

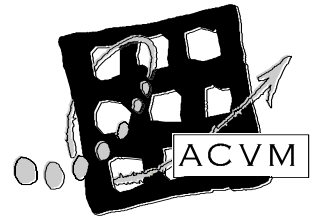
MR83 SUMMERLAND WAY

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

**SECOND OPTION ASSESSMENT
WORKSHOP**

Workshop Report

12th November 2012



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Report

Background

The existing vehicular 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, after extensive community consultation and other engineering and environmental investigations, a short list of six options was announced. Additional design refinements were undertaken on the six short listed options and further field and technical investigations were undertaken. 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, Department of Planning and Infrastructure, NSW Police, RMS and Arup (technical project consultants). The purpose of the workshop was for participants to discuss the six route options 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 then 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:

- There was a preference expressed for either Option C or Option E and the whole group found it difficult to decide between the two options
- Options A, 11, 14 and 15 should not be pursued further because they were the least preferred options and 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 was held on 31 October 2012 as part of the process to identify a recommended preferred route for the additional crossing.

The Option Assessment Workshop allowed the RMS 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. Members of the Arup technical team (including sub-contract specialists), RMS advisors and a representative of Clarence Valley Council also attended the workshop to provide advice and input to the process.

The key findings of this workshop were that:

- The conclusions reached were the same as at the VM workshop in Grafton, ie. Options E and C were recommended for further consideration for the preferred route option.
- It was difficult to decide between Options E and C, on the basis of the assessment criteria used. The differences between these two options were very small.
- The participants' assessment of the options, ranked Options E and C virtually the same in terms of functional and socio-economic performance. Option E was ranked higher than Option C for environmental performance.
- As the BCRs for Options E and C are the same (1.6) and the strategic cost estimate for Option C is less than 10% more than that for Option E, the economic performance of both options were considered not substantially different at this stage of project development.

- Options A, 11, 14 and 15 were the least preferred options because they did not perform as well as Options E and C when evaluated against the assessment criteria and the project objectives

It was felt that the group needed to reconvene and consider further information particularly focussed on the established and weighted assessment criteria and then to comparatively re-evaluate the two best performing options (Options E and C) in more specific detail with a sensitivity analysis in order to recommend a preferred option to progress the project.

The second Option Assessment Workshop (the subject of this report) was held on **12 November 2012**. Attendees included the RMS workshop participants and the Arup technical project team who, with a representative from the Clarence Valley Council, 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. 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:

- Build on the work undertaken at the first Option Assessment Workshop (31 October 2012) in particular the conclusions drawn from that workshop regarding the need for refined information to allow a more detailed assessment of Options E and C*
- Undertake a more detailed assessment and evaluation of Options E and C with a sensitivity analysis 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 continued to build on the work undertaken during the VM workshop and the first Option Assessment Workshop as well as the perspectives and specialist knowledge of the workshop participants. Information from the investigations (now more focussed in line with the assessment criteria) was reviewed and the two options recommended by the previous workshops were re-evaluated on a finer scale of assessment.

At the commencement of the workshop, it was agreed that the same assessment criteria and weightings as established at the first Option Assessment Workshop (being a refinement of the assessment criteria developed by the VM workshop in Grafton on 23-24 October 2012) should be used and that only Options E and C would be re-evaluated.

The workshop group then identified other aspects (additional to the assessment criteria) which could be relevant to the comparative assessment of Options E and C. These would also be discussed and considered (**Appendix 2**).

The group then re-evaluated the two options (Options E and C) using a more refined scale. The information to inform the re-evaluation was a combination of:

- Route Options Development Report (RODR) and presentations of Options E and C at the first Option Assessment Workshop
- The Draft Route Options Community Feedback Report and presentations made to the first Option Assessment Workshop
- Outcomes of the first Option Assessment Workshop
- The package of information (particularly focussing on the assessment criteria) provided by the Arup technical project team to assist with the comparative assessment of Options E and C (see **Appendix 3**)

A refined scale was adopted for the re-evaluation of the two options which used a relative and qualitative approach (based on the quantitative investigations undertaken, where possible).

The agreed approach was to review the relevant information related to a criteria (as refined and weighted from previous workshops in the category/themes of functional criteria, socio economic criteria and natural and built environment criteria) for each option, then to decide which of the two options performed better against this criteria and rate the other option relative to the better option.

This allowed a more refined scale for the assessment of differences and ranking of the options within the various assessment criteria categories. Key points of discussion when evaluating the options against criteria for each category were also recorded (see **Appendix 2**). This information, together with cost estimates and value for money data, meant that a recommendation could be made for a preferred option to move forward.

To provide an even further refinement, a sensitivity test was undertaken to determine if the recommendation would change should the group consider any of the categories/themes to be of greater importance in terms of meeting the project objectives within the project's context and setting, and how the options performed within that particular category (see **Appendix 2**).

The discussion undertaken in the workshop, led the group to the outcomes below.

Workshop Outcomes

By the end of the workshop, the participants:

- **Agreed** that the same assessment criteria and weightings as established at the first Option Assessment Workshop (which was a refinement of the assessment criteria developed by the VM workshop in Grafton on 23-24 October 2012) should be used and that only Options E & C would be re-evaluated
- **Were informed** by the investigations undertaken in the RODR and the packaged information provided (particularly focussing on the assessment criteria) to assist with the comparative assessment of Options E and C
- **Discussed and assessed** other aspects (additional to the assessment criteria) which could be relevant to the comparative assessment of Options E and C. The group concluded that, although some of the consideration favoured one or other of the options, none were of a substantial nature that would sway the ultimate recommendation of a preferred option. However, a number of the issues identified would need to be considered as part of the project risk management and construction planning processes as the project proceeds
- **Re-evaluated** Options E and C using a refined scale that incorporated a relative and qualitative approach informed by quantitative information including the options' strategic cost estimates and BCRs
- **Recommended** unanimously that Option C should be the preferred option to move forward. A summary of the reasons and issues to be addressed included:

Reasons Why:

- On balance, it presents greater overall value to the community, in particular addressing long term connectivity, providing for economic growth and supporting Grafton as a regional centre, without presenting unmanageable impacts or risks
- It best meets the project objectives
- It provides better transport efficiency improvements over the whole of the road network for both the short and long term, including for road freight movements, as it:
 - Better supports the distribution of traffic flows between the eastern and western sides of South Grafton, especially traffic travelling to and from the south-east as it is located east of the existing bridge and provides better access to the Pacific Highway to the north and south and to Clarenza. Option C also

provides good access to Armidale Road

- Provides a better road hierarchy as it provides a parallel road network with improved redundancy
- Avoids channelling traffic flows from both crossings into the junction of Fitzroy and Villiers Streets
- Provides a better opportunity for traffic to travel around the edge of the Grafton CBD by directing traffic to the intersection of Villiers and Pound Streets
- It performs well in the other areas of the functional assessment criteria
- It provides better outcomes in the socio economic area including its ability to better support Grafton as a regional centre, it has less impacts to businesses and minimises noise impacts
- It provides better outcomes than Option E in terms of non-Aboriginal heritage by avoiding impacts on the important and intact heritage precinct around Villiers Street and Victoria Street, and traverses through a smaller length of heritage conservation area
- It performs comparatively to Option E in terms of capital cost and BCR at this stage of project development

Subject to:

- Managing the potential risks and impacts on Aboriginal cultural heritage (particularly the Golden Eel site) and other environmental impacts. This will require close ongoing consultation with the Aboriginal community (with respect to Aboriginal cultural heritage issues)
- Careful consideration and management of potential impacts on state heritage listed items and other non-Aboriginal heritage elements including archaeological sites
- Minimising the identified impacts on the urban design and the landscape character of Grafton
- Identifying ways to promote pedestrian and cyclist connectivity to South Grafton
- Investigation and management of potential contaminated land at the old railway site south of the Grafton River
- Minimising traffic noise impacts and ecological impacts
- Undertaking detailed environmental impact assessment and, following any decision or approval to proceed, development of appropriate management plans (construction and ongoing)

operational plans) to avoid, manage and mitigate impacts of the preferred option

- **Undertook** some sensitivity testing to determine if the recommendation would change should the group consider any of the categories/themes to be of greater importance in terms of meeting the project objectives within the project's context and setting, and how the options performed within that particular category. Overall, the group considered that the functional criteria was twice as important as the socio economic and natural and built environment criteria (which were rated equally). This sensitivity test reinforced the recommendation of Option C as the preferred option to progress the project
- **Drew** other conclusions as a result of their deliberations including:
 - It has been a difficult exercise to determine the preferred option. There was no easy, clear cut answer that would address all the issues raised. All the options assessed had their advantages and disadvantages and met the criteria to varying degrees
 - It needed three workshops and required qualitative judgement using quantitative information as well as the need to balance various views and aspects of the project, and the options being assessed. However the process used was transparent, explainable and justifiable
 - The group had a large amount of good information to draw from in order to reach conclusions
 - The process demonstrated a consistency of outcome in each workshop and the group had the benefit of building and refining their assessment based on the information gathered and assessed at the previous workshops in order to reach its conclusions
- **Were told** of the next steps in the process to move the project forward being:
 - The outcomes of the three workshops and the process to determine the recommended preferred option will be reported within RMS and government
 - RMS will go through their internal reporting mechanism including a Major Project Review Committee (MPRC) presentation and approval processes
 - Liaison will take place with the Minister and the NSW Government
 - Upon approval, the project team will prepare information and explanations for release to the public of the preferred option
 - The recommended preferred option will be displayed for community comment
 - Submissions from the display of the recommended preferred option will be considered before a final decision is made on the preferred option
 - The corridor for preferred option will be preserved

Appendix 1. List of Participants

**ADDITIONAL CROSSING OF THE CLARENCE RIVER AT GRAFTON
SECOND OPTION ASSESSMENT WORKSHOP
PARTICIPANTS LIST**

PARTICIPANTS:

Roads and Maritime Services

Bob Higgins

Steve Arnold (*apology*)

Chris Clark

Ed Scully

James Green

Craig Leckie (*Acting for Steve Arnold*)

Alison Nash

Arup

Ben Schnitzerling

ADVISORS:

Roads and Maritime Services

Vicky Sisson

Adam Cameron

Rachel Sadler

Arup Project Team

Kathryn Nation

Nicola Fleury

John Hamilton

Gerard Cavanagh

Nick Finegan

Peter Rand

id Planning

Denise Wilson

Clarence Valley Council

Dave Morrison

FACILITATOR (ACVM)

Ross Prestipino Facilitator, ACVM

Appendix 2. Workshop Outputs

Workshop Outputs

The information presented in this Appendix is a consolidation of the general outputs and perceptions by the workshop participants as they reviewed information about the Additional Crossing of the Clarence River at Grafton Project. It particularly builds on the information generated during the Value Management (VM) Workshop undertaken in Grafton on 23-24 October 2012 and the first Option Assessment Workshop undertaken on 31 October 2012.

The workshop participants reviewed the conclusions reached at the end of the first Option Assessment Workshop and considered further information (predominantly focussed on the established and weighted assessment criteria) about the two options that previous workshops had concluded were the most favoured options to proceed (being either Option C or Option E).

The workshop participants then comparatively re-evaluated the two options against the assessment criteria using a finer evaluation scale as well as the options' estimated costs and value for money data (strategic capital cost estimates and benefit cost ratios – BCRs) and other considerations in order to recommend a preferred option to progress the project.

Context

The existing vehicular 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 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 undertaken on the six short listed options and further field and technical investigations were undertaken.

Following the display of the six options, a Value Management (VM) Workshop was held in Grafton on 23-24 October 2012. The workshop was attended by a wide range of stakeholders including community interest representatives, stakeholder groups, Clarence Valley Council, Department of Planning and Infrastructure, NSW Police, RMS and Arup (technical project consultants). The purpose of the workshop was for participants to discuss the six route options 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 then 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:

- There was a preference expressed for either Option C or Option E and the whole group found it difficult to decide between the two options
- Options A, 11, 14 and 15 should not be pursued further because they were the least preferred options and they did not perform as well as the Options E and C when assessed against the agreed and weighted selection criteria

Subsequent to the VM workshop, an Option Assessment Workshop was undertaken on 31 October 2012 as part of the process to identify a recommended preferred route for the additional crossing.

The workshop allowed the RMS workshop 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 if a preferred option could be recommended. Members of the Arup technical project team (including sub-contract specialists), RMS advisors and a representative of Clarence Valley Council also attended the workshop to provide advice and input to the process.

The key findings of this workshop were that:

- The conclusions reached were the same as at the VM workshop in Grafton, ie. Options E and C were recommended for further consideration for the preferred route option.
- It was difficult to decide between Options E and C, on the basis of the assessment criteria used. The differences between these two options were very small.
- The participants' assessment of the options ranked Options E and C virtually the same in terms of functional and socio-economic performance with a small difference environmentally within the sensitivity limitations of the process adopted. As the BCRs for Options E and C are the same (1.6) and the strategic cost estimate for Option C is less than 10% more than that for Option E, the economic performance of both options could also be considered not substantially different for this stage of project development
- Again, Options A, 11, 14 and 15 were the least preferred options because they did not perform as well as Options E and C when evaluated against the assessment criteria and the project objectives

The next step was for the group to reconvene and consider further information particularly focussed on the established and weighted assessment criteria and then to comparatively re-evaluate the two preferred options (Options E and C) in more specific detail with a sensitivity analysis in order to recommend a preferred option to progress the project.

This second Option Assessment Workshop was held on 12 November 2012. Attendees included the RMS workshop participants and the Arup technical project team who, together with a representative from Clarence Valley Council attended the workshop to provide advice and input to the process.

