

COUNTRY BRIDGE SOLUTIONS

Technical Bridge Design Review Workshops

Value Engineering Report

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Contents

1. Workshop Overview	4
1.1 Background	4
1.2 Workshop objectives	5
1.3 Workshop activities.....	5
1.4 Workshop outcomes.....	6
1.5 Next steps.....	7
2. Wagga Wagga Workshop Outputs	9
2.1. Identifying Issues and Concerns in relation to the Country Bridge Solutions program and project objectives	9
2.2 Identifying Issues, Concerns and Suggested Improvements in Relation to the Technical Solution	11
2.3 Identifying risks to successful implementation of the Country Bridge Solutions program.....	16
2.4 Design assumptions	18
2.5 Next Steps	19
3. Grafton Workshop Outputs	21
3.1. Critical issues facing local councils in relation to timber bridge maintenance and repair	21
3.2. Local council support for the Country Bridge Solutions program and project	23
3.3 Identifying issues and concerns with the Country Bridges Solutions program and project objectives	23
3.4 Identifying Issues, Concerns and Suggested Improvements in Relation to the Technical Solution	24
3.5 Next Steps	30
Appendix 1 Workshop Participants	31
Appendix 2 Workshop Agenda	33

1. Workshop Overview

1.1 Background

Roads and Maritime Services recognises that local councils are facing a growing challenge as road authorities to maintain and eventually replace aging bridges on their regional and local roads. Given this, Roads and Maritime has initiated the Country Bridge Solution.

The Country Bridge Solution represents a new approach to addressing the problem. Roads and Maritime is developing an innovative and cost effective solution to enable councils to replace bridges on their roads. The principles underpinning the program are:

- Collaboration with regional councils and acknowledgement that involvement of councils as critical to the solution
- Provide a technical bridge solution that is simple and easy to build
- Implementation using existing council resources
- Roads and Maritime will provide manuals to assist with design, development and construction.

The stated program and project objectives for the Country Bridge Solution are:

Program Objectives

- Improve the reliability of road connections in regional NSW
- Ensure meaningful involvement of local government in developing the solution, determining priorities and delivering projects
- Develop a cooperative approach between the Commonwealth, state and local governments in addressing maintenance and replacement of bridges
- Engage with councils, industry and local communities to create employment in regional NSW
- Enhance the relationship between Roads and Maritime and local government
- Strengthen the position of Roads and Maritime as a technical adviser, coordinator of road activity and a keeper of road standards.

Project Objectives

- Develop an innovative and cost effective solution for the replacement of bridges maintained by councils on regional and local roads in regional NSW
- Develop an agreed and updated set of Bridge Standards for bridges on regional and local roads
- Involve elite engineering and logistical skills to optimise the solution
- Enhance the experience and skills of local government staff to deliver consistent projects to agreed standards
- Ensure the solution overcomes key constraints such as access to technical skills and high quality materials
- Maintain high standards of Work Health & Safety (WHS) and environmental practice.

Roads and Maritime has progressed the development of a technical bridge solution, involving a prestressed concrete modular bridge system with an inverted double tee deck unit suitable for SM1600 loadings. Two Value Engineering workshops involving councils and industry representatives were held to solicit feedback on the concept design.

ACVM was commissioned to prepare for, facilitate and report on these Value Engineering workshops. The first was held in Wagga Wagga on 20 August 2014 and the second in Grafton on 27 August 2014.

A list of attendees is provided in Appendix 1.

The purpose of this document is to report on the process followed and outcomes reached during the workshops.

1.2 Workshop objectives

The objectives of the Value Engineering workshops were:

- For Roads and Maritime to gain an understanding of the critical issues facing councils in bridge replacement and maintenance on their networks
- Review the current bridge design solution, consider its appropriateness and highlight issues, concerns and potential improvements associated with various aspects of the design
- Identify ways to address the issues and concerns, evaluate improvements identified and ensure the design is robust as it moves forward in development.

1.3 Workshop activities

The workshop agenda is provided in Appendix 2.

The workshops generally involved a sequence of formal presentations followed by an opportunity for participants seated in subgroups to comment on different aspects of the information presented.

