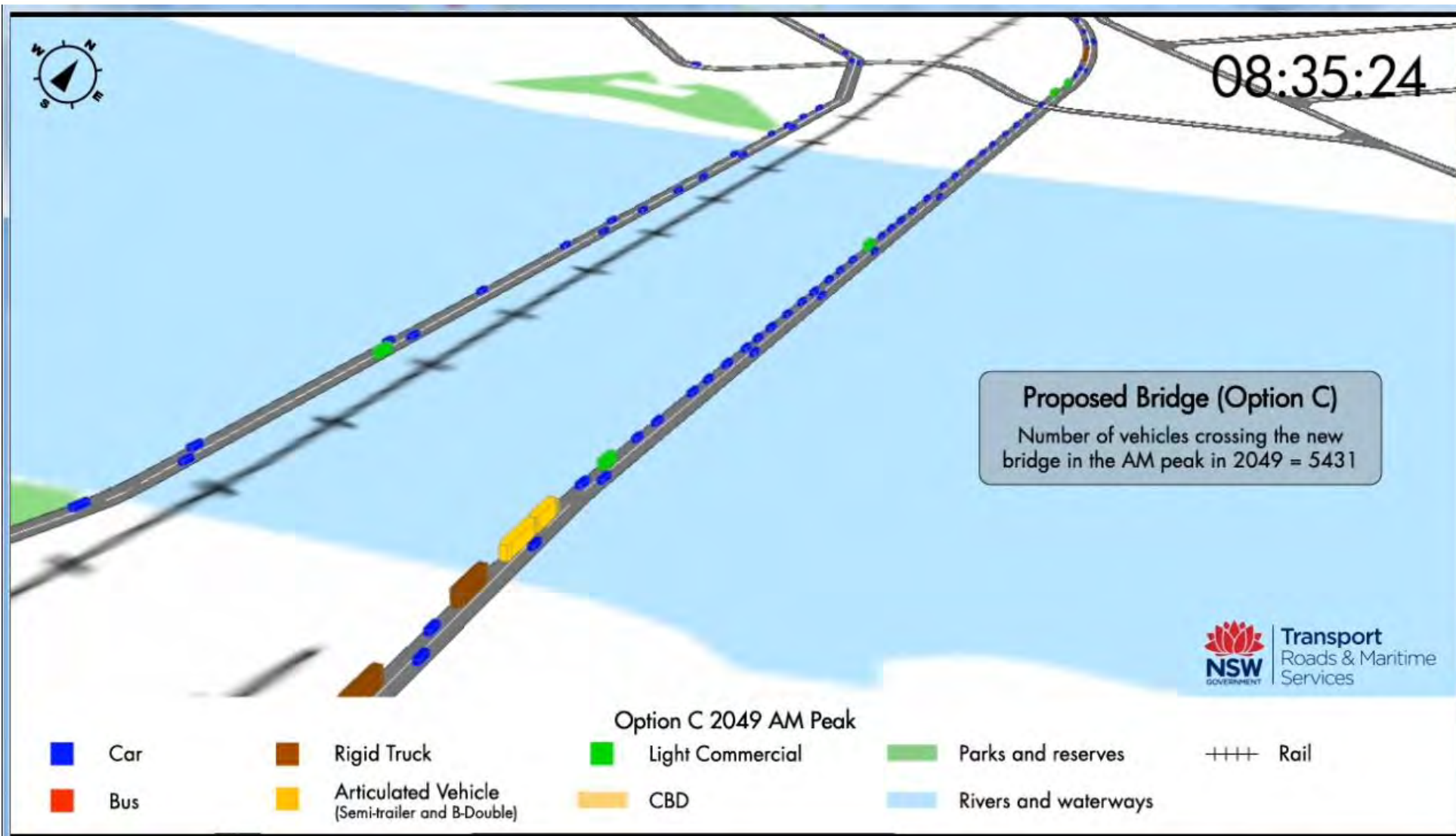
Option A 2049 AM Peak

- | | | | | |
|-----|---|------------------|----------------------|------|
| Car | Rigid Truck | Light Commercial | Parks and reserves | Rail |
| Bus | Articulated Vehicle (Semi-trailer and B-Double) | CBD | Rivers and waterways | |