Recap Presentation on the First Technical Workshop

Although most of the participants attending the workshop had been involved in the first Option Assessment Workshop (31 October 2012), a brief recap of the workshop was presented by Ross Prestipino, Facilitator, ACVM.

A summary of the first Option Assessment Workshop included:

- The workshop group reviewed the assessment criteria developed in the VM workshop against the project objectives and refined as well as re-weighted the criteria, as necessary. The group had agreed with the assessment criteria developed for the three themes/categories of Functional, Socio Economic and Natural and Built Environment and also agreed these reflected the project objectives that could assist in differentiating between the six short listed options (except for one criteria under the Natural and Built Environment criteria)
- The deleted the criteria "*minimise the surface/ground water impacts*" as it was felt that, regardless of the option, current best practice, technical management processes will be put in place to address adverse impacts (ie. surface and groundwater impacts, acid sulfate soils) and the strategic capital cost estimates include specific contingency allowances for these aspects. The remaining criteria in the Natural and Built Environment category were re-weighted using the "paired comparison approach

- The group 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
- Presentations were then made of the six short listed options in terms of performance from a Functional; Socio-Economic; and Natural & Built Environment perspective. After each focused presentation, the group conducted a comparative evaluation across all six short listed 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 to reach consensus
- After establishing relative rankings of the options under each of the three categories/themes, cost and value for money data was introduced. The comparators used were the strategic capital cost estimates and Benefit Cost Ratios (BCRs)
- As a result of the workshop, the same conclusion was reached as the group who undertook the assessment of options at the VM workshop in Grafton the previous week. It was difficult to decide between Options E and C, on the basis of the assessment process used. Whereas, Options A, 11, 14 and 15 were considered least preferred options because they did not perform as well as the Options E and C when evaluated against the assessment criteria and the project objectives
- As a result, it was decided that the group should reconvene and consider further information particularly focussed on the established and weighted assessment criteria and then comparatively re-evaluate the two preferred options (Options E and C) in more specific detail and with a sensitivity analysis in order recommend a preferred option to progress the project

Comparative Assessment Process for this Workshop

A more refined process was adopted in this workshop for the assessment of Options E and C which is outlined below.

- It was agreed that the re-evaluation of options should be for only Options E and C as in both previous workshops, these two options were assessed to be the preferred options
- It was also agreed that the same assessment criteria and weightings as established at the first Option Assessment Workshop (being a refinement of the assessment criteria developed by the VM workshop in Grafton on 23-24 October 2012) should be used
- The group identified other aspects (additional to the assessment criteria) that could be relevant to the comparative assessment of Options E and C. These should also be discussed and considered
- The group would re-evaluate the two options (Options E and C) using a more refined scale. The information to inform the re-evaluation would be a combination of:
 - Route Options Development Report (RODR) and presentations of Options E and C at the first Option Assessment Workshop
 - The draft Route Options Community Feedback Report and presentations made to the first Option Assessment Workshop
 - Outcomes of the first Option Assessment Workshop
 - The package of information (particularly focussing on the assessment criteria) provided by the Arup technical project team to assist with the comparative assessment of Options E and C (see **Appendix 3**)
- The refined evaluation scale to be adopted was a relative and qualitative approach (based on quantitative investigations, where possible). The approach was to review the relevant information related to a criteria for each option, then to decide which of the two options performed the better against this criteria. **The better option would be scored as a 4**
- The next step would be to assess how much better it was relative to the other option. A **major difference** between them would score the other option as a **1**, a **medium difference** would score the other option as a **2** or a **minor difference** between them would score the other option as a **3**.
- The intent of the refined scoring system is to allow more opportunity to differentiate between the two options when ranking the options within the various assessment criteria categories/themes. Together with cost estimates, a recommendation could then be made as to a preferred option to move forward
- An even further refinement would be a sensitivity test by determining if the recommendation would change should the group consider any of the categories/themes to be of greater importance in terms of meeting the objectives within the context and setting of the project and how the options performed within that particular category

Identifying Additional Considerations to the Assessment Criteria

The group identified other considerations (additional to the assessment criteria) which may be relevant to the comparative assessment of Options E & C. These were recorded at this stage and would be assessed later in the workshop, if necessary. The additional considerations identified were:

- Staging costs of the options
- Minimising navigation restrictions on river users
- Maintaining the relationship of the town to the river (view of the river)
- Maintaining the visual experience to the existing bridge (to and from the bridge)
- Environmental impact of the levee upgrade
- Ease of constructability (ie. safety, impact on neighbours, constraints, time taken, etc)

Re-evaluation of Options E and C

The group re-evaluated the two options (Options E & C) against the weighted assessment criteria (as established in the previous Option Assessment Workshop) in each of the three categories/themes being functional criteria, socio economic criteria and then natural and built environment criteria, separately.

The group used the reference information and the more refined evaluation scale mentioned earlier. The workshop group were reminded of the key features of the two options being evaluated as:

- **Option E.** The additional crossing located west (upstream) of the existing bridge and southeast (downstream) of Susan Island and connecting Cowan Street, South Grafton to Villiers Street, Grafton
- **Option C.** The additional crossing located about 70 metres east (downstream) of the existing bridge and connecting the junction of the Pacific Highway and the Gwydir Highway, South Grafton to Pound Street, Grafton

Once the evaluation was completed, a ranking was established for each option within each category/theme and the strategic capital cost estimates and BCRs considered.

Key points of discussion when evaluating options against the assessment criteria for each theme were also recorded.

Evaluation of Options against Functional Assessment 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	4	4	4	4	4	Rank 2
	3	3	3	3	3	
	2	2	2	2	2	
	1	1	1	1	1	
Sub-total	66	45	30	72	45	258
Option C	4	4	4	4	4	Rank 1
	3	3	3	3	3	
	2	2	2	2	2	
	1	1	1	1	1	
Sub-total	132	72	60	36	60	360

Key points raised in discussion during the evaluation process included:

- For Criteria “*Improve the overall efficiency of the road network including am and pm peaks*”:
 - Both options substantially reduce network congestion
 - Attraction of traffic away from the existing bridge is similar for both options, with Option C performing slightly better in the AM peak and Option E performing slightly better in the PM peak
 - In terms of average travel distances travel times and travel speed, Option C performed slightly worse than Option E in the AM peak in year 2049 because of the build up of congestion between the roundabout on Iolanthe Street and the roundabout of Gwydir Highway and Pacific Highway due to right turning traffic coming from the Pacific Highway. However the reverse happens in the PM peak in year 2049 with traffic leaving Grafton quicker with Option C
 - A further breakdown of internal to internal and external to internal movements was made available based on existing data. Particularly investigating traffic travelling to the west of Bent Street in South Grafton as against traffic travelling to the east of Bent Street in current and future projections
 - There appears that more traffic is and will move to and from the east of Bent Street (especially to and from the south east) than the west of Bent Street when examining the internal to internal analysis breakdown. As it connects to the road network on the eastern side of the existing bridge approaches, Option C provides a road network that better caters for these movements than Option E which connects to the road network on the western side of the existing bridge approaches.
 - When considering the future Pacific Highway Upgrade (which will move the highway further east), and based on planned development in the South Grafton area, there is likely to be more growth and traffic movement coming from and going to the south east which would be better serviced by Option C than Option E. Historically, development has often migrated towards major transport routes which, at South Grafton, would also likely be towards the south east.
 - By providing a parallel road network, Option C was considered to provide a better road hierarchy than Option E with improved redundancy in the event of maintenance activities and/or incidents as well as providing another quite separate route to the CBD.

- There is concern that, with Option E most traffic will head into the one node in Grafton being the Victoria Street and Fitzroy Street intersection. The size and scale of this intersection will become quite large over time to cater for all traffic volumes and movements coming into that intersection from both bridges. The network would also be more susceptible to network delays and congestion in the event of a breakdown or crash at this intersection
- While both options substantially reduce network congestion and provide good connections to the Grafton CBD, Option C provides a better opportunity for traffic to travel around the edge of the Grafton CBD than Option E as it directs traffic to the intersection of Villiers and Pound Streets
- Option C also provides better connections than Option E to the junction of the Pacific and Gwydir Highways.
- There is a need to consider public transport/buses which connect people to schools and CBDs. With Option E, Busways raised concerns in regard to the intersection of Victoria and Villiers Streets, Grafton and the resultant impact on school bus services to the Clarence Valley Anglican Primary School and with the intersection of Bligh Street and the Gwydir Highway, South Grafton. These concerns were also considered as part of this discussion.
- The two options seem to perform similarly on the indicators relating to travel time and distance (on balance). However consideration of current and future traffic movements based on the survey data and modelling of internal to internal and external to internal movements undertaken and the road hierarchy network benefits arising from the parallel road network provided favours Option C
- ***In summary, the group agreed that Option C was better than Option E on this criteria by a medium amount as it:***
 - ***Better supports the distribution of traffic flows between the eastern and western sides of South Grafton, especially traffic travelling to and from the south-east, where future development is planned, as it is located east of the existing bridge and provides better access to the Pacific Highway to the north and south and to Clarenza. Option C also provides good access to Armidale Road***
 - ***Provides a better road hierarchy as it provides a parallel road network with improved redundancy in the event of maintenance activities and/or incidents***
 - ***Avoids channelling traffic flows from both crossings into the junction of Fitzroy and Villiers Streets with the resultant need to increase the size and scale of the intersection to cater for traffic volumes and movements***
 - ***Provides a better opportunity for traffic to travel around the edge of the Grafton CBD as it directs traffic to the intersection of Villiers and Pound Streets***
- For Criteria *“Enhance safety for all road users (pedestrians, cyclists, vehicles, etc)”*:
 - Option C is marginally safer when considering the intersection of the Gwydir Highway and Pacific Highway. Option E has problems due to the proximity of the Spring Street intersection with the Pacific Highway/Gwydir Highway intersection. Option C rationalises and improves the layout in this area, reducing the potential for congestion and improving safety
 - By directing all traffic using the new crossing into the western end of Villiers Street, Option E directs more traffic through the commercial section of Villiers Street than Option C, resulting in more safety issues for vehicles, cyclists and pedestrians than Option C
 - The community has raised concerns that currently some pedestrians do not feel safe using the existing bridge. Option E takes a more direct route between the CBDs of Grafton and South Grafton with a newer and potentially safer pedestrian crossing
 - Roundabouts are less safe for pedestrian and cyclists. Both options would need to consider how pedestrian and cyclist safety is being addressed in roundabouts
 - There are concerns with Option E particularly with the potential safety issues of the bigger intersections. These are high volume pedestrian areas (ie. nearby school, post office, etc). There is also potential for “rat running” through high pedestrian areas such as Victoria Street.
 - There is a distinction between connectivity and safety. Whilst Option E may provide better connectivity for pedestrians and cyclists between Grafton and South Grafton, safety issues relating to Option E are considered worse than Option C

- ***In summary, the group agreed that Option C was better than Option E on this criteria with a magnitude between a medium and minor amount as it:***
 - ***Directs traffic to the intersection of Villiers and Pound Streets and provides a better opportunity for traffic to travel around the edge of the Grafton CBD than Option E by permitting traffic using the new crossing to disperse at that intersection***
 - ***Addresses the existing safety issues at the Pacific Highway / Gwydir Highway / Iolanthe Street intersection***
 - ***Has slightly fewer safety issues identified by the Road Safety Audit***
 - ***Provides better safety outcomes for pedestrians and cycle movements than Option E***
- For Criteria *“Optimise the efficiency of road freight movement”*:
 - Feedback considered from heavy vehicle stakeholder groups included concerns with the Villiers Street and Fitzroy Street intersection in Option E
 - It is likely that the majority of heavy vehicles will come from the Pacific Highway using the south east corridor which will result in slightly shorter travel times and distances by using Option C
 - Consideration needed to be given to community comments desiring heavy vehicles not to be directed through the middle of town. Option C meets this desire better than Option E
 - ***In summary, the group agreed that Option C was better than Option E on this criteria by a medium amount as it:***
 - ***Results in shorter travel times and travel distances between the existing Pacific Highway and the Summerland Way for the heavy vehicle movements which are more likely to be coming from the south-east***
 - ***Provides a route that avoids the Villiers Street and Fitzroy Street intersection for heavy vehicles***
 - ***Provides a better opportunity for heavy vehicles to travel around the edge of the Grafton CBD as it directs traffic to the intersection of Villiers and Pound Streets***
- For Criteria *“Improve bicycle and pedestrian linkages”*:
 - Having discussed the traffic data, the future highway upgrade, the location of the large residential areas between Blight Street and Armidale Road and the existing and future land uses, the issue of bicycle and pedestrian linkages came down to the impacts on the current situation and linkages in the future. Option E was considered as better now (linkages between the CBDs, linkages to recreational areas), but as Clarence and other areas grow (linkages to schools, growth areas), Option C is likely to be the better future option
 - ***In summary, the group agreed that Option E was better than Option C on this criteria by a medium amount as it:***
 - ***Provides better connectivity between Grafton and South Grafton CBDs***
 - ***Provides more opportunity and better connectivity for travel and recreational use by cyclists and pedestrians***
 - ***Provides pedestrians with an alternate crossing route (ie. a separate stream) between Grafton and South Grafton as Option C is already located in the same corridor as the existing bridge***
 - ***It was noted that there was not consensus on the scoring difference. It was acknowledged by the group that this topic was very subjective and some participants felt that the difference in scoring could have been less***
- For Criteria *“Provide an effective alternate route during incidents and maintenance events”*:
 - Option C presents a flooding risk with the lowering of the approach road under the Pound Street viaduct
 - Preference for Option C has been noted by Fire and Rescue NSW

- There is a pinch point on Option E (ie Villiers Street and Fitzroy Street intersection) which would require greater traffic management if there was an accident at this intersection. Option E would require fairly substantial traffic controls and traffic management plans compared to Option C if there was an accident at this location. With Option E the network would also be more susceptible to network delays and congestion which would follow a breakdown or crash at this intersection.
- Maintenance work on the existing bridge can be planned and managed better with Option C as it is in an adjacent corridor. With Option E, existing bridge maintenance would require a greater diversion of traffic wishing to cross the river
- ***In summary, the group agreed that Option C was better than Option E on this criteria by a minor amount as it:***
 - o ***Provides better response times in emergency situations (a more efficient route)***
 - o ***Provides a better alternative route for emergency vehicles (considering the Villiers Street and Fitzroy Street pinch point)***
 - o ***Allows simpler management of traffic flows when an incident occurs or when planned maintenance is required on the existing bridge***

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	4	4	4	4	Rank 2
	3	3	3	3	
	2	2	2	2	
	1	1	1	1	
Sub-total	34	176	84	44	338
Option C	4	4	4	4	Rank 1
	3	3	3	3	
	2	2	2	2	
	1	1	1	1	
Sub-total	68	176	112	33	389

Key points raised in discussion during the evaluation process included:

- For Criteria “*Minimise impact on operation of existing business, provide for economic growth & support Grafton as a regional centre*”.