The workshops commenced with an introductory presentation outlining the scale of the timber bridge replacement problem and an overview of the program and project objectives. Workshop attendees were asked to identify critical issues currently facing councils in bridge replacement and maintenance on their networks, reflect on the program and project objectives and the stated “givens” for the bridge design solution and offer opinion as to whether the program and project objectives will assist councils with their bridge replacement and maintenance problems. Attendees were asked to identify issues or concerns with the program and project objectives. Group responses are provided in Sections 1 and 2 of this report.

The second section of the workshops involved a technical presentation on the concept design. Participants were offered the opportunity to provide comment on the technical detail of the proposal. The focus topics for review were:

- Superstructure
- Substructure
- Constructability issues with a focus on safety
- Review of Roads and Maritime guidelines with a focus on areas to emphasise in the development of the guidelines and ideas for maintaining ongoing stakeholder involvement
- Risk identification.

The final workshop task was an open discussion on the best way forward with specific focus on how Roads and Maritime can continue to consult and involve councils in the development of the program.

1.4 Workshop outcomes

Participants from both workshops generally agreed the program and project objectives identified for the bridge replacement program will assist councils with their bridge replacement and maintenance problems.

The critical issues identified by councils in relation to timber bridge replacement included:

- The scale and magnitude of the timber replacement bridge task
- Securing sufficient funding to maintain or replace existing timber bridges
- Accessing and securing skilled staff with knowledge of bridge assessment
- Access to bridges and lack of alternative access for some bridges during repair or replacement
- The need to replace bridges serving a limited number of properties
- Resolving appropriate standards for construction
- Availability of timber and required skills for current timber bridge stock
- Lack of training for bridge inspectors
- Lack of regional manufacture expertise such as local precast yards and difficulty in securing suitably skilled resources.

Comments offered by participants in relation to program and project objectives included the following (considered to be representative of the suite of comments collected):

- Participants generally support Roads and Maritime leading projects such as this to develop consistent standards across the state
- Program approach provides more control over design and costs, utilises pre-cast units and would leading to reduced costs
- A standard cost effective bridge design would allow better opportunities for funding and simplify funding application submissions while reducing the cost of grant applications and assessments
- Modular construction increases speed of construction, assisting in reducing the backlog (pending funding). Speedy construction assists rural councils in areas with limited detour opportunities
- Foundation issues can represent a substantial portion of a bridge replacement, up to 60-70% of the total bridge costs. Precast units do not address foundation issues.
- Councils would like ongoing involvement in the program, in particular the prioritisation of the bridges
- Councils would like the program geared towards local roads
- The design needs to ensure as much work as possible can be done 'in house' or locally
- Ensure technical bridge design is suitable for local roads and traffic volumes
- The program objective to create employment is generally affirmed. However many councils have small stock of replacements. Increase regionally rather than locally
- Funding timeframes and complexities are likely to impact on implementation
- Tendering and procurement process requires resolution
- Construction techniques and constructability need to include safety considerations
- Councils are concerned about design and construct procurement
- Will there be an obligation to use the technical specification?
- Roads and Maritime should be seen as providing assistance rather than dictating standards
- Bridge solutions should ensure fit for purpose and not be overly conservative.

Participants offered ideas in relation to technical considerations pertaining to the superstructure, substructure and constructability. Those identified as worthy of further consideration and development are summarised below.

- Superstructure
 - Design does not seem to consider how to erect formwork for in-situ pouring of the stitch
 - Apparent insufficient vertical fixing for the tee sections in the event of significant overtopping during floods
 - No provision for utilities within the tee sections
 - Possible differential settlement of stitch vs. pre-cast beam
 - No provision within tee sections for temporary hand rail installation for construction
 - Possible lack of scuppers
 - Weight issues generally and concern about limitations of craneage, particularly the panels at distance from crane
 - Most bridges requiring replacement are 7.5 to 8m wide with some 6.5m with two lanes requiring replacement and some single lane bridges down to 4.5m
 - 400mm x 400mm driven piles seen to be a limitation
 - Consider a castellated kerb for low level structures
- Substructure
 - Weight of the headstock units
 - Applications where concrete piles are not suitable for site conditions
 - Excavation for the abutment construction is significant to allow for the placement of the panels and re-instatement of fill material
 - Positioning the panels below water level to seal off the abutment fill and the potential for scour underneath the abutment
 - The expansion joint where the running planks meet the abutment
 - The return of the abutment wing-walls recess and the adequacy for keeping the abutment sealed for water inflow
 - Difficult to get a grout proof seal on headstock stitch pour
 - Issues with joint in vertical abutment lining up to stop material falling through
- Constructability
 - Access for driven piles. Big pile rig required which is heavy to handle
 - Forming for pour strips needs significant thought
 - Wing wall precast panels could fall during placement of fill
 - Ability to replace bearings and access during construction for screws to adjust position tolerances
 - Access for strip pour
 - Pile tolerance +/- 75mm appears unreasonable
 - Provisions to allow traffic to continue flow during construction
 - Ability to run traffic continually while constructing online will have issue with trying to cure the concrete in the stitch pour, damage due to vibrations.