Option C - 2049



Transport
Roads & Maritime
Services

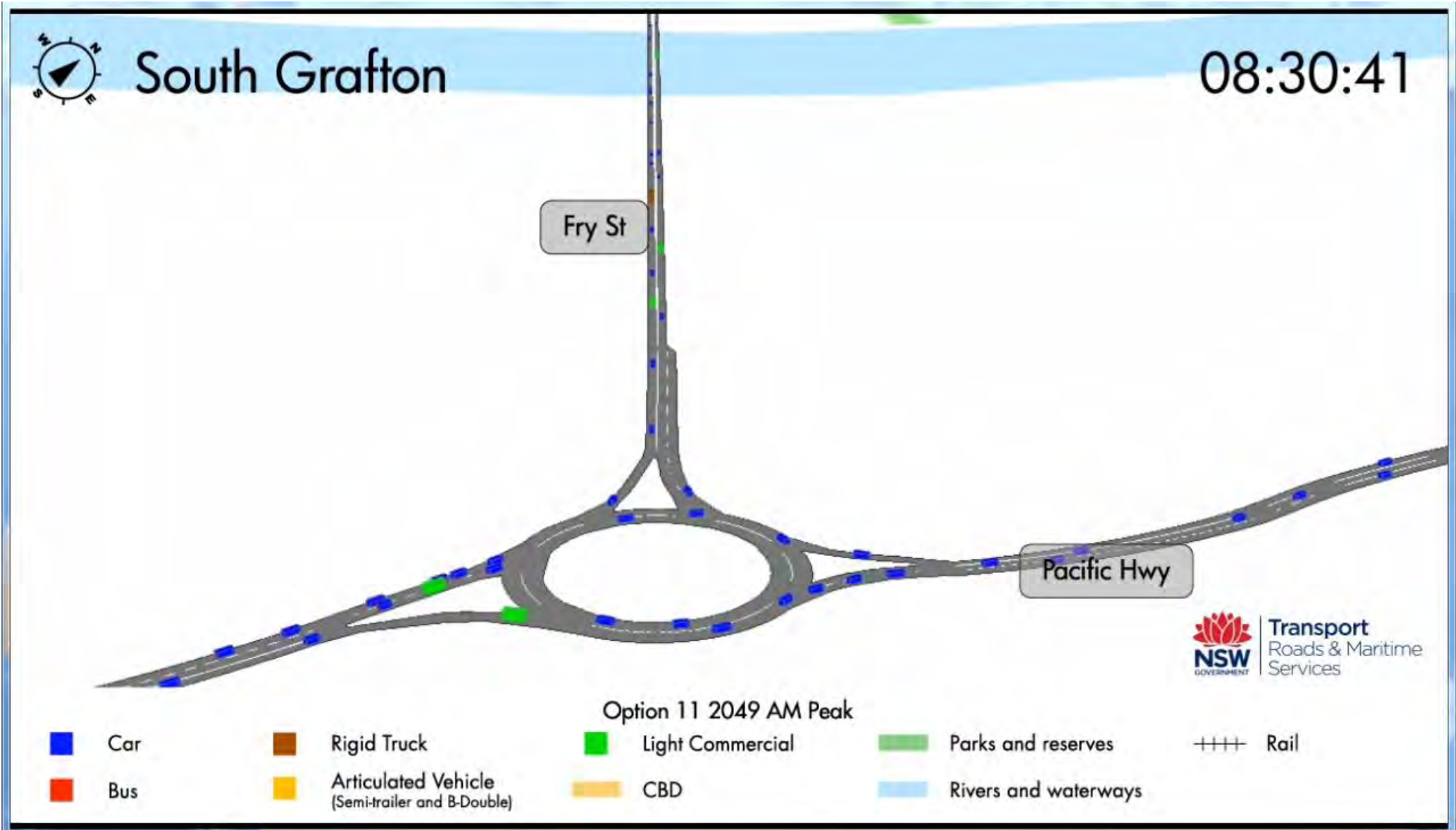


Transport
Roads & Maritime
Services

Option 11 - 2049



Transport
Roads & Maritime
Services

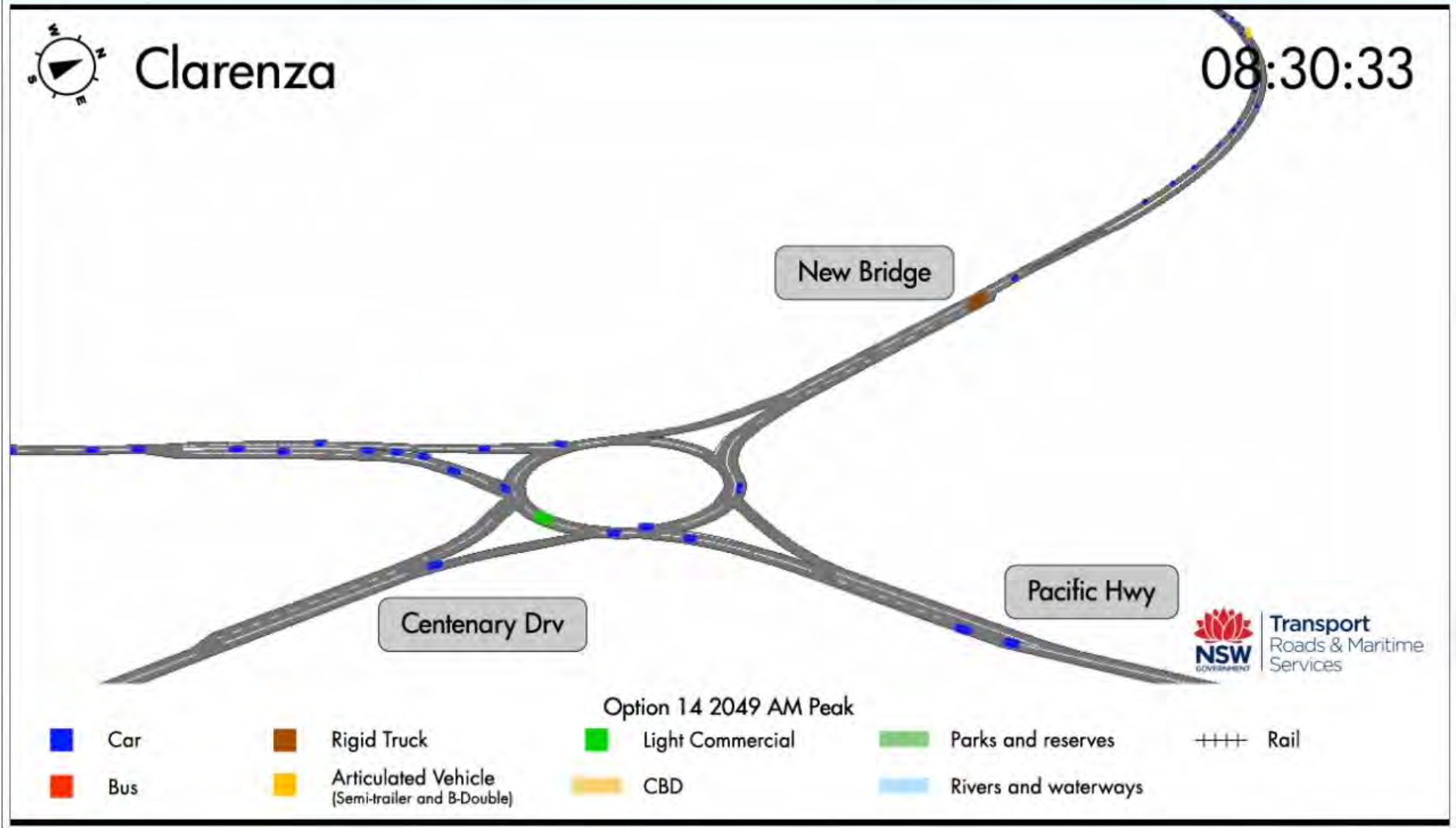


Transport
Roads & Maritime
Services

Option 14 - 2049



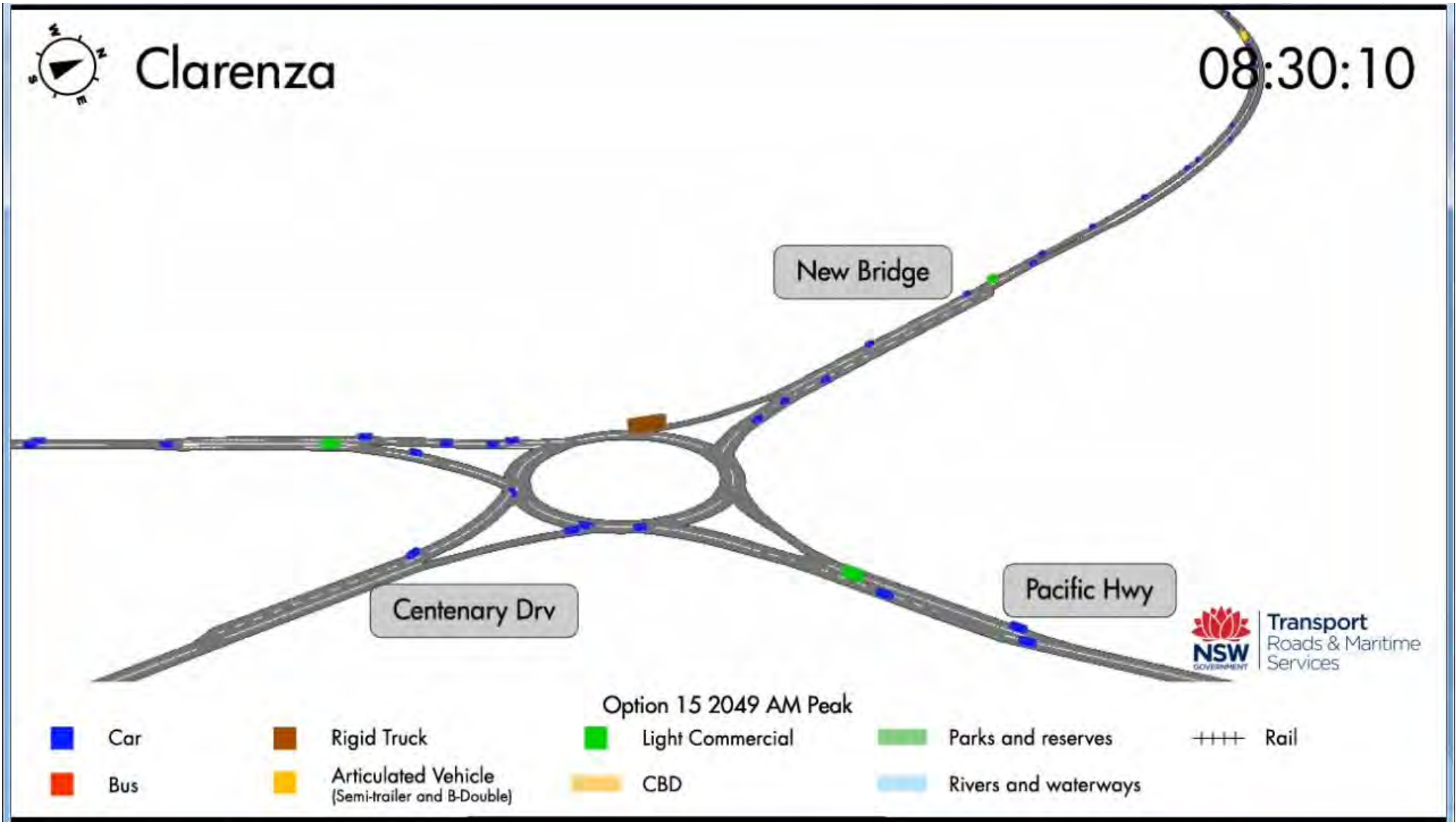
Transport
Roads & Maritime
Services



Option 15 - 2049



Transport
Roads & Maritime
Services



Transport
Roads & Maritime
Services

Functional - Road safety

Project objective: Enhance road safety for all road users over the length of the project

Supporting objective: Reduce the potential for road crashes and injuries on the bridge and approaches including any intersections and connecting roads.