In order to provide some structure to the discussion, this criteria was examined in three components.

Minimise impact on operation of existing businesses:

- Consideration given to existing businesses such as the Quality Inn was discussed. Information available indicated that Option C has less impacts on existing businesses than Option E. Option E impacts on quite large employment generating businesses with more full time equivalent (FTE) owners or employees compared to Option C

Provide for economic growth:

- This component of the criteria was considered to be about the economic growth of the wider Clarence Valley area. Current patterns show that coastal towns (based to the east of Grafton) are being supported by the regional centre. In addition the upgraded highway will move further to the east and therefore it could be assumed that there will be more growth in the vicinity of the new highway (east of Grafton)
- With regards economic growth within Grafton, Option C would reduce traffic flows through South Grafton. Whereas Option E would encourage more traffic flow through this area and provide a greater chance of revitalisation of commercial activity in South Grafton
- Although Option E may provide greater opportunity to revitalise South Grafton and increase economic growth in this area, it may cut into the waterfront precinct and cause conflicts with river activities and the attractiveness of the river. Also Option E would impact the large fig tree at the intersection of Villiers Street and Victoria Street which is a feature of that area
- Consideration was given to the Clarence Valley Masterplan, urban design, gateway experience of Grafton, revitalisation of the CBD and activation of the waterfront precinct. Option C provides an opportunity for industrial growth in the south. However, it was noted this may be fairly limited
- Option C doesn't offer the same degree of connectivity opportunities between CBDs that Option E does

Support Grafton as a regional centre:

- One dimension of this component was seen as access to employment markets, thus connections to growth areas such as Clarenza were viewed as important. However, it was acknowledged that connectivity is addressed as a separate criteria
- Also as mentioned earlier, current patterns show that coastal towns (based to the east of Grafton) are being supported by Grafton as their regional centre. In addition the upgraded highway will move further to the east and therefore it could be assumed that there will be more growth in the vicinity of the new highway (east of Grafton)
- ***In summary, the group agreed that Option C was better than Option E on this criteria by a medium amount as it:***
 - o ***Has a lesser impact on business viability than Option E.***
 - o ***Has potential impacts on fewer full time equivalent (FTE) business owners or employees***
 - o ***Would better provide for economic growth and support Grafton as a regional centre.***
 - o ***Provides a better opportunity for development and growth likely to occur to the east of Grafton, including along the coast***
- For Criteria "*Promote better connectivity either side of the river for social, commercial & industrial users*":
 - Option C favours the existing industrial areas. Some commercial areas are closer to Option E. However, Option C also connects to commercial areas (ie. Bunnings, KFC, McDonalds, etc). It was noted by some participants that access to these commercial areas may also be provided by the existing bridge
 - It was noted that Option C could further disadvantage the existing South Grafton CBD
 - ***After much discussion, the group agreed that Option C and Option E should be rated the same on this criteria because Option E provides better opportunity and some benefits for commercial users (connectivity between Grafton and South Grafton CBD) and it promotes better connectivity directly into South Grafton CBD. However, Option C provides better connectivity to other commercial/industrial areas associated with the Iolanthe Street precinct, as well as to the Pacific Highway commercial area. It was acknowledged by the group that this was a difficult criteria with which to assess the options because of its subjectiveness***
- For Criteria "*Minimise adverse amenity impacts of traffic on residential areas & community facilities (noise, air quality)*":
 - Indicator results indicate that the options are reasonably similar
 - Option C performs better than Option E in terms of noise (ie. increases of more than 12 dB(A) to residential properties)

- It was noted that while Option C appears to go through a greater length of residential area and therefore may have higher amenity impacts on surrounding properties, Option E also has high impacts associated with extra traffic on Cowan Street and the Gwydir Highway back to Bent Street
- Further, Option E has greater impacts on the South Grafton residential area which may be harder to mitigate due to its aging housing stock. Properties affected include properties on the Gwydir Highway between Cowan Street and Bent Street with necessary upgrades and increased traffic potentially leading to property access issues
- Option E would have noise and amenity impacts on community facilities such as the Sisters of Mercy Convent. There was a feeling that increases in noise levels in the Victoria Street area may have a greater impact than increases in noise levels along Pound Street given that Pound Street was already close to major infrastructure (favouring Option C)
- There appears to be no differentiator on the air quality component of amenity
- ***In summary, the group agreed that Option C was better than Option E on this criteria by a minor amount as it:***
 - o ***Performs better than Option E based on the number of residential properties experiencing increases in noise impacts of more than 12 dB(A).***
 - o ***Goes through less residential area which would result in fewer access issues for the remaining properties and creating less impact on amenity than Option C***
- For Criteria “Minimise acquisition of properties – rural, residential, business & community”:
 - ***The group agreed that Option E was better than Option C on this criteria by a minor amount as it:***
 - o ***Has less impacts on residential acquisition than Option C***
 - o ***Has no impact on rural properties***

Evaluation of Options against Natural and Built Environment Assessment 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	4	4	4	4	Rank 1
	3	3	3	3	
	2	2	2	2	
	1	1	1	1	
Sub-total	60	164	116	24	364
Option C	4	4	4	4	Rank 2
	3	3	3	3	
	2	2	2	2	
	1	1	1	1	
Sub-total	96	82	29	18	225

Key points raised in discussion during the evaluation process included:

- For Criteria “Minimise non Aboriginal heritage impacts”:
 - Options E and C impact on similar numbers of non-Aboriginal heritage items and archaeological sites

- The impact of the options on the quality of the heritage conservation area within Grafton and South Grafton is an important consideration. These conservation areas lay on both sides of the river. Option E would traverse through a greater length of heritage conservation area, particularly in South Grafton
- Option E impacts on the large fig tree on the corner of Villiers Street and Victoria Street. The fig tree is considered of high importance by the community (being a large, old tree) and is noted in many of Council’s documents including the River Masterplan
- Also the entry of Option E into Villiers Street comes into the most important heritage area in Grafton, an important iconic area with prominent landmarks (post office, court house, cathedral, etc) as well as some of its most iconic streets. Clarence Valley Council believes this precinct is the most intact heritage precinct within Grafton, which makes a major contribution to the heritage character of the town
- Community feedback related to this criteria focussed on the impacts to the Convent (affected by Option E), 36 Villiers Street (affected by both options), the corner fig tree (affected by Option E) and the visual impact of Option C on the existing bridge
- Option E introduces more traffic into a conservation area considered quite important to Grafton. Whereas, Option C impacts on individual heritage properties around the northern end of the new bridge location
- Indirect impacts on heritage items were discussed (eg. making the road busier adjacent to a heritage listed item has an indirect affect on that item). Traffic impacts on Villiers Street near the river would be quite substantial as a result of Option E. Option E could also encourage increased traffic (rat running) through Victoria Street
- It was acknowledged that Option E would require the acquisition of fewer residences than Option C, but the impact is potentially greater if the emphasis is placed on the impact to the conservation area “precinct” overall
- There is a need to consider the visual impact of Option C on the existing bridge and the Grafton City Railway Station group which are state listed heritage items. Option C would also require some minor works on the existing bridge
- ***In summary, the group agreed that Option C was better than Option E on this criteria with a magnitude between a medium and minor amount as:***
 - ***Option E has a greater impact on the heritage conservation area and precinct. In particular considering the increased traffic impact through the Villiers and Victoria Street areas. This area is considered more important to Grafton as it is an “older area” with iconic buildings such as the Old Post Office, Cathedral and the Court House. Option E was seen to more fragment this precinct.***
 - ***Option E would have a greater impact on trees contributing to the streetscape and setting of Grafton (ie. the large fig tree on the corner of Villiers and Victoria Streets and removal of more jacaranda trees than Option C)***
- For Criteria “*Maintain the material fabric and character of Grafton (urban landscape, character & streetscape)*”:
 - Option E has less need for viaducts and embankments, it provides a corridor linking Grafton and South Grafton as well as being along an existing road corridor
 - Option E was considered to be a better “fit” into the fabric of the town as it was less disruptive to the town layout and improves connectivity
 - ***In summary, the group agreed that Option E was better than Option C on this criteria by a medium amount as it:***
 - ***Was more compatible with the surrounding built environment as the smaller viaducts and embankments on both sides of the river created a lesser physical and visual barrier***
 - ***Results in less disruption to the existing landscape and street layout, primarily due to the lesser extent and scale of roadworks and intersection upgrades***
 - ***Provides better connectivity between Grafton and South Grafton.***
 - ***However it was acknowledged that Option E did have adverse impacts on the precinct around Victoria Street***

- For Criteria “*Minimise impact on Aboriginal cultural heritage*”:
 - Option C would have potential construction impacts on the Golden Eel site. This was raised during the VM workshop in Grafton. Comments from the LALC referred to the consideration of aesthetic and construction impacts to the Golden Eel site. Correspondence from the LALC identified that Option C is a concern.
 - Option E has a lesser impact on Aboriginal cultural heritage.
 - ***In summary, the group agreed that Option E was better than Option C on this criteria by a major amount as:***
 - ***Option C has the potential for aesthetic and construction impacts relating to the Golden Eel site. It was noted that while the impact from Option C may not be major, there is a strong preference for Option E by the Aboriginal community due to Option E having no impact on Aboriginal cultural heritage***
 - ***It was noted that if Option C was identified as the preferred option, it would need to include measures to ensure that the Golden Eel site was not impacted during construction and that operational aesthetic/visual impacts were minimised.***
- For Criteria “*Minimise ecological impacts (EEC, fauna, flora, aquatic, etc)*”:
 - The information presented indicated that Option E would be slightly better in terms of ecological impacts. However, this would be by a small margin as both options have impacts on various fauna and flora communities (albeit minor)
 - ***In summary, the group agreed that Option E was better than Option C on this criteria by a minor amount as it:***
 - ***Would potentially impact on a lesser area of Ecologically Endangered Community (EEC)***
 - ***Would potentially impact on a lesser area of other vegetation and habitat***

Discussion and Assessment of Additional Considerations

The group discussed and assessed the other considerations (additional to the assessment criteria) which may be relevant to the comparative assessment of Options E & C that were identified earlier. A summary of discussion and conclusions drawn appear below.

- Staging costs of the options:
 - In terms of cost, the strategic cost estimate of Stage 1 for Option E is approximately \$146M and Option C is \$161M. Option E is slightly better on this consideration (but not by much)
 - Some discussion took place as to whether the cost difference was substantial at this stage of project development. Also the question remains whether Option E or Option C is the better option in the longer term and whether a cheaper Stage 1 option would have an impact on the overall long term investment decision
- Minimising navigation restrictions on river users:
 - The difference between the two options against this consideration was seen to be minor
 - Discussion focussed on where river front activities for the centre of Grafton took place. This was seen to be between the Prince and Villiers Street area. The view was that Option C should be favoured based on this consideration as it would not limit or restrict any possible or potential future use of the Villiers and Prince Street riverfront precinct whereas Option E might
- Maintaining the relationship of the town to the river (view of the river):
 - Option E as it stands alone and away from the existing bridge is favoured against this consideration by urban planners in the investigation reports
 - However there appears to be differing views particularly within the community. Some believe that Option E may restrict future potential use of the riverfront in the more popular area between Prince Street and Villiers Street
- Maintaining the visual experience to the existing bridge (to and from the bridge):
 - Option E maintains the visual experience to the existing bridge as it stands alone and away from the existing bridge.
 - Option C impacts on views downstream of the existing bridge
 - Option E would provide new views of the existing bridge and could be designed to have its own visual experience

- Environmental impact of the levee upgrade:
 - Option E was favoured against this consideration. However it was not seen as a substantial difference
- Ease of constructability (ie. safety, impact on neighbours, constraints, time taken, etc)
 - Option C has more space for construction on the South Grafton side which would make construction easier and have less impact on neighbours. However it would have flatter grades (bridge deck drainage would be more difficult) and more embankment work required than Option E. It is also nearer to some sensitive sites which will require considerable care particularly during construction
 - Option E would be constructed in a more brownfield (constrained and restrictive) environment along existing road corridors with many neighbours and may take longer to complete

As a result of these discussions, the group believed that although some of the considerations favoured one or other of the options, none would sway the ultimate recommendation of a preferred option.

A number of the issues identified would need to be considered as part of the project risk management and construction planning processes as the project proceeds.

Summary of Option Evaluation

A summary of the rankings of the options against the various assessment themes/categories together with the strategic capital cost estimates and benefit cost ratios (BCR) appears below in **Table 1 - Value Matrix**.