1.5 Next steps

Towards the end of the workshop, Peter Mahar, Roads and Maritime Project Manager Country Bridge Solutions, outlined the next steps and sought feedback on whether councils wanted to maintain ongoing involvement and if so, the best way for that to occur.

Mr Mahar advised that workshop outputs would be finalised in a report. The report and presentation material will be uploaded to Roads and Maritime's publically accessible website.

In general terms, council representatives from both workshops expressed strong interest in having ongoing involvement in the program, especially the prioritisation process.

Council representatives supported the initiative and sought responses to possible funding arrangements with some councils indicating they would be unlikely to be able to provide a 50/50 split. Other councils suggested a block grant funding arrangement based on asset numbers. It was suggested there should be a mechanism or additional concession to those councils unable to meet the funding requirement.

It was noted there is currently no commitment of funds to this program from the State Government.

Roads and Maritime will invite submissions from councils using a similar process to the Fixing Country Roads and Bridges Renewal Scheme. The importance of councils correctly completing submissions was emphasised, as this information will be used to complete the bridge prioritisation process. Councils will be asked to put forward the bridges they would like considered by January 2015.

After considerable discussion, participants agreed the best way forward for prioritisation is to establish a working party comprising the Institute of Public Works Engineering Australia (IPWEA) Bridge Working Party with additional representation from each eligible Regional Organisation of Councils (ROC).

It was suggested ROCs should be asked to nominate a representative to the working party.

The key concern expressed by participants was the need to ensure representation for all local councils.

2. Wagga Wagga Workshop Outputs

The agenda of the Wagga Wagga workshop is provided in Appendix 2.

The workshop generally involved a sequence of formal presentations followed by an opportunity for participants seated in subgroups to comment on different aspects of the information presented. The Wagga Wagga workshop involved three subgroup tasks:

- Task 1. Reflect on the program and project objectives and the stated “givens” for the country bridge design Solution and identify issues or concerns with the information presented
- Task 2. Identify issues, concerns and suggest improvements to the technical solution with respect to the following focus topics
 - Subgroup 1: superstructure
 - Subgroup 2: substructure
 - Subgroup 3: constructability issues with a focus on safety
 - Subgroups 4 & 5: review of Roads and Maritime guidelines with a focus on areas to emphasise in development of the guidelines and ideas for maintaining ongoing stakeholder involvement
- Task 3. Identify risks that may prevent successful implementation of the Country Bridge Solutions program.

The information presented by the subgroups was discussed by the whole group and is documented below.

2.1. Identifying issues and concerns in relation to the Country Bridge Solutions program and project objectives

The subgroups’ responses to the following prompt are provided below.

Reflect on the program and project objectives and the stated “givens” for the Country Bridge Solution and identify issues or concerns with the information presented.

Subgroup 1

#	Issue
1	In favour of the proposal and agree with Roads and Maritime leading projects such as this to develop consistent standards across the state
2	Many councils have a significant backlog of small span timber bridges and would benefit from a common design for bridge replacement
3	A standard cost effective bridge design would provide better opportunities for funding, simplify funding application submissions and reduce the cost of grant applications and assessments
4	Program approach provides more control over design and costs utilising pre-cast units, leading to reduced costs
5	Foundation issues can contribute to a substantial portion of a bridge replacement, up to 60-70% of total bridge costs. Precast units do not address foundation issues
6	Loading requirements through AS5100 are onerous for minor local roads. Are there options to use lower load standards?
7	Modular construction increases speed of construction, assisting in reducing the backlog (pending funding). Speedy construction assists rural areas with limited detour opportunities.