Road safety was addressed by undertaking an independent road safety audit for each option.

- Options A and E have the highest number of safety issues in total. Generally this is because these two options direct traffic through the centre of Grafton, and are more constrained by existing developments and infrastructure.
- Options C, 11, 14 and 15 remove some traffic from central Grafton and therefore are less constrained by existing developments and infrastructure.

Supporting objective: Provide safe facilities for pedestrians and cyclists.

- Option A has the most safety issues for pedestrians and cyclists related to higher exposure to traffic volumes and heavy vehicles.
- Options E, C, 11, 14 and 15 had fewer issues, mainly related to roundabouts.



Transport
Roads & Maritime
Services

ENVIRONMENTAL

Environmental - Natural environment (ecology)



Transport
Roads & Maritime
Services

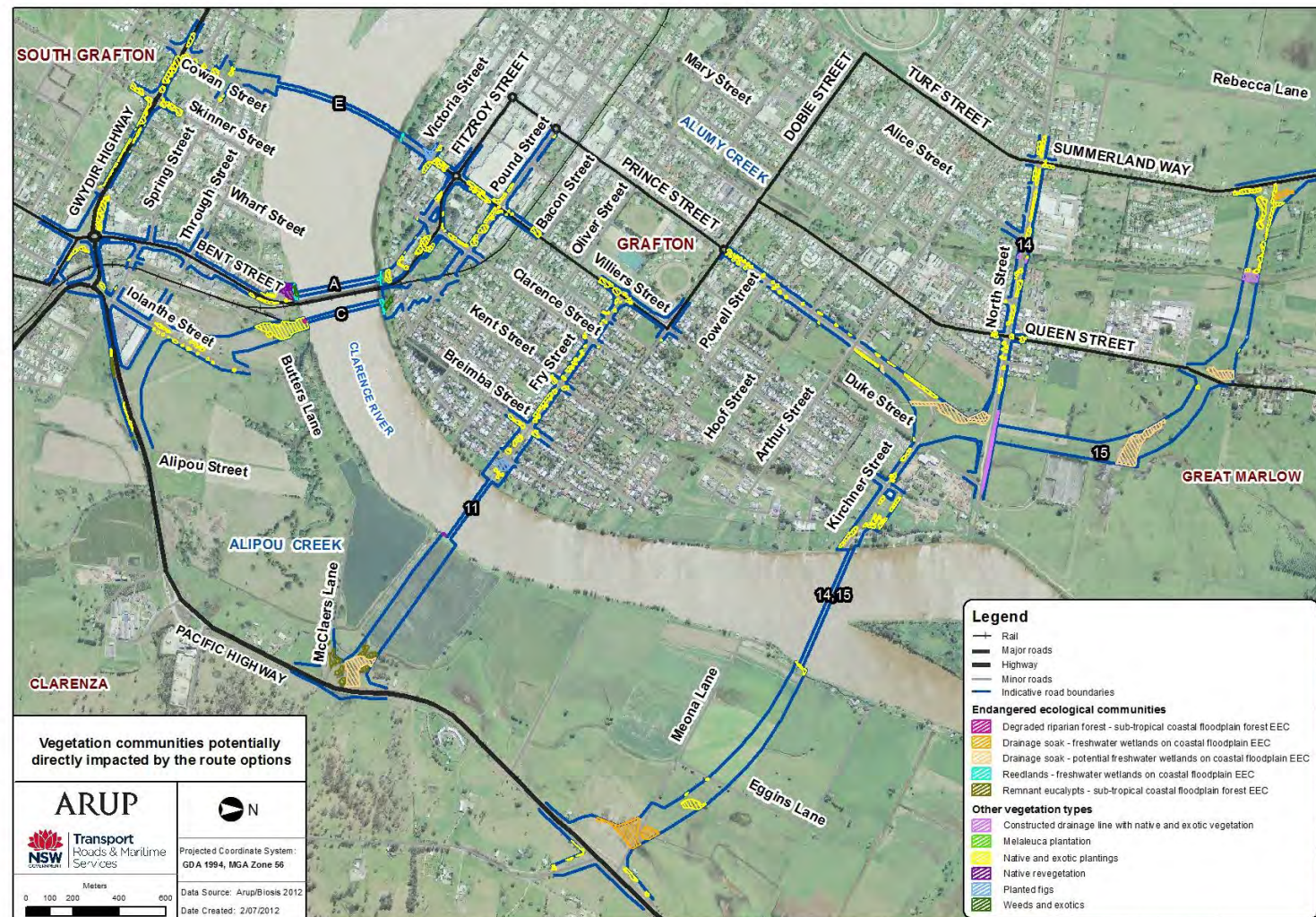
Project objective: Minimise impact on the environment

Supporting objective: Minimise impact on the natural environment

- Options 14 and 15 have the greatest potential direct impacts on ecological communities
 - drainage areas on freshwater wetlands on coastal floodplains
 - native and exotic plantings

- Options E, A, C and 11 affect lower areas of communities
 - reedlands
 - native and exotic plantings
 - eucalypts
 - riparian forest

- Known habitat for threatened listed species
 - Option E – flying foxes (fig trees and flight path to Susan Island)
 - Options A and C - bats (bridge and riparian zone)
 - Option 14 and 15 – egret (wetland)