It should be noted that in determining the rankings for the various assessment themes/categories, the differences in score between Options E & C in each case was considered substantial within the sensitivity of the assessment tool adopted.

Also it should be noted that in terms of the strategic capital cost estimates, although different, were considered not substantially different at this stage of project development.

Rank	Functional	Socio Economic	Environmental	Capital Cost	BCR
1	Options C (360)	Options C (389)	Options E (364)	Option E & C (\$215M, \$231M)	Options E & C (1.6)
2	Options E (258)	Options E (338)	Options C (225)		

Table 1: Value Matrix

Sensitivity Test

To provide further refinement, a sensitivity test was considered to determine if the recommendation would change should the group consider any of the categories/themes to be of greater importance in terms of meeting the objectives within the project's context and setting, and how the options performed within that particular category.

Each of the RMS workshop participants (charged with making the recommendation of the preferred option) was requested to share their opinion of how they might weight the various categories/themes of criteria (ie. functional criteria, socio economic criteria and natural and built environment criteria) in terms of the project's context and setting in meeting its objectives.

These were collated and it became apparent that the group as a whole considered that the functional criteria was twice as important as the socio economic and natural and built environment criteria (which were rated equally) within the project's context and setting.

With this in mind (as a sensitivity test) and with the Value Matrix (above) as well as other discussion throughout the workshop, the group was now in a position to make a recommendation as to their preferred option to progress the project.

Recommending a Preferred Option

As a result of the work undertaken above, each of the RMS workshop participants (charged with making the recommendation of the preferred option) was asked “Which option should be recommended as the preferred option to move forward to progress the project” as well as the reasons why. However, the preference is “subject to” the issues identified being addressed.

The recommendation was unanimous that Option C should be the preferred option to move forward. A summary of their reasons and issues to be addressed are outlined below.

We recommend Option C as the preferred option to progress the project

Because:

- On balance, it presents greater overall value to the community, in particular addressing long term connectivity, providing for economic growth and supporting Grafton as a regional centre, without presenting unmanageable impacts or risks
- It best meets the project objectives
- It provides better transport efficiency improvements over the whole of the road network for both the short and long term, including for road freight movements, as it:
 - Better supports the distribution of traffic flows between the eastern and western sides of South Grafton, especially traffic travelling to and from the south-east as it is located east of the existing bridge and provides better access to the Pacific Highway to the north and south and to Clarenza. Option C also provides good access to Armidale Road
 - Provides a better road hierarchy as it provides a parallel road network with improved redundancy
 - Avoids channelling traffic flows from both crossings into the junction of Fitzroy and Villiers Streets
 - Provides a better opportunity for traffic to travel around the edge of the Grafton CBD by directing traffic to the intersection of Villiers and Pound Streets
- It performs well in the other areas of the functional assessment criteria
- It provides better outcomes in the socio economic area including its ability to better support Grafton as a regional centre, it has less impacts to businesses and minimises noise impacts
- It performs better than Option E in terms of non-Aboriginal heritage because Option E has impacts on the important and intact heritage precinct around Villiers Street and Victoria Streets
- It performs comparatively to Option E in terms of capital cost and BCR at this stage of project development

Subject to:

- Managing the potential risks and impacts on Aboriginal cultural heritage (particularly the Golden Eel site). If identified as the preferred option, Option C would need to include measures to ensure that the Golden Eel site was not impacted on during construction and that operational aesthetic/visual impacts were minimised. This will require close ongoing consultation with the Aboriginal community (with respect to Aboriginal cultural heritage issues)
- Careful consideration and management of potential impacts on state heritage listed items and other non-Aboriginal heritage items including archaeological sites
- Minimising the identified impacts on the urban design and the landscape character of Grafton
- Identifying ways to promote pedestrian and cyclist connectivity to South Grafton
- Investigation of contaminated land at the old railway site south of the Grafton River
- Minimising traffic noise and ecological impacts
- Undertaking detailed environmental impact assessment and, following any decision or approval to proceed, development of appropriate management plans (construction and ongoing operational plans) to avoid, manage and mitigate potential impacts

Conclusion Drawn

As a result of their deliberations, other conclusions drawn by the group were:

- It has been a difficult exercise to recommend the preferred option. There was no easy, clear cut option that would address all the issues raised. All the options assessed had their advantages and disadvantages and met the criteria to varying degrees
- It needed three workshops and required qualitative judgement using quantitative information as well as the need to balance various views and aspects of the project, and the options being assessed. However the process used was transparent, explainable and justifiable
- The group had a large amount of good information to draw from in order to reach conclusions
- The process demonstrated a consistency of outcome in each workshop and the group had the benefit of building and refining their assessment based on the information gathered and assessed at the previous workshops in order to reach its conclusions

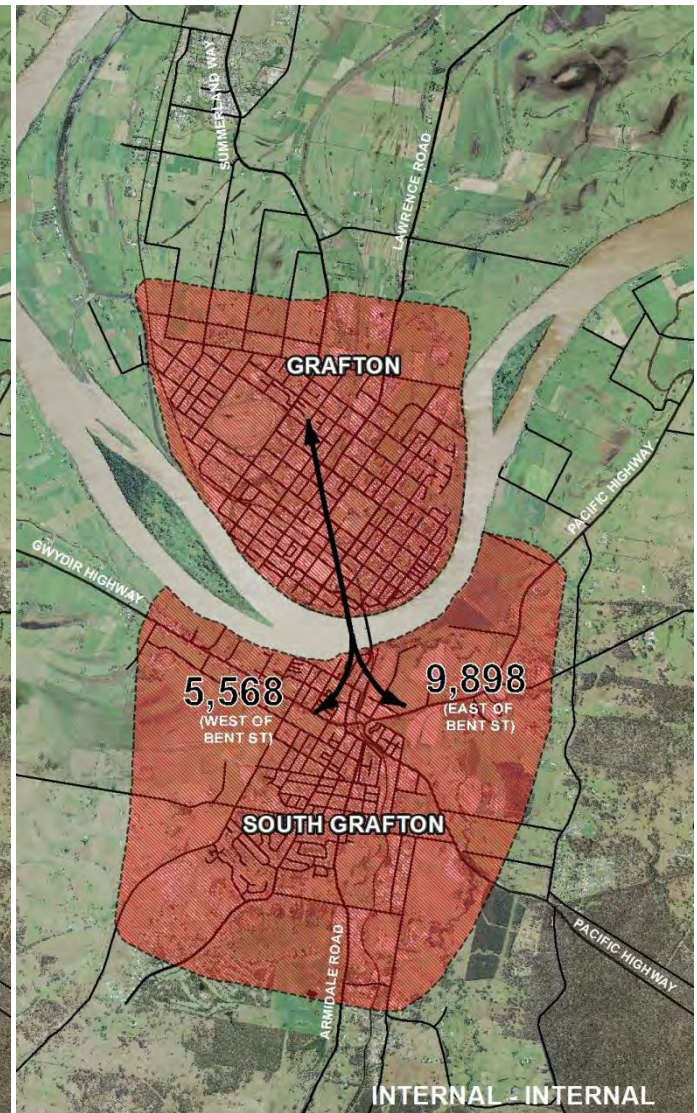
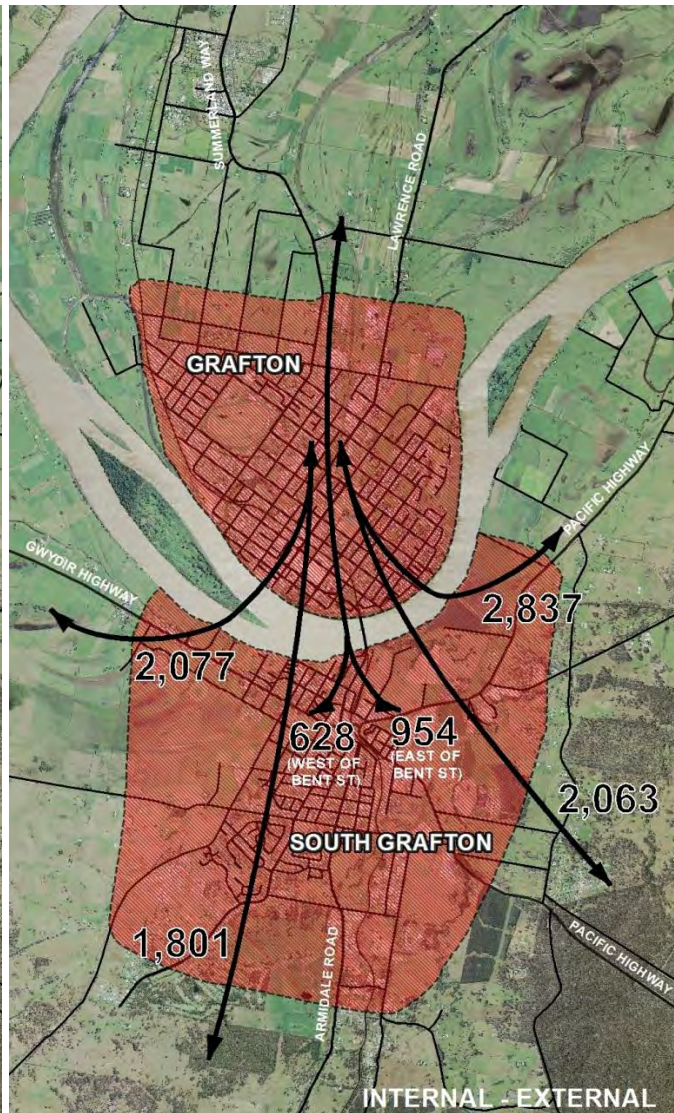
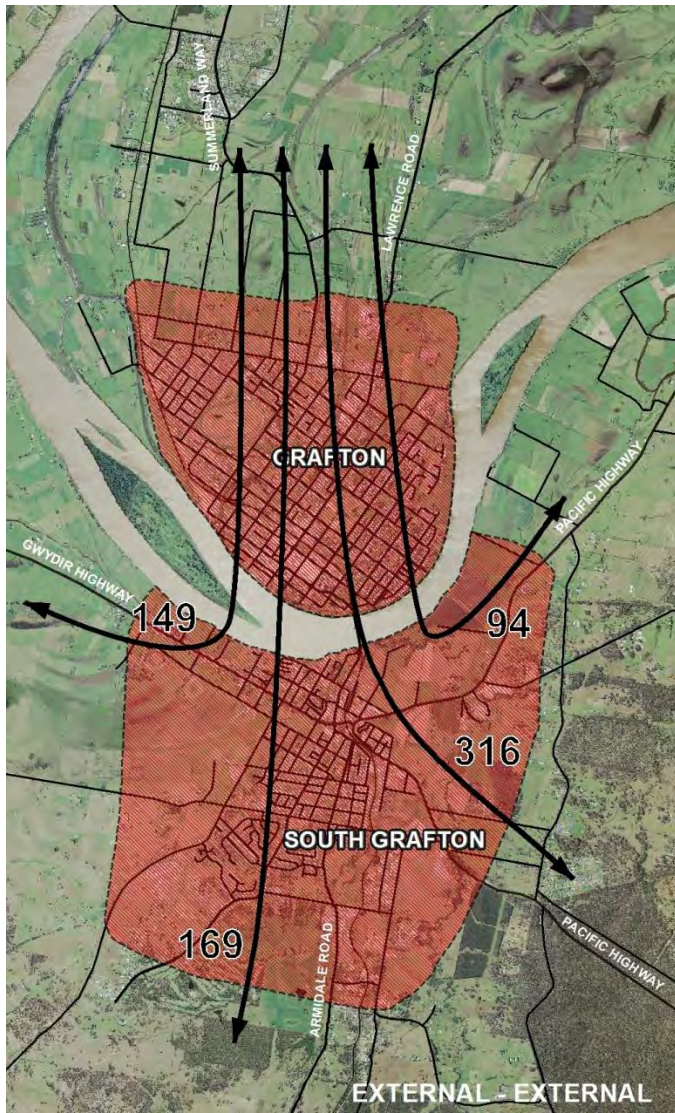
Where to from Here?