Subgroup 2

#	Issue
1	Councils are generally supportive of program and project objectives
2	Will the proposal allow partial replacement of an existing timber bridge or would the entire bridge need to be replaced? Some councils have existing timber bridges with a deck in satisfactory condition but the abutments need repair or replacement. Could the program be configured to allow staged bridge replacement?
3	Will the technical design be compatible with existing systems?
4	Councils would like to see the project progress and not stall due to political issues
5	Councils would like ongoing involvement, not only during these workshops
6	Councils would like to be involved in the prioritisation of bridges
7	Councils would like the program geared towards local roads. Regional roads are important and once bridges on these roads and repaired/replaced, councils do not want funding skewed towards state roads
8	Design needs to ensure that as much work as possible can be done 'in house' or locally
9	Ensure the technical bridge design is suitable for local roads and traffic volumes.

Subgroup 3

#	Issue
1 2 & 3	Affirmed program objectives associated with improving reliability of road connections in regional NSW, ensuring meaningful involvement of local government in developing solutions and developing a cooperative approach between different levels of government
4	Program objective to create employment is generally affirmed. Many councils have a small stock of replacements. Increase regionally rather than locally.
5	Affirmed program objective to enhance the relationship between Roads and Maritime and local government
6	Affirmed program objective to strengthen Roads and Maritime's position as a technical advisor. Roads and Maritime to consider providing training in its bridge inspection guidelines. Consider aligning with ARRB/AUSTROADS manual.
7	Affirmed project objective to develop an innovative and cost effective solution. Need to consider inclusion of multiple spans. Roads and Maritime should not pilot alternative material options such as CFT, etc.
8	Affirmed project objective to develop an updated set of bridge standards. Need to consider requirements for modern agricultural machinery.
9	Affirmed project objectives involving elite engineering and logistical skills, enhancing the experience and skills of local government staff and maintaining high standards of Work Health & Safety.

Subgroup 4

#	Issue
1	Support implementation of program and support program objectives
2	Relationships between levels of government might be difficult
3	Funding time frames and complexities are issues and concerns likely to impact on

	implementation
4	Tendering process simplification
5	Availability of resources with suitable expertise in remote areas could be a major impediment
6	Lack of existing expertise within councils. Development of expertise and maintaining expertise will be challenging
7	Consider including replacement of ageing concrete and/or composite bridges in the program?
8	Lack of engineering expertise and focus within councils
9	Will there be standardised contract conditions?
10	Construction techniques and constructability will need to include safety considerations.

Subgroup 5

#	Issue
1	Differing information on the M-Lock product. Anecdotal reports of structural deficiencies yet defence that bridge built to specifications.
2	What is the problem the Country Bridge Solution is trying to fix? Trying to minimise in-situ concrete pours
3	Will this solution fix regional road problems?
4	Councils do not have the technical knowledge /design expertise of Roads and Maritime. Looking for support
5	Need for a pre-qualification system?
6	Councils concerned about design and construct
7	Is SM1600 necessary for all roads?
8	Is there a cycleway width? Standard Roads and Maritime plank design but needs a concrete deck
9	Is local government interested in casting a prestressed plank structure?

2.2 Identifying issues, concerns and suggested improvements in relation to the technical solution

Following the technical presentation of the concept for the Country Bridge Solution, the workshop participants were asked to comment on the solution. This task was undertaken in subgroups with the following focus topics:

- Subgroup 1: superstructure
- Subgroup 2: substructure
- Subgroup 3: constructability issues with a focus on safety
- Subgroups 4 & 5: review of Roads and Maritime guidelines focusing on areas to emphasise in the development of the guidelines and ideas for maintaining ongoing stakeholder involvement.

The specific prompts for subgroups were:

Groups 1 & 2

- Positive aspects associated with the topic area in relation to the technical solution
- Identify concerns associated with the topic area in relation to the technical solution and offer suggestions you would like considered

Group 3

- Positive aspects of the solution with regard to constructability
- Identify concerns with the solutions with regard to constructability and offer suggestions you would like considered

Groups 4 & 5

- Areas of emphasis for which you would like Roads and Maritime to provide greater detail when they develop the guidelines for the technical bridge solution
- Offer ideas and suggestions for ways Roads and Maritime can continue to maintain stakeholder involvement.