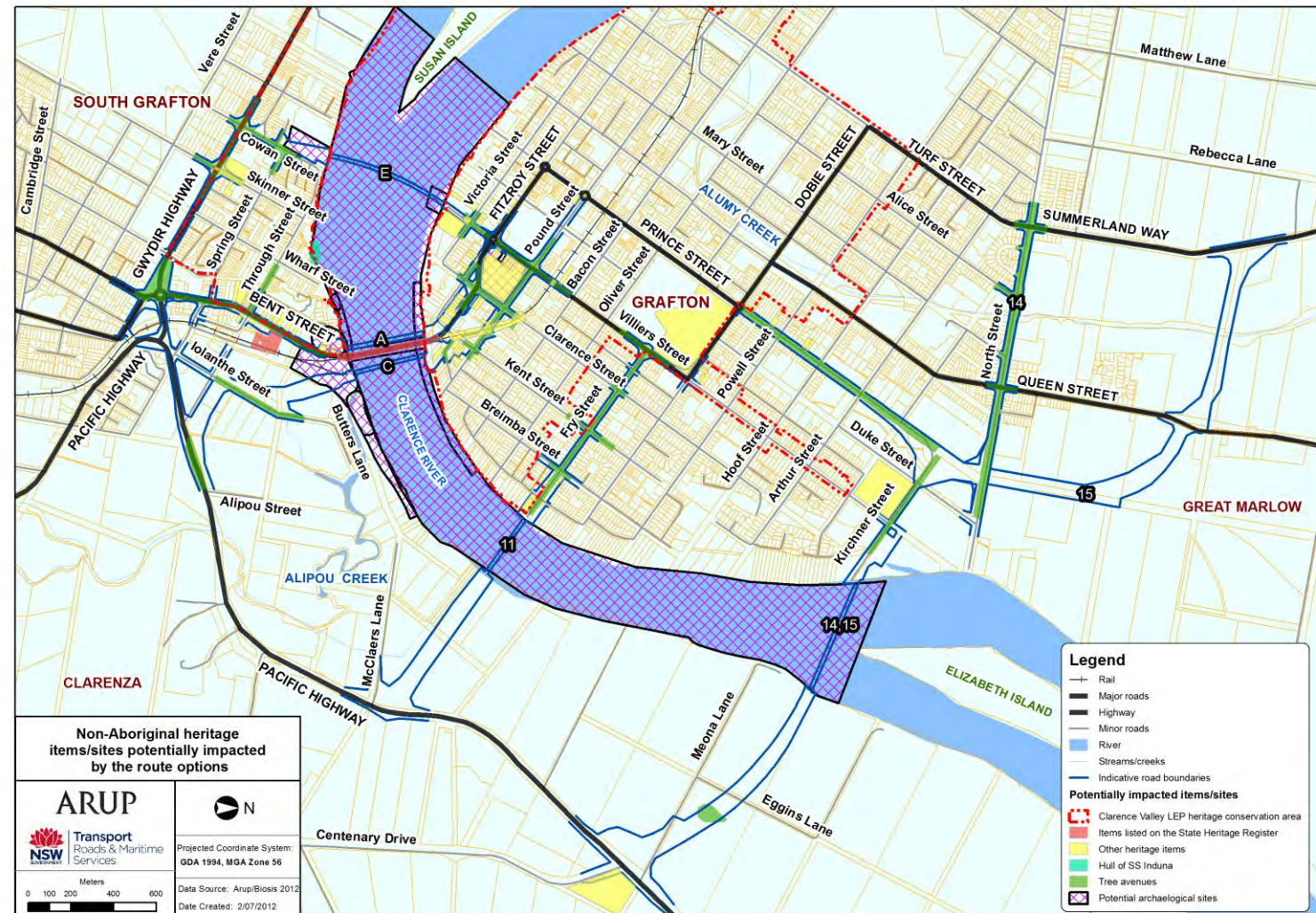


Environmental - Non-Aboriginal heritage

Project objective: Minimise impact on the environment

Supporting objective: Minimise impact on heritage

- Options E, A and C greatest potential impact on items of non-Aboriginal heritage due to urban location.
- Option A potential direct impact on two items on state heritage register.
 - Grafton Road and Rail Bridge
 - Railway Station Group
- Options E and C will also have visual impacts on the existing state heritage listed bridge.



Environmental - Non-Aboriginal heritage



Transport
Roads & Maritime
Services

Direct impact on non-Aboriginal heritage items and archaeological sites	Option E	Option A	Option C	Option 11	Option 14	Option 15
Items of State heritage significance (No.)	0	2	0	0	0	0
Other items (No.)	21	25	24	12	10	10