The next steps in the process to move the project forward were highlighted as:

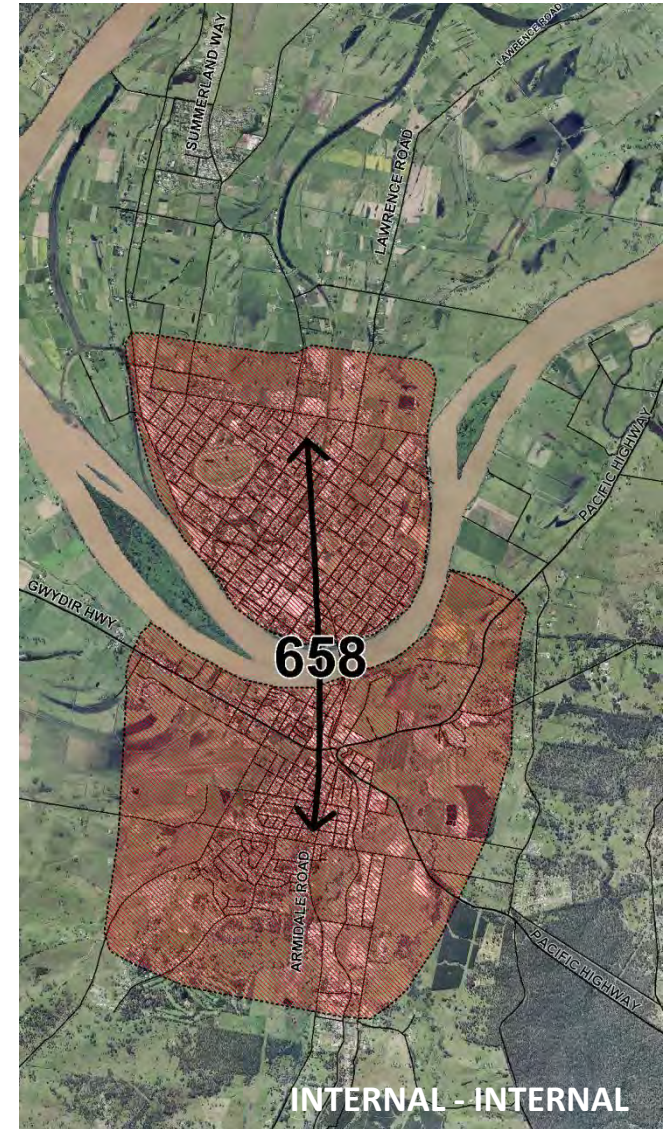
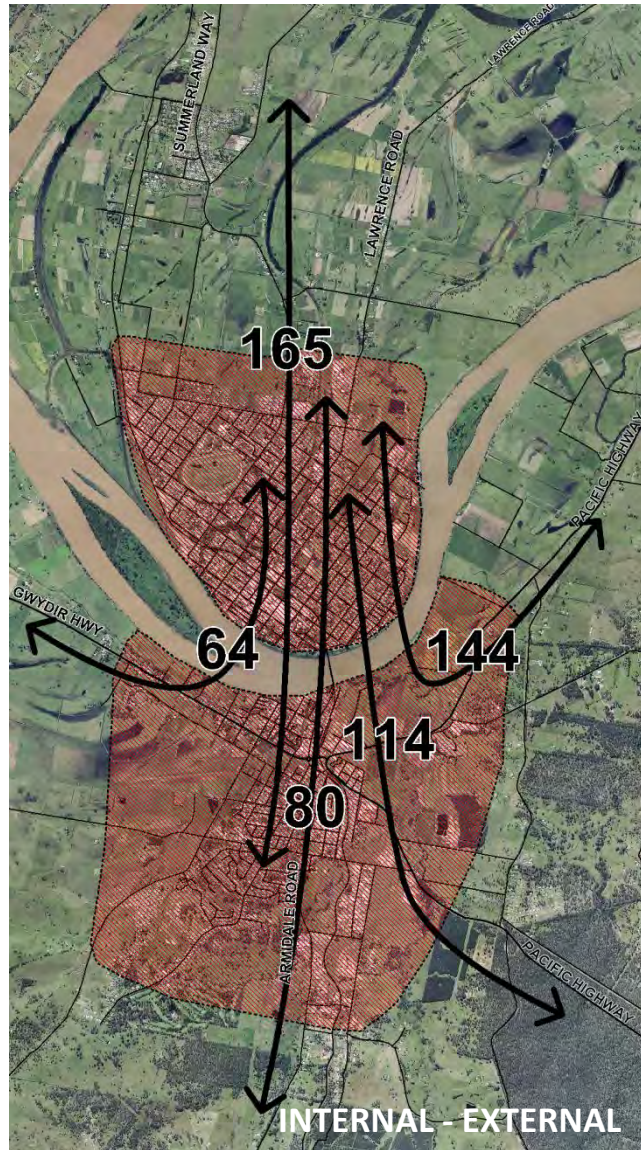
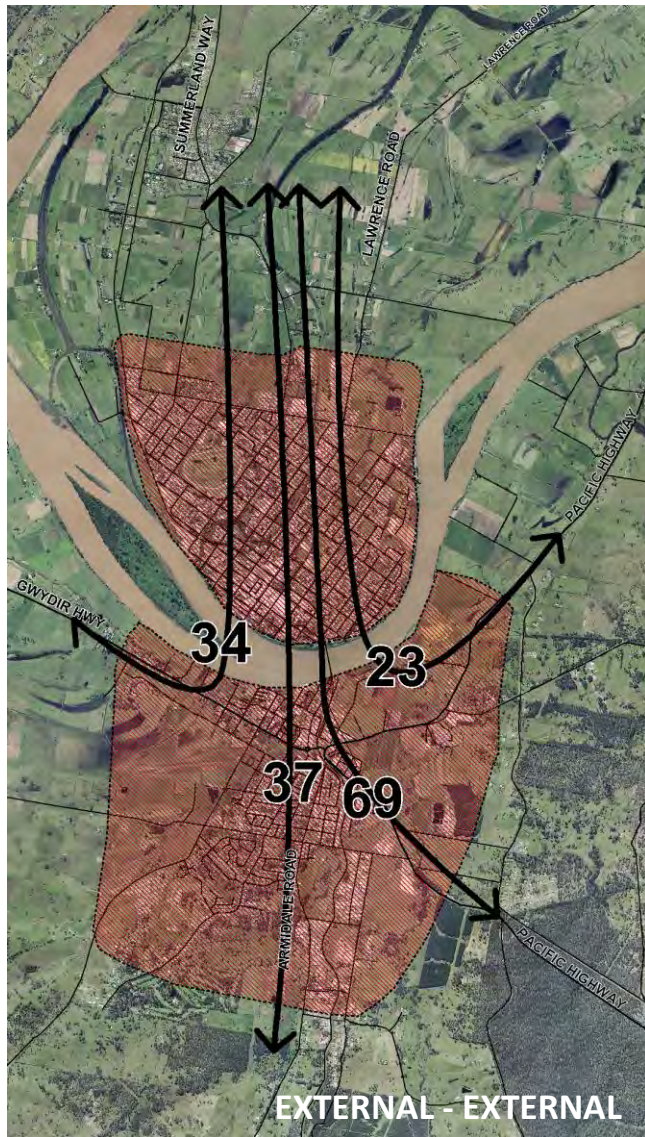
- The outcomes of the three workshops and the process to determine the recommended preferred option will be reported within RMS and government
- RMS will go through their internal reporting mechanism including a Major Project Review Committee (MPRC) presentation and approval processes
- Liaison will take place with the Minister and the NSW Government
- Upon approval, the project team will prepare information and explanations for release to the public of the preferred option
- The recommended preferred option will be displayed for community comment
- Submissions from the display of the recommended preferred option will be considered before a final decision is made on the preferred option
- The corridor for preferred option will be preserved

Appendix 3. Packaged Information (by the Arup Project Team) related to Assessment Criteria

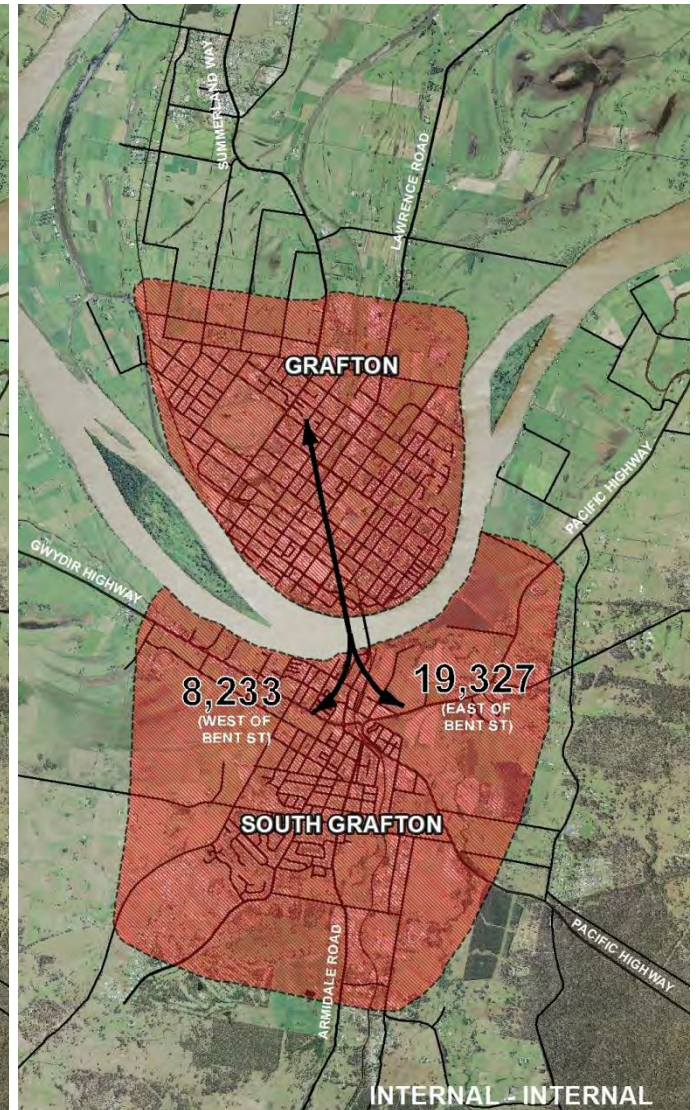
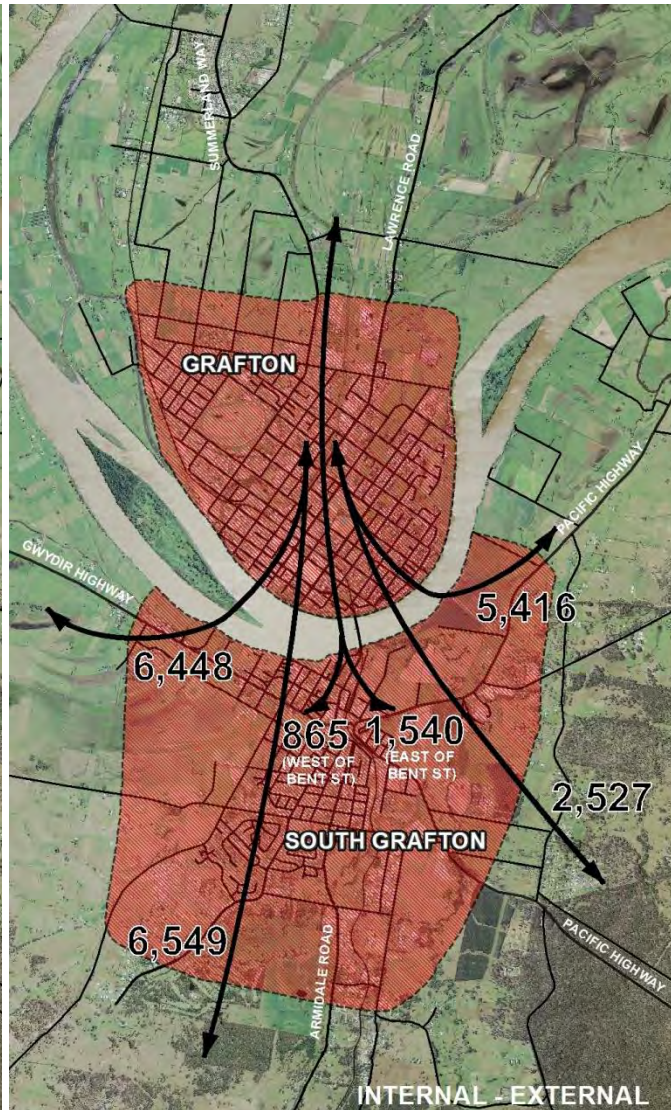
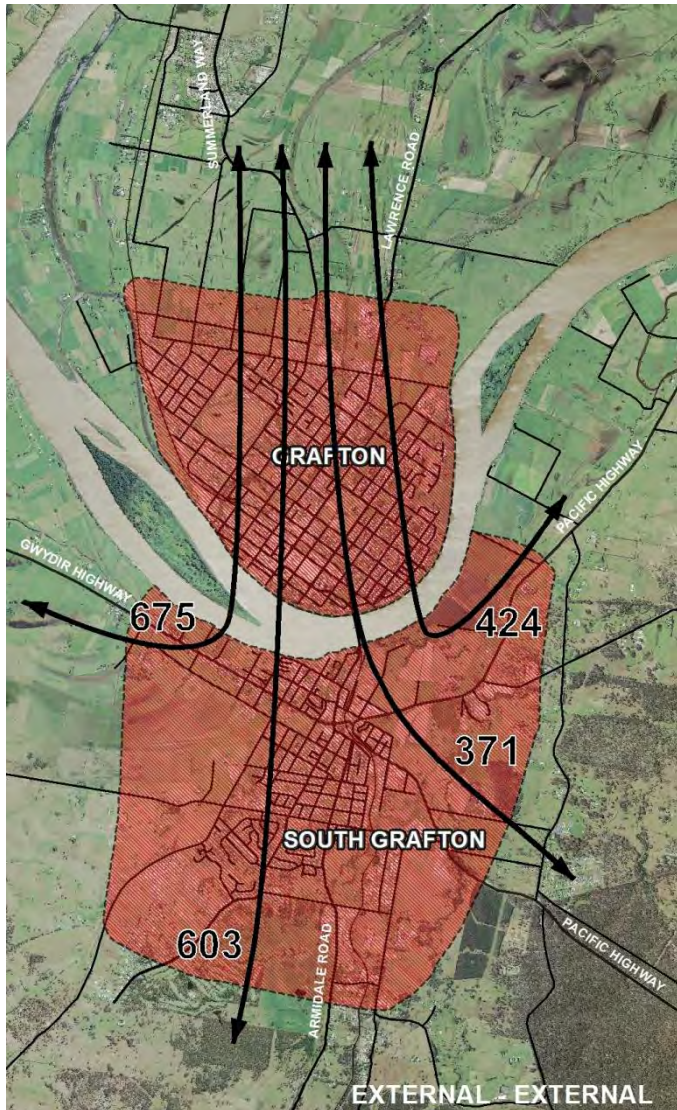
Existing 2010 Daily Traffic Volumes – TOTAL VEHICLES (from GTA HV Study OD Survey – 5am to 7pm)