Subgroup 1 – Superstructure

Positive aspects associated with the superstructure solutions presented in the technical solution

#	Issue	Response
1	Prestressed beams enable flat deck	Agree
2	Dramatically reduced risk to cyclists based on stitch methodology	Agree
3	Fewer precast beams than some competitors, potential to reduce cost.	Generally Agree

Concerns associated with the superstructure solutions presented in the technical solution

The suggestions presented to the group were evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	Response
1	Closure strips are potential weak points	Has location been considered in relation to wheel path loadings?	Covered
2	Design does not seem to consider how to erect formwork for in-situ pouring of the stitch	Has trimdek/bondek been considered for stitch form (may need less reo), or maybe provision to bolt formwork through tee?	Consider further
3	Apparent insufficient vertical fixing for the tee sections in the event of significant overtopping during floods		Consider further
4	No provision for utilities within the tee sections	Consider conduit/external mountings	Consider further
5	Are longitudinal bars & ligatures required for stitch?		Covered
6	Wet to dry joints at stitch, no mention of epoxy for joint?	Elastomeric strip to seal longitudinal joint?	Covered - include detail in

			plans and guidelines
7	Differential settlement of stitch vs pre-cast beam?		Consider providing edge deck stiffening
8	No provision within tee sections for temporary hand rail installation for construction		Adopt
9	Apparent weak spot in joint between stitch	Recess/scrabble of end of tee for stitch to provide toggle joint (better keying of stitch)	Same as item 6
10	Lack of scuppers?	Put scuppers in pre-cast units	Consider further

Subgroup 2: Substructure

Positive aspects associated with the superstructure solutions as presented in the technical solution

#	Issue	
1	Concrete driven piles would generally be adequate but further options need to be considered	Agree
2	Concrete bridge solution is agreed	Agree
3	Standardised design is considered a good idea and should provide economies in production and supply	Agree

Concerns associated with the substructure solutions presented in the technical solution

The suggestions presented to the group were evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	Response
1	Weight of the unit - 15T for the headstocks will require significant crane required to lift into place	Consider options to minimise weight of headstocks	Consider further
2	Elastomeric bearing plate-potential for the bearing to wear away and movement in the deck with a thick plate	Steel reinforced elastomeric bearing plates. The less thickness in the bearing the better	Covered
3	Instances where concrete piles are not suitable for site conditions	Possible design options for other pier solutions: <ul style="list-style-type: none"> • Keep a standard for creek level to the head stock. Construct a pile cap, but leave the foundation construction open to interpretation dependant on site conditions • Provide a suite of design options for different 	Consider further

		piling/foundations systems eg driven piles, H-piles, spread footing	
4	Excavation for abutment construction is significant to allow for placement of the panels and re-instatement of fill material	Option for construction in front of existing abutments	Consider further as an option
5	Installing the panels below water level to seal the abutment fill and the potential for scour underneath the abutment		Consider issue further regarding scour – include advice in construction report/guideline
6	Expansion joint where the running planks meet the abutment	Expansion joint required in the abutment deck stitch	Consider further
7	The return of the abutment wing-walls recess and the adequacy for keeping the abutment sealed for water inflow	<ul style="list-style-type: none"> • Poured concrete stitch similar to the bridge deck • Notching the abutment panels to key them in for a seal • Consider including weep holes in precast panels 	Include in construction guide for the backfilling behind the abutments
8	Are the concrete piles a standard design?		Consider further
9	Adjustable screw footing difficult to use	Clamping system on the piles - clamp in place prior to fitting the headstock	Covered

Subgroup 3: Constructability

Positive aspects associated with the solution as presented with regard to constructability

#	Issue	
1	The assumption we are replacing straight timber bridges is reasonable	Agree
2	The nylon screw for setting the bearing pads/grout is a good option to level the double tees as rocking is a common issue with double tees	Agree
3	The 800/850 wide fill strip allows variance in hogging	Agree
4	8.5m width is good as it avoids current restrictions/hazards with thinner bridges. 6m width required for agricultural equipment. Supports variability through options of numbers of tees required	Consider alternative bridge widths
5	Versatility of double tees and setting them on bearing strips.	Agree