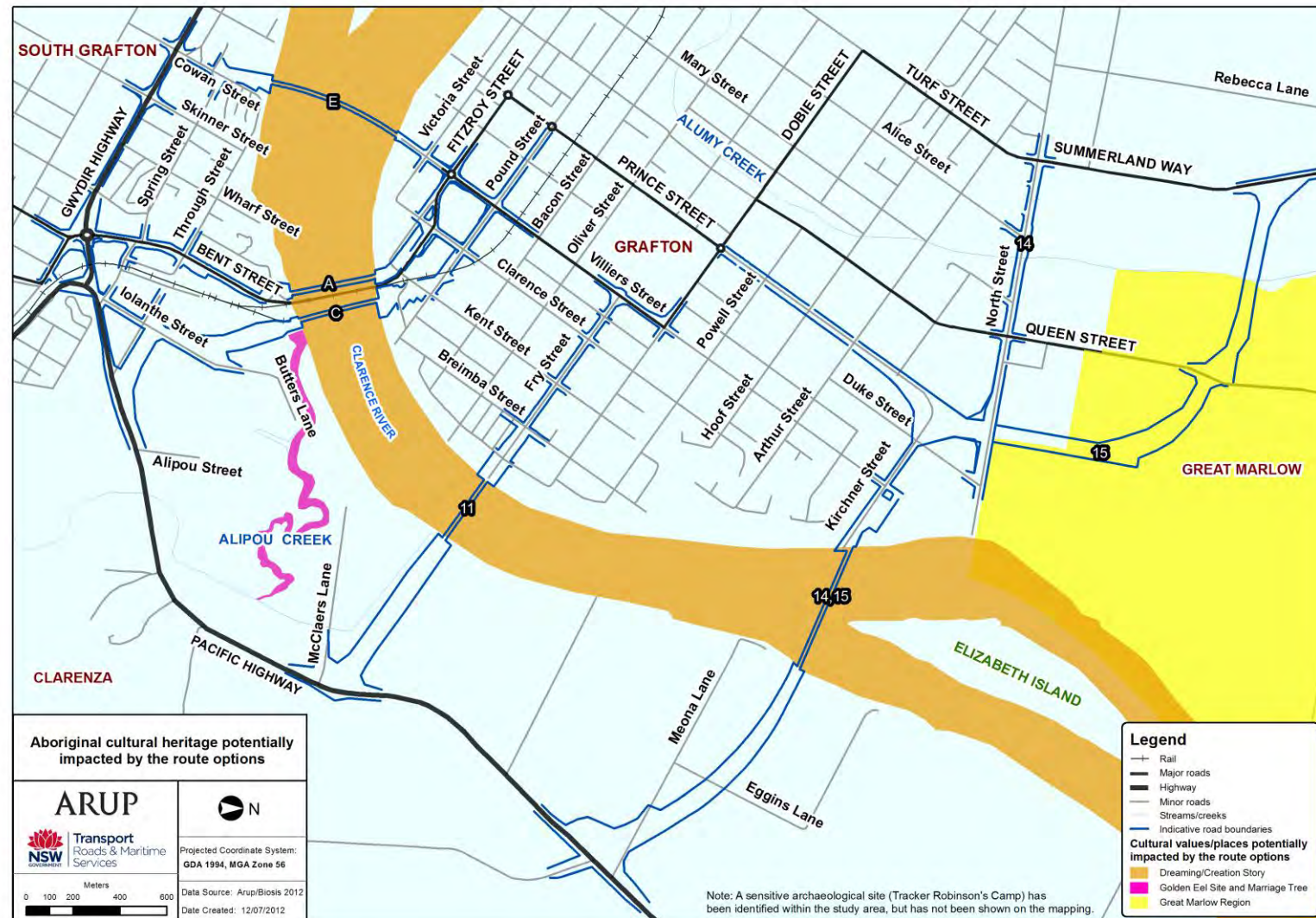
- All options impact on listed trees such as figs, jacaranda and flame trees and other significant plantings. Option 14 affecting the most trees (140).
- Potential Archaeological Sites (PAS) have also been considered and these include potential maritime sites.

Environmental - Aboriginal cultural heritage



Transport
Roads & Maritime
Services

- Options 14 and 15 direct impact Great Marlow cultural site.
- Option C could potentially affect the aesthetic value of the Golden Eel cultural site. Protection measures to be put into place during construction.
- Option 15 is in close proximity to the Tracker Robinson camp site. Protection measures to be put into place during construction.



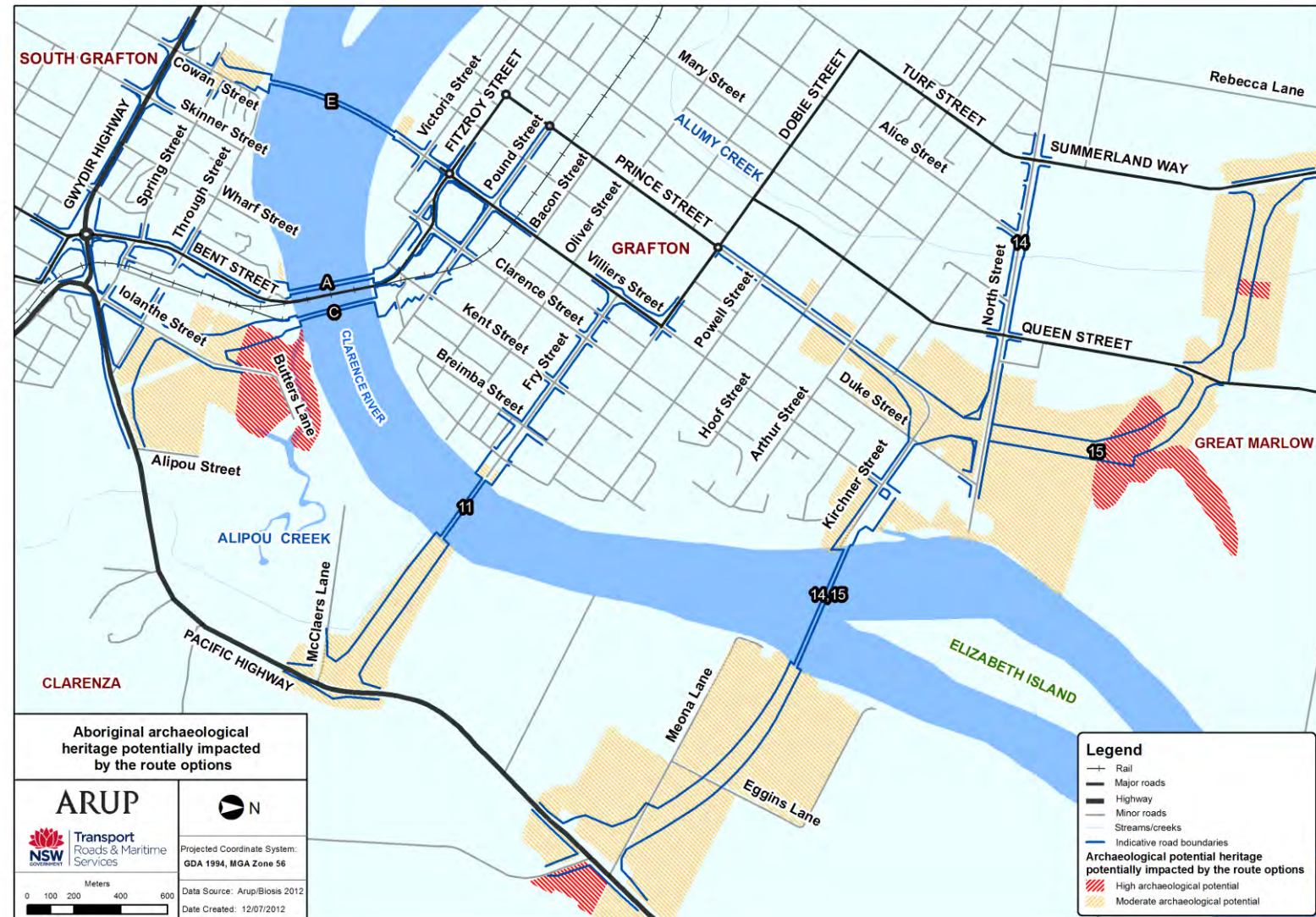
Environmental - Aboriginal archaeological heritage