Existing 2010 Daily Traffic Volumes – HEAVY VEHICLES (from GTA HV Study OD Survey – 5am to 7pm)



2049 Daily Cross River Volumes – All Vehicles (5am to 7pm)



LEGEND

- Locations where indicators are used more than once
- Additional information provided by the Project Team for the Second Option Assessment Workshop held on 12 November 2012. This interpretive information is based on information in the RODR and Technical Papers.
- * Corrected from RODR

Grading based on Landscape and Urban Character Technical Paper

- Strongly agree
- Agree
- Neutral/no change
- Disagree
- Strongly disagree

FUNCTIONAL - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator		E	C	
Improve the overall efficiency of the road network including AM and PM peaks	Total time travelled by all vehicles across the modelled road network	At the year of opening (2019) (million hrs per year)	'Do minimum' 2.37	1.91	1.89
		20 years after opening (2039) (million hrs per year)		2.99	2.96
	Total distance travelled by all vehicles across the modelled road network	At the year of opening (2019) (million km per year)	'Do Minimum' 95.56	94.63	95.14
		20 years after opening (2039) (million km per year)		145.85	146.88
	Average travel time between Grafton and South Grafton using the existing bridge, 30 years after opening (2049)	Morning (AM) peak period, northbound (minutes)		7	7
		Afternoon (PM) peak period, southbound (minutes)		7	6
	AM Peak 2049 (8-9am)	Average kilometres per vehicle (km/veh)		3.3	3.4
		Average travel time per vehicle (min/veh)		4.5	4.8
		Average speed (km/hr)		43.7	42.5
	PM Peak 2049 (4-5pm)	Average kilometres per vehicle (km/veh)		3.1	3.2
		Average travel time per vehicle (min/veh)		4.2	4
		Average speed (km/hr)		44.5	47.6
	Public transport	Ability to improve connectivity and connection opportunities for local traffic and public transport <i>Also under Socio-Economic criteria "Promote better connectivity either side of the river for social, commercial and</i>		Strongly agree (++) - Strong connections for local traffic and public transport as it provides a direct crossing for local trips close to the two town centres with some separation from the existing bridge crossing. Trips from the new release areas of Waterview Heights would benefit from this option.	Agree (+) - Good connections for local traffic and public transport although it is more removed from the town centres.
Enhance safety for all road users (pedestrians, cyclists, vehicles, etc)	Issues identified by the road safety audit	High priority (No.)	2	1	
		Medium priority (No.)	9	10	
		Low priority (No.)	7	4	
	Main areas where options are perceived as less safe:		- More traffic directed through centre of Grafton than with Option C - Existing safety issues at Gwydir/ Pacific/ Spring/ Iolanthe not resolved	- Constriction with narrow shoulders under railway viaduct on Pound St	
Issues related to pedestrians and cyclists identified by the road safety audit (No.)		4*	4		
Optimise the efficiency of road freight movement	Travel distance between the Pacific Highway and the Summerland Way using the new bridge (km)		9.1	8.4	
	Average travel time between the Pacific Highway and the Summerland Way using the new bridge, 30 years after opening (2049) (minutes)	Morning (AM) peak period, northbound (minutes)	15	13	
		Afternoon (PM) peak period, southbound (minutes)	12	10	
	Total time travelled by heavy vehicles across the modelled road network	At the year of opening (2019) (million hrs per year)	'Do minimum' 0.041	0.035	0.033
		20 years after opening (2039) (million hrs per year)		0.053	0.05
	Total distance travelled by heavy vehicles across the modelled road network	At the year of opening (2019) (million km per year)	'Do minimum' 1.86	1.83	1.77
20 years after opening (2039) (million km per year)			2.73	2.62	
Improve bicycle and pedestrian linkages	Urban connectivity	Ability to improve connectivity and connection opportunities for pedestrian and cycle networks	Strongly agree (++) – Creates new and stronger connections for pedestrians and cyclists being more direct and creating a circular network between the bridges.	Disagree (-) – Connections are not improved, more removed from the town centres and the shared path would have poor amenity in the industrial area in South Grafton.	
		Ability to improve connectivity to existing and proposed riverfront public recreation spaces <i>Also under Socio-Economic criteria "Promote better connectivity either side of the river for social, commercial and industrial users" and "Maintain the relationship of the town to the river eg views and river users"</i>	Strongly agree (++) – Provides improved access to both existing and proposed riverfront recreation spaces by creating a circular path system between Grafton and South Grafton.	Disagree (-) – Does not provide new or additional access to riverfront recreation spaces nor does it encourage new opportunities along the foreshores.	

FUNCTIONAL - Indicators from RODR & Technical Papers - Sept 2012			
VMW Criteria	Indicator	E	C
Improve bicycle and pedestrian linkages	Potential impacts of an additional crossing of the Clarence River on the <i>Bike Plan and Pedestrian Access and Mobility Plan (CVC and QED, 2008)</i> GRAFTON PRIMARY: (1) Prince Street, north side of Oliver Street to the Clarence River; (2) East-west running streets that intersect with the Prince Street section of the primary destination zone, from roughly half way to Queen Street in the west to Duke Street in the east; (3) Pound Street, from above section west to Queen Street; (4) Duke Street, Pound Street to Fitzroy Street; (4) King Street SECONDARY (1) Victoria Street, Duke Street to Villiers Street, south side; (2) Victoria Street, Queen Street to primary destination zone, north side; (3) Queen Street, Bacon Street to Fitzroy Street, east side; (4) Fitzroy Street/ Craig Street, Duke Street to Clarence Street, north side; (5) Fitzroy Street, primary destination zone to Queen Street, both sides; (6) Pound Street, primary destination zone to Villiers Street, south side; (7) Duke Street, Victoria Street to Fitzroy Street, west side; (8) Schools near the primary destination zone; (9) Other school and land use frontages) SOUTH GRAFTON PRIMARY: (1) Skinner Street commercial area; (2) Bent Street commercial area. SECONDARY (1) Areas framing the primary destination zones; (2) School frontages and other land uses	Would provide direct connection to/from Grafton and South Grafton primary (the most frequent destinations – or combination of destinations located in a single area – for both walking and cycling trips) and secondary (individual land uses and smaller groupings of pedestrian activity and interaction areas, having lower pedestrian and cyclist generation rates associated with them than for primary destination zones. There is a likelihood of at least children cycling on footpaths) destination zones defined by the plan	Would provide direct connection to Grafton primary and secondary destination zones but no direct connection to South Grafton primary destination zones. Would connect to very few South Grafton secondary destination zones as defined by the plan.
	Potential impacts of an additional crossing of the Clarence River on the <i>Clarenza Cycleway Options Study (CVC, 2012)</i>	Would not provide direct benefit to the proposed Clarenza cycleway	Would link to the proposed Clarenza cycleway and provide a shorter connection between McAuley Catholic College (Clarenza) and Grafton.
	Potential impacts of an additional crossing of the Clarence River on the <i>South Grafton Heights Precinct - A Strategy for the Future (CVC, 2007)</i>	Would provide a more direct connection between the proposed South Grafton Heights Precinct and Grafton	Would not connect the proposed South Grafton Heights Precinct with Grafton
Provide an effective alternate route during incidents and maintenance events	Flooding emergency response considerations	- Uses current evacuation routes. - No contingency if Grafton CBD evacuation routes are inundated or affected by a crash or congestion.	- Uses current evacuation routes. - No contingency if Grafton CBD evacuation routes are inundated or affected by a crash or congestion. - Access to new bridge may be compromised earlier than in other options.
	Emergency response to incidents	Very unlikely that any one incident (other than flooding) would block access to both bridges, since even a major incident at the intersection of Fitzroy/Villiers would still allow access to and from the existing bridge via Clarence St, and to and from the new bridge via Victoria St. In this respect there would be little if any additional risk with Option E than there would be for any of the other options including Option C. However, Option E would be more susceptible to network delays and congestion caused by a breakdown or crash at this intersection. Measures that might be considered to reduce any perceived risk could include: • developing an incident response plan for closure of the Villiers/Fitzroy intersection that would direct traffic on and off the bridge relatively efficiently, for example by introducing one-way flow on Victoria St with one direction off the bridge and one direction onto the bridge. • amending the design at the intersection of Victoria St and Villiers St to allow use by heavy vehicles in an emergency. • constructing the new roundabout at the intersection of Bent St and Clarence St as part of Stage 1 to avoid any restrictions associated with the existing left-in/left-out arrangement at Bent/Clarence.	Extremely unlikely that any one incident (other than flooding) would block access to both bridges, since the bridge approaches for each bridge are quite separate on both sides of the river.
Minimise navigation restrictions on river users	Navigation restrictions on river users	- Has shorter spans (49m) and may therefore affect river users more (especially skiers). - Affects "Monster Energy Pro Wake Show" area. - Has a minimum maritime clearance for the navigable channel of 9.1m.	- Has longer spans (74m) to match existing bridge. - Affects the Clarence River Sailing Club Course. - Has a minimum maritime clearance for the navigable channel of 9.1m.

ENVIRONMENTAL - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator	E	C	
Minimise non-Aboriginal heritage impacts	Number of non-Aboriginal heritage items and archaeological sites that would potentially be directly impacted to a 'greater extent'.	Items of State heritage significance (No.)	0	0
		Other items (No.)	14	16
	Number of non-Aboriginal heritage items and archaeological sites that would potentially be directly impacted to a 'lesser extent'.	Items of State heritage significance (No.)	0	0
		Other items (No.)	7	8
	Number of non-Aboriginal heritage items and archaeological sites that would potentially be indirectly impacted.	Items of State heritage significance (No.)	1	1
		Other items (No.)	24	31
	Contribution of trees as heritage items as well as their collective effect on streetscape and setting (No.)	Fig (No.)	15	8
		Jacaranda (No.)	84	58
		Flame tree (No.)	5	3
		Other significant plantings, not listed (No.)	12	7
		TOTAL	116	76
	Contribution of trees as heritage items as well as their collective effect on streetscape and setting (No.)	Avenues of trees, listed (No.)	1	1*
Avenues of trees, not listed (No.)		1	5*	
Potential impact on (non-Aboriginal) heritage conservation area (m)		4280	3150	
Maintain the material fabric and character of Grafton (Urban landscape, character and streetscape)	Compatibility with the surrounding built environment	Ability to utilise the existing topography and landforms wherever possible to reduce the need to artificially elevate the approach roads	Agree (+) - Minimal need for viaducts and artificially elevated roadways.	Disagree (-) - A major requirement for viaducts and artificially elevated roadways on both sides of the River.
		Ability to minimise the potential visual and physical barrier effect of the approach roads by maintaining cross connections for local traffic, transport, cyclists and pedestrians	Agree (+) - Results in minimal physical barriers which would impact some cross connections for vehicular traffic on both sides of the River.	Disagree (-) - Creation of physical barriers that would impact cross connections mostly on the northern foreshore in Grafton.
	Integrity of existing landscape and street pattern	Ability to minimise the street scale and form of the new bridge approach roads	Disagree (-) – Widening of streets on both sides of the river will impact on street scale and form.	Strongly disagree (--) – Widening of streets on both sides of the river will impact on street scale and form in particular on Pound St and on Iolanthe St.
		Ability to retain the existing landscape character of the area, including minimising the removal of trees	Disagree (-) – Moderate impacts on the existing landscape particularly along Villiers Street including the removal of some large Fig Trees.	Strongly disagree (--) – Substantial impacts on the existing landscape character on both sides of the river particularly the Greave and Pound Street area.
		Ability to minimise the size of intersections between the approach roads and the existing local roads	Disagree (-) – Some widening of a range of intersections will occur on both sides of the river particularly on Villiers St.	Disagree (-) – Requires large scale intersections on the approach roads on both sides of the river particularly on Iolanthe St and Pound St.
		Ability to generally maintain existing urban patterns and integrate the geometry of any new approach roads within the existing road reserves	Agree (+) – Consistent with the existing street pattern in Grafton, and generally supports the physical and visual experience of the historical street grid. A short section of approach road (265 m) in South Grafton is not aligned with the street grid.	Disagree (-) – Urban patterns on both sides of the river are not maintained as neither approach road is aligned with existing road reserves. The northern approach road has a major impact on developed land and structures cutting diagonally across the existing urban form.
	Continued urban development	Ability to minimise the effects of fragmentation on neighbourhoods or precinct areas	Agree (+) - Does not result in the fragmentation of the existing patterns of urban settlement.	Strongly disagree (--) - Results in some fragmentation of the existing residential neighbourhoods in Grafton.
		Ability to minimise the creation of new main street environments and strip development that does not support or connect to the town centres of Grafton and South Grafton	Agree (+) – Provides additional access along the existing commercial corridor between the town centres on both sides of the river.	Disagree (-) – Increases potential for new strip development to occur that will detract from the two town centres.
		Also under Socio-Economic criteria "Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre"		
	Changes to access and disruption to community activities or plans	Disruption of access to high density of community facilities and residences particularly around Villiers St and Victoria St.	Localised disruption to access and community activities.	