Concerns associated with the solutions presented with regard to constructability

The suggestions presented to the group were evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	Response
1	Access for driven piles, big pile rig required that is heavy to handle	Steel tubular or driven H section steel piles or bored piles. Develop foundation alternatives/options – flexibility on options for site conditions	Repeat/consider further
3	Forming for pour strips needs significant thought	Prefab plastic/bondek/strammit options. Waegerdeck, lost form with shear key/ connection into stitch beam to eliminate stripping of form	Consider further
5	Wing wall precast panels could fall during placement of fill	Weep holes placed in panels for strapping, s/s bands so that during construction and post construction excavation panels are secure. Chemset into pile	Consider further
6	Variability of substructure / scour protection requirements at each site. Can't suit all sites	Design something suitable for 80% of cases, allow flexibility of substructure for individual sites and use of superstructure system	Repeat/consider further

Subgroup 4: Roads and Maritime guidelines - areas of emphasis

#	Issue
1	<p><u>Investigation Report</u></p> <p>Roads and Maritime develop a checklist of required design inputs at early stage:</p> <ul style="list-style-type: none"> • Geotechnical investigation (are boreholes required at every pier?) • Flood study (scour? Allow bridge to be submerged or not) • Review of environmental factors • Planning approvals • Loading requirements • Width (carriageways, footways cycle ways etc.) • Traffic volumes • Keep existing condition or improve?
2	<p><u>Construction Guide</u></p> <ul style="list-style-type: none"> • Ideally a 5–10 page document explaining assumed construction methodology and identifying any 'hold-points' • Roads and Maritime to provide a Safety in Design Report for the proposed design • Roads and Maritime to provide a checklist for construction stage, including councils to ensure contractors provide adequate site safety documents including Safe Work Method Statements
3	Councils should provide a complete list of design constraints to ensure D&C tenderers can provide adequate tenders
4	Councils to consider adopting designers and contractors from Roads and Maritime's pre-approved lists to simplify the procurement process for councils
5	Councils should comply with AS5100
6	Roads and Maritime to review potential conflicts between Roads and Maritime and

	AUSTROADS guidelines
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Ideas and suggestions of ways Roads and Maritime can continue to maintain stakeholder involvement

#	Issue
1	Roads and Maritime to provide a central contact to liaise with councils on an ongoing basis

Subgroup 5: Roads and Maritime Guidelines - Areas of Emphasis

#	Issue
1	Are there geotechnical constraints on this solution?
2	What are the standard solutions being used?
3	Confirmation that the bridge is designed for overtopping? Is 4 m/s adequate?
4	Set of guidelines/design rules/flow chart
5	A design guideline for suitable bridges for suitable lengths? Small Bridges 101. Development of a risk matrix
6	Most suitable bridge types and constraints eg less spans for poor foundation
7	Level 3 assessment/load rating of existing structures
8	Roads and Maritime prequalification/panel for assessment
9	Allow a solution incorporating cycle ways
10	Separate single module cycle way on the same substructure
11	Guidelines only for assembly/construction
12	What do the different traffic loadings guidelines mean to a layperson eg SM1600 / T44?
13	Roads and Maritime guidelines for verification/load rating of existing bridges
14	Cost estimation of options

Ideas and suggestions how Roads and Maritime can continue to maintain stakeholder involvement

#	Issue
1	Working group for on-going liaison

2.3 Identify risks to the successful implementation of the Country Bridge Solutions program

The final workshop task involved subgroups identifying risks that could prevent or impact on the successful implementation of the program. The risks identified are listed below with significant risks highlighted in bold italics.

Subgroup 1

#	Risks – what could go wrong!
1	Design failure
2	Lack of industry support for the initiative
3	Lack of support by councils of concept
4	Inappropriate use
5	<i>Lack of funding for successful implementation at state and local government levels</i>
6	Lack of ongoing political support for the program
7	<i>Difficulty in determining and agreeing to the priority assessment process and eligibility criteria</i>
8	Lack of support within Roads and Maritime to the project teams
9	Lack of flexibility in design

Subgroup 2

#	Risks – what could go wrong!
1	<i>Program not funded or the funding split between federal, state or local governments</i>
2	Failure to achieve a general consensus on the design
3	<i>Trying to provide too many options/alternatives and not providing a standardised design</i>
4	Change of government and reduced support for the initiative

Subgroup 3

#	Risks – what could go wrong!
1	Restricting freedom of trade/options leading to potentially sub-optimal solutions for specific sites
2	<i>Lack of funding for implementation</i>
3	Local government intransience to the initiative
4	Resistance to change and lack of take up by councils
5	<i>Timelines of design finalisation and the possible missed funding opportunity for some councils</i>