Transport
Roads & Maritime
Services

Length through areas of high Aboriginal archaeological potential:

- Option 15 affects the greatest length
- Option C and 14 affect shorter lengths
- Options E, A and 11 would not affect



Environmental - Urban Character and Landscape



Transport
Roads & Maritime
Services

Project objective: Minimise impact on the environment

Supporting objective: Provide a project that fits sensitively into the built, natural and community context

Option E	Option A	Option C	Option 11	Option 14	Option 15
Maintains visual integrity of existing bridge.	Impacts on views to, and visual character of, existing bridge.	Impacts on views to, and visual character of, existing bridge.	Maintains visual integrity of existing bridge.	Maintains visual integrity of existing bridge.	Maintains visual integrity of existing bridge.

Environmental - Urban Character and Landscape



Transport
Roads & Maritime
Services

Option E	Option A	Option C	Option 11	Option 14	Option 15
Would not fragment existing urban settlement patterns.	Would fragment existing urban settlement patterns.	Would significantly fragment existing urban settlement patterns.	Would significantly fragment existing urban settlement patterns.	Would fragment existing urban settlement patterns.	Would fragment existing urban settlement patterns.
Generally consistent with the existing landscape pattern on both sides of the river, and has the smallest physical footprint.	Substantially impacts the existing urban character of Grafton and South Grafton.	Substantially impacts the existing urban character of Grafton and South Grafton.	Impacts the existing character on both sides of the river through the creation of large scale approach roads, viaducts and roundabouts.	Impacts the existing character on both sides of the river through the creation of large scale approach roads, viaducts and roundabouts.	Impacts the existing character on both sides of the river through the creation of large scale approach roads, viaducts and roundabouts.



SOCIO-ECONOMIC

Project objective: Support regional and local economic development

Supporting objective: Provide transport solutions that complement existing and future land uses and support development opportunities

- All options would provide some improvement to the level of connectivity.
 - Option E provides a strong link between the Grafton & South Grafton CBD
 - Options E, A and C improve connectivity between existing residential areas and CBDs
 - Option 11 provides improved connectivity to Clarenza residential growth area
 - Options 14 and 15 provide improved connectivity between the two separate growth and employment areas of Junction Hill and Clarenza

Supporting objective: Provide improved opportunities economic and tourist development for Grafton

- Option E provides strong potential to integrate with several local strategies and provides stronger link with waterfront
- Options A and C have a stronger potential to contribute to tourism development than Options 11, 14 and 15 as they enter Grafton at some distance from the CBD

Socio-economic - Traffic

Project objective: Support regional and local economic development

Supporting objective: Provide for commercial transport including B-doubles where required.



Study Outcomes – Heavy Vehicles 2049 AM Peak

Option	Distance	Time
E	9.1 km	15 min
A	8.7 km	14 min
C	8.4 km	13 min
11	10.0 km	11 min
14	10.5 km	10 min
15	10.3 km	10 min

- Option 11, 14, 15 provide the lowest travel time for HV
- Option A, C similar and slower than 11, 14, 15
- Option E has the highest travel time

Project objective: Minimise impact on the environment

Supporting objective: Minimise the impact on the social and economic environment, including property impacts

- Options are likely to affect access to community activities such as:
- Option E – disruption to movement to facilities in Villiers and Victoria St
 - Options A and C – relatively little impact, localised disruption
 - Option 11 – significant disruption to ease of north-south movement across Fry St
 - Options 14 and 15 – increased traffic along Prince St may disrupt ease of east-west movement

- Land use impacts, including property acquisitions – as per table below

	Option E	Option A	Option C	Option 11	Option 14	Option 15
Residential	16	21	24	22	6	1
Businesses	7	21	4	1	2	1
Rural	0	0	2	2	7	14
Community	8	15	12	5	5	6

- Option A, C and 11 have largest impact on residential properties
- Options 14 and 15 have largest impact on rural properties and regionally significant farmland
- Option A has the greatest impact on businesses, mostly located along Bent St
- Option C is the only option which may potentially require demolition of a community facility

Project objective: Minimise impact on the environment

Supporting objective: Minimise the impact on residential amenity, including noise, vibration, air quality etc.