ENVIRONMENTAL - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator	E	C	
Maintain the visual experience of the existing bridge (to and from the bridge)	Visual integrity of the existing bridge in its setting	Ability to maintain important and recognisable views from and to the existing and new bridges of Grafton and South Grafton <i>Also under Socio-Economic criteria "Maintain the relationship of the town to the river eg views and river users"</i>	Agree (+) – Maintains the visual integrity of the existing bridge and can be designed to enhance views from a potentially upgraded foreshores and from the new bridge.	Strongly disagree (--) – Substantially impacts on views to, and visual character of, the existing bridge. Views through the bridge will also be heavily impacted.
		Ability of the new bridge to have a complementary scale and form, particularly related to aligning the new bridge deck with the lower (railway) deck of the existing bridge, that still allows the existing bridge to take visual precedence	Neutral/no change (=) - Can be designed to have scale and form that compliments existing bridge, and is far enough away to allow existing bridge to take visual precedence and be seen from the new bridge.	Strongly disagree (--) - Scale and form does not compliment existing bridge, height of the new bridge will be located across the middle of the existing bridge between the rail deck and road deck.
		Ability of the new bridge to have an independent visual expression (form and scale) from the existing bridge and the potential to become a landmark in its own right	Agree (+) - Distance from existing bridge provides the potential for the new bridge to have its own visual expression and be designed as a complimentary landmark.	Disagree (-) – Close proximity does not allow the new bridge to have its own visual expression.
Minimise impact on Aboriginal cultural heritage	Impact on known Aboriginal cultural heritage	Nil	Impact on the aesthetic value of the Golden Eel site which is in close proximity to the option. Measures would need to be taken during construction to protect the site.	
	Number of known Aboriginal archaeological sites potentially impacted	Nil	Nil - Golden Eel Site is in close proximity to the option and measures will need to be taken during construction to protect the site	
	Length through areas of high Aboriginal archaeological potential (m)	0	170	
Minimise ecological impacts - (EEC, Fauna, Flora, Aquatic, etc)	Potential direct impact on known threatened flora species	Nil	Nil	
	Potential direct impact on identified endangered ecological communities (EEC) (m ²)	Reedlands – freshwater wetlands on coastal floodplain (m ²)	100	600
		Drainage soak – potential freshwater wetlands on coastal	0	0
		Drainage soak - freshwater wetlands on coastal floodplain (m ²)	0	0
		Degraded riparian forest - sub-tropical coastal floodplain forest	0	150
		Remnant eucalypts - sub-tropical coastal floodplain forest (m ²)	0	700
		TOTAL EEC (m²)	100	1450
	Potential direct impact on other vegetation and habitat (m ²)	Native and exotic plantings (m ²)	30000	32000
		Planted figs (m ²)	900	0
		Native revegetation (Induna Reserve) (m ²)	0	0
		Weeds and exotics (m ²)	0	850
		Constructed drainage line with native and exotic vegetation (m ²)	0	0
	TOTAL OTHER (m²)	30900	32850	
	Potential direct impact on known habitat for threatened fauna species	Adjacent grey-headed flying-fox maternity roost	Breeding (Susan Island)	Nil
		20+ grey-headed flying-foxes foraging in figs	Foraging (figs)	Nil
Cattle egret breeding colony		Nil	Nil	
Little bentwing-bat		Nil	Roosting (under bridge)	
Eastern bentwing-bat		Nil	Roosting (under bridge)	
Eastern freetail bat		Nil	Foraging (riparian zone)	
Southern myotis	Nil	Foraging (riparian zone)		
Minimise the surface/ground water impacts	Potential acid sulphate soils and contaminated land	Option E bridge approach on south side passes through about 200m of Potential Acid Sulphate Soils (PASS).	Option C Pacific Highway realignment passes through about 600m of PASS . Option C passes through an area where remediation and management may be required for site to be suitable for on-going commercial/industrial use due to potential presence of metals and Total Petroleum Hydrocarbons (TPH).	

OTHER INDICATORS WITH NO ASSOCIATED CRITERIA

	Maximum Clarence River afflux upstream of option in a 20-year ARI flood event with levee upgrades in place (m)	0.03	0.05
	Length of levees upstream that would need to be upgraded for a 20-year ARI flood event (km)	11.75	18.10

SOCIO-ECONOMIC - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator	E	C	
Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre	Potential to contribute to tourism <i>Also under Socio-economic criteria "Maintain the relationship of the town to the river eg views and river users"</i>	Strong potential to integrate with several local strategies and provides stronger link with waterfront	Moderate potential as option enters Grafton near CBD	
	Number of businesses with potential impacts on business viability	Number of businesses with potential impacts on business viability (No.) <i>Also under Socio-economic criteria "Minimise acquisition of properties - rural, residential, business & community"</i>	5 Country Road Nursery Palroz Pty Ltd - Cetnaj Lighting Centrel Pty Ltd - BP Station EJ&MM Pty Ltd - Quality Inn Wynstan Blinds and Doors	2 Country Road Nursery Wynstan Blinds and Doors
		Number of full time equivalents (FTE) business owners or employees (No.)	34.5	4
	Area of regionally significant farmland potentially directly affected (ha) <i>Also under Socio-economic criteria "Minimise acquisition of properties - rural, residential, business & community"</i>	0	3.4	
	Continued urban development	Ability to be integrated with or support future development and revitalisation of existing areas (retail, commercial, industrial, recreation, education, etc)	Strongly agree (++) – Potential to improve future development and revitalisation in existing areas, and has the potential to encourage new economic development and connections between existing town centres.	Agree (+) – Potential to support industrial area in South Grafton.
		Ability to minimise the creation of new main street environments and strip development that does not support or connect to the town centres of Grafton and South Grafton <i>Also under Environmental criteria "Maintain the material fabric and character of Grafton (Urban landscape, character and streetscape)"</i>	Agree (+) – Provides additional access along the existing commercial corridor between the town centres on both sides of the river.	Disagree (-) – Increases potential for new strip development to occur that will detract from the two town centres.
	Effects on economic growth	More minimal-change scenario. Increased ease of access and passing traffic flows will likely contribute to the revitalisation of South Grafton, particularly retail businesses. Lower rents, revitalisation and increased proximity/ease of access may make the South Grafton CBD a more attractive location for offices and other businesses currently based in Grafton. Some minor economic benefits from better connectivity between South Grafton industrial lands and Grafton CBD.	Likely to stimulate additional development in Iolanthe Street industrial estate, which is not yet fully developed. However Council has predicted a shortage of employment land in Grafton in the future, meaning this will likely be developed under either scenario. Improved connectivity may encourage Council to expand the industrial estate, although this has not previously been considered. This could result in the loss of regionally significant farmland. Option C would divert traffic further away from South Grafton's centre, likely contributing further to its relative economic underdevelopment. Slightly reduced transport times between the South Grafton Industrial Estate and Grafton (including the Summerland Way and Junction Hill) will offer some economic benefits.	
	Impact of traffic on economic viability	- Route in south passes close to Skinner St, South Grafton's commercial precinct	- Route to Grafton from Pacific Hwy does not enter south Grafton, potentially affecting economic viability and/or social environment - Route may divert traffic from established commercial areas reliant on passing business - Route may increase traffic flows past small commercial area on Pound St	

SOCIO-ECONOMIC - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator	E	C
<p>Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre</p>	<p>Potential impacts on highway-orientated businesses</p>	<p>Some diversion of traffic from exiting routes likely to have minor adverse impacts on Bent and Fitzroy Street businesses (includes hotels, fast food restaurants and petrol stations), but potential to stimulate some minor passing trade along the Gwydir Hwy to Cowan St.</p>	<p>Some diversion of traffic from existing routes likely to have minor adverse impacts on Bent and Fitzroy Street businesses, but a cluster of businesses in Pound St (between Clarence and Duke streets) likely to benefit. Businesses located around the intersection of Spring St and the Pacific Hwy (including McDonald's and Hungry Jacks) may be vulnerable to decreased traffic flows as Grafton-bound traffic coming south along the Pacific Hwy exit at the new Through St and Iolanthe St intersection.</p>
	<p>Potential impacts of an additional crossing of the Clarence River on the <i>Clarence River Way Masterplan</i></p>	<ul style="list-style-type: none"> - Option E offers a stronger possibility of integrating with strategies in the Masterplan. - Design of this option may be able to enhance the Grafton waterfront precinct and define river access at Villiers Street, and reorient Grafton towards the river. - Option E aligns closely with the Masterplan's goal of improving Grafton's arrival experience. It would run adjacent to a sports field in South Grafton, and enter Grafton at heritage-rich Villiers Street. It also offers streetscaping possibilities along roads that would be upgraded. - Option E is likely to affect a large fig tree located in Villiers Street, which would have a negative impact on the heritage character of the area. - Care would need to be taken in subsequent stages of the project that this option would not introduce a noisy or visually unappealing feature within the waterfront precinct. 	<ul style="list-style-type: none"> - Option C offers some possibility of integration with the Masterplan. - This option offers some streetscaping/ embellishment possibilities along roads that would be upgraded, Pound and Clarence Street. - Option C also offers the possibility of improving Grafton's arrival experience, through an extended tree-lined approach to the bridge. The entry point at Grafton would not have the heritage appeal of Option E. - This option may reduce public access to the river at Pound Street. This area lies outside the waterfront precinct.
	<p>Potential impacts of an additional crossing of the Clarence River on the Mid North Coast Regional Strategy (DP&I, 2009)</p>	<p>It would better connect with the identified future urban release areas and the proposed employment lands located on the south western end of South Grafton</p>	<p>It would better connect with the identified future urban release area of Clarenza and the proposed employment lands located on the south Eastern end of South Grafton</p>
	<p>Potential impacts of an additional crossing of the Clarence River on the Clarence Valley Settlement Strategy (Grafton Council et al, 1999)</p>	<p>Would better support the revitalisation of South Grafton CBD provided in the Plan</p>	<p>Would not contribute to the South Grafton CBD revitalisation</p>
	<p>Potential impacts of an additional crossing of the Clarence River on the Clarence Valley Settlement Strategy (Grafton Council et al, 1999)</p>	<p>Would encourage further commercial development within the South Grafton boundaries prescribed by the Plan ie. Ryan St, Bent St, Cowan St and the Clarence River.</p>	<p>Would encourage further commercial development outside the South Grafton boundaries prescribed by the Plan ie. Ryan St, Bent St, Cowan St and the Clarence River.</p>
	<p>Potential impacts of an additional crossing of the Clarence River on the Grafton Waterfront Precinct Masterplan (CVC and Clouston Associates, 2011)</p>	<p>Would cross above the Masterplan precinct creating a new element in the landscape of appreciable bulk and scale. It is unlikely it would prevent continuous public access along the foreshore between Clarence St and Queen St.</p>	<p>Would cross outside the Masterplan precinct.</p>
		<p>Would have a greater impact on the public recreational amenity of this stretch of the Clarence river.</p>	<p>Would have a lesser impact on the public recreational amenity of this stretch of the Clarence river.</p>
<p>Potential impacts of an additional crossing of the Clarence River on the South Grafton Heights Precinct - A Strategy for the Future (CVC, 2007)</p>	<p>Would provide a more direct connection between the proposed South Grafton Heights Precinct and Grafton</p>	<p>Would provide a less direct connection to the proposed South Grafton Heights Precinct with Grafton</p>	

SOCIO-ECONOMIC - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator		E	C	
Promote better connectivity either side of the river for social, commercial and industrial users	Level of connectivity to existing and future land uses and development (refer to future land use map)	Existing and future residential areas with the Grafton and South Grafton CBDs	Strong - Creates a more direct link between relatively disadvantaged area of South Grafton and Grafton CBD - Improved connectivity between existing and future residential areas in South Grafton and Waterview Heights, and Grafton - Connects residential areas in parts of South Grafton and the proposed release area of South Grafton Heights, to the Grafton CBD and residential areas in the east of Grafton.	Moderate - Improved connectivity between existing and residential areas and the Grafton and South Grafton CBDs - Would provide better connectivity to the Clarenza growth area and the South Grafton growth area.	
		Existing and future residential areas with existing and future employment areas	Moderate (existing residential and employment areas) - Provides some increased connection between Grafton residential areas and South Grafton Industrial Estate (including proposed Armidale Road and Swallow Road lands) in South Grafton	Moderate (existing residential and employment areas) - Improve levels of connectivity between the Iolanthe St industrial area in South Grafton, and Grafton generally; in particular better connection would be provided to the residential area in the east of Grafton, connecting an established residential area with employment lands. - Provides some increased connection between Grafton residential areas and South Grafton Industrial Estate	
		Grafton and South Grafton CBDs	Strong potential - Helps to define South Grafton CBD and creates stronger, more direct link between the two CBDs - Has the potential to encourage new economic development and connections between existing town centres.	Moderate potential - Provides some increased connectivity between the Grafton and South Grafton CBDs by providing a second crossing in close proximity to town, which will help address traffic congestion	
	Urban Connectivity	Ability to improve connectivity to existing and proposed riverfront public recreation spaces <i>Also under Functional criteria "Improve bicycle and pedestrian linkages" and Socio-Economic criteria "Maintain the relationship of the town to the river eg views and river users"</i>	Strongly agree (++) – Provides improved access to both existing and proposed riverfront recreation spaces by creating a circular path system between Grafton and South Grafton.	Disagree (-) – Does not provide new or additional access to riverfront recreation spaces nor does it encourage new opportunities along the foreshores.	
		Ability to minimise the travel distance and times between town centres for all modes of users.	Strongly agree (++) - Provides improved connectivity between the town centres by creating a more direct connection between the two centres.	Disagree (-) - Does not provide overall improved connectivity between the town centres as it draws traffic movements away for the two town centres.	
		Ability to improve connectivity and connection opportunities for local traffic and public transport <i>Also under Functional criteria "Improve the overall efficiency of the road network including AM and PM peaks"</i>	Strongly agree (++) - Strong connections for local traffic and public transport as it provides a direct crossing for local trips close to the two town centres with some separation from the existing bridge crossing. Trips from the new release areas of Waterview Heights would benefit from this option.	Agree (+) - Good connections for local traffic and public transport although it is more removed from the town centres.	
	Continued urban development	Ability to provide more direct connections for local trips and destinations beyond Grafton and South Grafton town centres	Neutral/no change (=) – Provides direct connections for local trips in the greater Grafton area.	Neutral/no change (=) – Close proximity to existing bridge continues to provide same connections for local trips in the greater Grafton area.	
Minimise adverse amenity impacts of traffic (including heavy vehicles) on residential areas and community facilities (noise, air quality)	Number of residential properties where noise levels exceed 55 dB(A) during the day or 50 dB(A) during the night, at 10 years after opening (2029) (No.)	Day (7am to 10pm) – 55 dB(A) (No.)	'No build' 634	630	616
		Night (10pm to 7am) – 50 dB(A) (No.)	'No build' 468	461	462
	Number of residential properties where noise levels increase by 12 dB or more, at 10 years after opening (2029) (No.)	Day (7am to 10pm) (No.)		12	1
		Night (10pm to 7am) (No.)		11	1
	Number of other sensitive land uses where noise levels exceed the criteria in the NSW Road Noise Policy (NSW OEH, 2011), at 10 years after opening (2029) (No.)	Places of worship, education, childcare and hospitals (No.)		17	17
		Open space (No.)		34	34
	Community Noise Burden (CNB) before the implementation of noise mitigation measures, at 10 years after opening, 2029	Absolute CNB (Number of residential receivers annoyed) Note: Numbers in brackets represent the properties for 'no build' (2029) scenario		192 (203)	191 (203)
		Relative CNB (Number of residential receivers annoyed by change in noise level above 'no build' scenario)		212	212
	Estimated fuel consumption in urban areas during peak hours at 10 years after opening (2029) (L)			7400	7400