Subgroup 4

#	Risks – what could go wrong!
1	<i>Availability of funding generally. Council contribution will likely restrict take up within council jurisdictions</i>
2	Councils' procurement processes
3	Difficulty obtaining project approvals
4	<i>Lack of council resources to successfully project manage works</i>

Subgroup 5

#	Risks – what could go wrong!
1	<i>Too many alternative options/variables proposed by local government</i>

2	The final design is not easily constructible by local government
3	Lack of ongoing funding commitment by governments
4	Lack of project commitment by local government
5	<i>Risk that design standards are too high for councils to comply</i>
6	Failure to resolve procurement risks in relation to who can supply and tender for the works
7	Failure to resolve differing procurement requirements between councils and Roads and Maritime
8	Overpromising and under delivering

2.4 Design assumptions

The design assumptions identified in the technical presentation were listed and discussed to affirm whether there was general agreement and support for the individual items.

The assumptions and the groups' comments are provided below.

Design Assumption	Group Comment
Straight bridge, constant grade, no skew	Agreed
Low traffic volumes – 1000 AADT	Agreed
Maintain current flood immunity	Agreed
100 year design life	Agreed
Load assumption	Provide options for SM1600 and T44
Simplified construction	Agreed
Maximise precast components and minimise in-situ concrete pours	Agreed
Standardised foundation options and suitable geotechnical investigation requirements	Agreed
Low performance level barrier suitable for submergence	Agreed
Precast components able to be transported on standard trucks with fewer restrictions	Agreed
Minimise whole of life costs	Agreed
<i>Superstructure</i>	
Precast prestressed concrete twin ribbed bridge deck module	Agreed
Modules connected by cast-in-situ closure strip	Agreed
<i>Issue:</i> Is there merit in having a longitudinal joint in bridge options where traffic volumes are very low? <i>Comments:</i> Longitudinal joints are a source of maintenance due to water ingress and movement and impact on asset life	Council representatives expressed preference to spend additional funds on capital rather than maintenance and supported the inclusion of the in-situ stitch

Max 8.5m carriageway width adopted	Consider alternative bridge widths with 2 module and 3 module options and further investigation into AS5100
Two way 3% cross fall	Consider further (transition with gravel roads with 4%)

2.5 Next steps

Towards the end of the workshop, Mr Mahar, Roads and Maritime Project Manager Country Bridge Solutions, outlined the next steps and sought commentary on whether councils wanted to maintain ongoing involvement and if so, the best way for that to occur.

Mr Mahar advised the workshop outputs when finalised and the presentation material, will be uploaded to Roads and Maritime's publically accessible website.

Generally council representatives expressed interest in having strong and continued involvement.

The next steps emphasised the need for the NSW Government and regional councils to jointly deliver the Country Bridge Solution to communities.

To maintain ongoing contact, councils suggested Roads and Maritime provide a regular newsletter, hold, additional stakeholder workshops and/or establish a working party.

Mr Mahar advised Roads and Maritime will write to local councils asking for an inventory of their 10 worst timber bridges for consideration. He emphasised the importance of councils correctly completing the inventory as the information will be used to complete the bridge prioritisation process.

Councils will be asked to identify bridges they would like considered by January/February 2015.

Additional issues raised by councils in relation to funding were:

- How long will the program run for?
- What will be the funding split between councils and State Government?
- How will money be distributed? It was suggested that funds be distributed across relevant councils on a funding split based on predetermined criteria. Difficulties with this approach were discussed.

It was noted there is currently no commitment of funds to this program from the State Government.

Roads and Maritime will invite submissions from councils using a similar process to the Fixing Country Roads and Bridges Renewal Scheme. The importance of councils correctly completing submissions was emphasised, as this information will be used to complete the bridge prioritisation process. Councils will be asked to put forward the bridges they would like considered by January 2015.

After considerable discussion, participants agreed the best way forward is to establish a working party comprising the IPWEA Bridge Working Party with additional representation from eligible ROCs.

It was agreed the working party will be asked to identify and recommend funding options involving the allocation of funds to prioritised bridges.

It was suggested ROCs should be asked to nominate a representative to the working party.

The key concern expressed by participants was the need to ensure representation for all councils.

Roads and Maritime's Black Spot Program was identified as a possible funding model.