- Options A, C & E similar to each other and least change to existing noise impacts
- Option 11 clear outlier due to Fry Street
- Option 14 has significant impact on North Street
- Option 15 redirects traffic to greenfield area

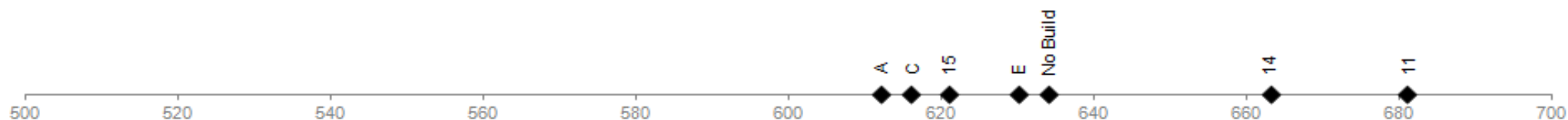
Report updated to correct errors in noise logger reference locations.

Note: These do not affect summary tables or indicator numbers.

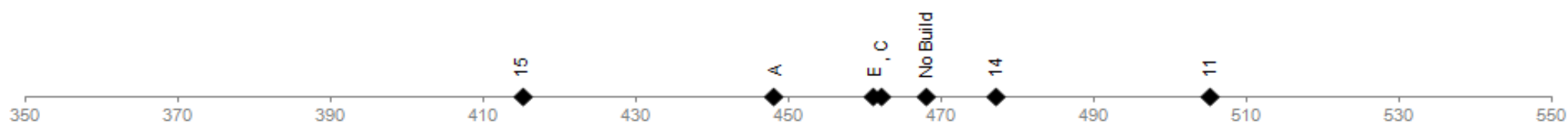
Socio-economic - Noise



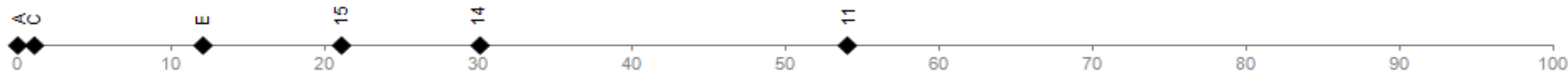
RNP Exceedance - Day



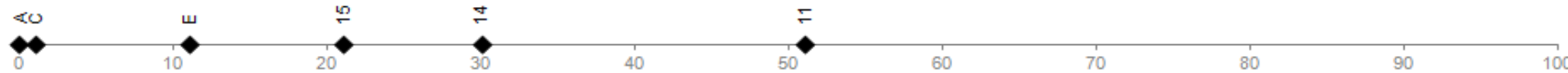
RNP Exceedance - Night



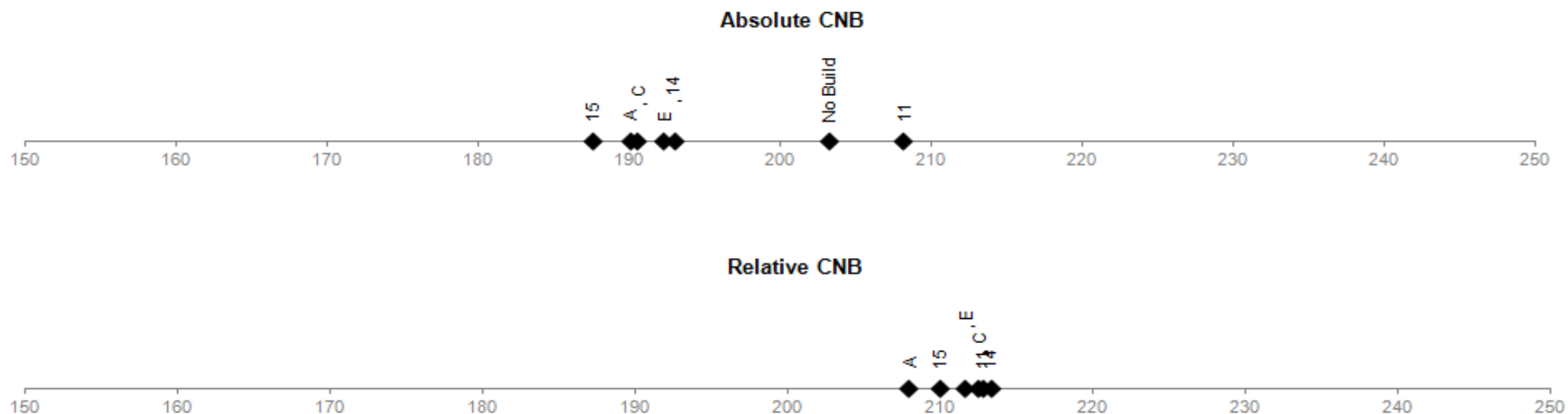
Relative Increase >12dB - Day



Relative Increase >12dB - Night



Socio-economic – Noise Analysis



- Community Noise Burden approach shows even closer spacing between options

Appendix 4 – Second Option Assessment Workshop Report