SOCIO-ECONOMIC - Indicators from RODR & Technical Papers - Sept 2012

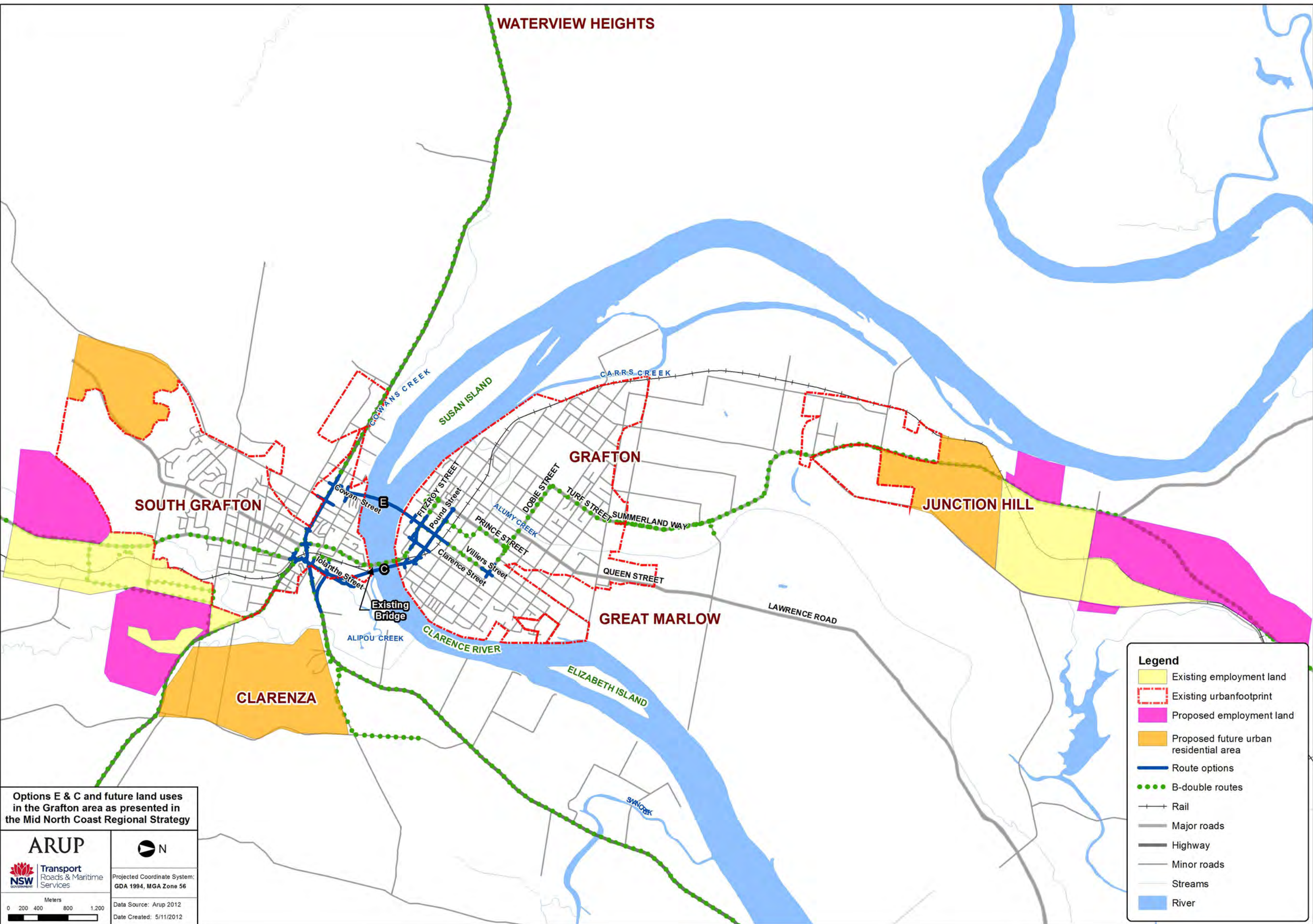
VMW Criteria	Indicator		E	C
Minimise acquisition of properties - rural, residential, business & community	Number of residential properties potentially directly affected	Acquisition likely to impact on residence or other major building (No.)	11	21
		Acquisition unlikely to impact on residence or other major building (No.)	5	3
		TOTAL	16	24
	Number of community facilities potentially directly affected	Clubs/recreation (No.)	1 Grafton Showground	2 Grafton Showground Basmar Hall
		Education (No.)	0	2 North coast Institute TAFE Gummyaney Indigenous Preschool
		River uses (No.)	1 "Monster Energy Pro Wake Show" area	1 Clarence River Sailing Club Course
		Places of worship (No.)	2 St Patrick's Catholic Church St Mary's Catholic Church and Sisters of Mercy Convent	1 St Patrick's Catholic Church
		Government (No.)	0	0
		Services (No.)	2 Grafton Shopping World Gurelgham Pty Ltd/ Aboriginal Legal Services	2 Grafton Shopping World Grafton Tourist Information Centre
		Health and emergency services (No.)	0	0
		Infrastructure (No.)	0	2 Railway infrastructure land next to Basmar Hall South Grafton railway infrastructure
		Parks and reserves (No.)	2 McKittrick Park Public open space at corner of Cowan St and Spring St	2 McKittrick Park McClymont Pl open space
		TOTAL	8	12
	Number and area of rural properties with potential direct impacts	Rural properties (No.)	0	2
		Area (ha)	0	4.5
	Area of regionally significant farmland potentially directly affected (ha)		0	3.4
	Also under Socio-economic criteria "Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre"			
	Number of businesses with potential impacts on business viability (No.)		5 Country Road Nursery Palroz Pty Ltd - Cetnaj Lighting Centrel Pty Ltd - BP Station EJ&MM Pty Ltd - Quality Inn Wynstan Blinds and Doors	2 Country Road Nursery Wynstan Blinds and Doors
	Also under Socio-economic criteria "Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre"			
	Number of businesses with potential minor impacts (No.)		2 KFC B&F Industries	2 KFC B&F Industries
	Distributional equity of social impacts and impact on housing affordability		- Impact on housing affordability as relatively high number of affected houses are in South Grafton where there are higher levels of disadvantage. - Provides improved access to Grafton from disadvantaged area of South Grafton.	- Affects residential properties in a relatively concentrated geographical area in Grafton, which has not been identified as disadvantaged.

SOCIO-ECONOMIC - Indicators from RODR & Technical Papers - Sept 2012

VMW Criteria	Indicator		E	C
Maintain the relationship of the town to the river eg views and river users	Urban Connectivity	Ability to improve connectivity to existing and proposed riverfront public recreation spaces <i>Also under Functional criteria "Improve bicycle and pedestrian linkages" and Socio-Economic criteria "Promote better connectivity either side of the river for social, commercial and industrial users"</i>	Strongly agree (++) – Provides improved access to both existing and proposed riverfront recreation spaces by creating a circular path system between Grafton and South Grafton.	Disagree (-) – Does not provide new or additional access to riverfront recreation spaces nor does it encourage new opportunities along the foreshores.
	Potential to contribute to tourism	<i>Also under Socio-economic criteria "Minimise the impact on the operation of the existing businesses (including tourism), provide for economic growth and support Grafton as a regional centre"</i>	Strong potential to integrate with several local strategies and provides stronger link with waterfront	Moderate potential as option enters Grafton near CBD
	Visual integrity of the existing bridge in its setting	Ability to maintain important and recognisable views from and to the existing and new bridges of Grafton and South Grafton <i>Also under Environmental criteria "Maintain the visual experience of the existing bridge (to and from the bridge)"</i>	Agree (+) – Maintains the visual integrity of the existing bridge and can be designed to enhance views from a potentially upgraded foreshores and from the new bridge.	Strongly disagree (--) – Substantially impacts on views to, and visual character of, the existing bridge. Views through the bridge will also be heavily impacted.
	River access and use		Option E may affect the "Monster Energy Pro Wake Show" area. This is a space which hosts an annual high-profile wakeboarding event. Under this option the crossing is likely to pass through a small section in the north-east corner of the area. This would be unlikely to have any major adverse impacts on the event.	Option C passes close to the boat mooring immediately downstream of the existing Grafton Bridge. However RMS has been advised by maritime stakeholders that Options A and C would not impact boats moored at Pound Street and would allow the same river access for visiting sailors / yachts.

ASSESSED SEPARATELY - Indicators from RODR & Technical Papers - Sept 2012

Indicator	E	C
Stage 1 costs (\$m)	\$146	\$161
Route option strategic cost estimate (\$m)	\$215	\$231
Benefit-cost ratio over 30 years from 2019 based on strategic cost estimates	1.6	1.6
Net present value over 30 years from 2019 based on strategic cost estimates (\$m)	\$75.3	\$72.4



Options E & C and future land uses in the Grafton area as presented in the Mid North Coast Regional Strategy

ARUP
 Transport
 Roads & Maritime
 Services

Projected Coordinate System:
 GDA 1994, MGA Zone 56

Data Source: Arup 2012
 Date Created: 5/11/2012

Meters
 0 200 400 800 1,200

N

Legend

- Existing employment land
- Existing urban footprint
- Proposed employment land
- Proposed future urban residential area
- Route options
- B-double routes
- Rail
- Major roads
- Highway
- Minor roads
- Streams
- River

Stage 1 Cost Estimates

MacDonald has provided indicative costs for the revised Stage 1 extent for Option C as attached.

There is a reduction in the Stage 1 cost from the previous figure of \$182 million to \$162 million. Some minor adjustments have been made for consistency as noted below, reducing this figure to \$161 million.

As agreed in our phone hook-up on 11 July the Stage 1 acquisition cost for each option was reduced to reflect the extent of the Stage 1 works. For Option C we had previously estimated Stage 1 acquisition costs of \$34 million including contingency (ultimate acquisition \$42 million including contingency). Based on the scope of Option C Stage 1 as now defined and using the same methodology as before for estimating the Stage 1 acquisition costs, the Stage 1 acquisition cost including contingency would reduce from \$34 million to \$33 million – the small reduction reflects the fact that the area around Bunnings that is no longer required for Stage 1 is just rural land with an estimated value (including contingency) of less than \$1 million.

A couple of other minor adjustments have also been made to MacDonald's numbers:

- the revised Stage 1 Investigation and Design cost has been reduced from the \$6 million suggested by MacDonald to \$5 million for consistency between options.
- the revised Stage 1 public utility adjustment cost has been increased from the \$1 million suggested by MacDonald to \$2 million to reflect the fact that more of the utility costs will be on the north side which is largely unaffected by the change.

With these three adjustments the revised Stage 1 Option C cost becomes \$161 million, or \$15 million more than the Option E Stage 1 cost. In effect the differential between E and C becomes about \$15 million both in Stage 1 and in the ultimate cost. Comparative costs in \$ millions are summarised in the following table:

No.	Item Description	Option E		Option C		
		Indicative Stage1	Full estimate including Stage 1	Indicative Stage 1 (original)	Indicative Stage 1 (revised)	Full estimate including Stage 1
1	Project Development	\$6	\$17	\$6	\$6	\$17
2	Investigation and Design	\$5	\$6	\$5	\$5	\$6
3	Property Acquisitions	\$14	\$32	\$34	\$33	\$42
4	Public Utility Adjustments	\$1	\$3	\$3	\$2	\$5
5	Construction					
5.1	<i>Roadworks</i>	\$19	\$55	\$52	\$35	\$78
5.2	<i>Bridge over Clarence River</i>	\$89	\$89	\$66	\$66	\$66
5.3	<i>Viaducts</i>	\$6	\$6	\$9	\$9	\$9
5.4	<i>Overpass (above existing roads/creeks)</i>	\$0	\$0	\$0	\$0	\$0
5.5	<i>Flood mitigation (Raising Levees)</i>	\$1	\$1	\$1	\$1	\$1
5.6	<i>Project Management and Insurance</i>	\$4	\$6	\$5	\$4	\$6
	Sub-total	\$119	\$156	\$132	\$115	\$160
6	Handover	\$1	\$2	\$1	\$1	\$2
TOTAL		\$146	\$215	\$182	\$161	\$231