3. Grafton Workshop Outputs

The agenda for the Grafton workshop is shown in Appendix 2.

The workshop generally involved a sequence of formal presentations followed by an opportunity for participants seated in subgroups to comment on different aspects of the information presented. The Grafton workshop involved three subgroup tasks:

- Task 1. Reflect on the program and project objectives and the stated “givens” for the program and,
 - Item 1: Identify critical issues currently facing councils in bridge replacement and maintenance on their networks
 - Item 2: Reflect on the program and project objectives and the stated “givens” for the program and offer an opinion as to whether the program and project objectives will assist councils with their bridge replacement and maintenance problems
 - Item 3: Identify issues or concerns with the program and project objectives
- Task 2. Identify issues or concerns and suggested improvements to the technical solution with respect to the following focus topics:
 - Subgroup 1: superstructure
 - Subgroup 2: substructure
 - Subgroup 3: constructability issues with a focus on safety
 - Subgroup 4: review of Roads and Maritime guidelines with a focus on areas to emphasise in the development of the guidelines and ideas for maintaining ongoing stakeholder involvement
 - Subgroup 5: identify risks that may prevent successful implementation of the program.

The information presented by the subgroups was discussed by the whole group and is documented below.

3.1. Critical issues facing local councils in relation to timber bridge maintenance and repair

Subgroup 1

#	Issue
1	Securing sufficient funding to maintain or replace existing timber bridges
2	Resolving appropriate standards for construction
3	Accessing and securing skilled staff with knowledge of bridge assessment
4	Access to bridges and lack of alternative access during repair or replacement
5	Time required to develop designs and construct, and the need to maintain alternative access during construction
6	Addressing environmental issues
7	Travel time from concrete batch plant to site
8	The need to replace bridges serving a limited number of properties
9	Risk assessment and lack of a standardised approach. SM1600 - T44 width

Subgroup 2

#	Issue
1	A large number of timber bridges are coming to the end of their useful life
2	Lack of funding for replacement, lack of funding programs
3	Some funding programs focus on freight and compete with other council priorities
4	Timber bridges are very forgiving and it is possible to allow them to deteriorate until replacement is required
5	Access to some bridges is difficult, particularly for a standard semi, with current load limits etc
6	Availability and access for cranes of suitable capacity
7	Over topping issue
8	Availability of required skills to build and design
9	Foundation issues, do we need SM1600?
10	Availability of timber and required skills for current timber bridge stock
11	Lack of training for bridge inspectors
12	Barrier issues with over topping and issues with complying with AS5100.
13	Services running off existing structures, issues with fixing

Subgroup 3

#	Issue
1	Funding constraints and high relative cost of replacement
2	Availability of timber for refurbishment
3	Magnitude of the timber bridge replacement task
4	Designing new bridges to a lower load requirement
5	Community expectations concerning bridge replacement and continued access
6	Ongoing maintenance and lifecycle cost issues for existing timber bridges

Subgroup 4

#	Issue
1	Funding constraints
2	Lack of technical ability and experience within regional councils
3	Availability of components for bridge repair and replacement
4	Difficult access for heavy equipment
5	Accurate bridge condition data and prioritisation process

Subgroup 5

#	Issue
1	Provision of grant funding for shovel ready bridges does not work as they cannot be fast tracked and there is no money for preconstruction
2	Lack of regional manufacture expertise such as local precast yards and difficulty in securing suitably skilled resources
3	Supply and demand problems in relation to funding. Short term programs drive up

	contractor prices. Long term programs allow better planning, programming and keep costs down Block grant/repair program type philosophy might be appropriate
4	Addressing environmental issues and inconsistency between sites including cultural heritage issues, NSW Fisheries, SEPP requirements etc
5	Spanning of waterways to avoid issues. Some options are now going to 20-22m spans to avoid working in water as much as possible.
6	Could the proposed technical solution be adapted so existing piers can be reused?

3.2. Local council support for the Country Bridge Solutions program

All subgroups generally agreed program and project objectives of the program will assist councils with bridge replacement and maintenance problems.

3.3 Identifying issues and concerns with the Country Bridges Solutions program and project objectives

The subgroups were asked “to reflect on the program and project objectives and the stated “givens” for the program and identify issues or concerns. Their responses are provided below.

Subgroup 1

#	Issue
1	Raised expectations from press announcements are not always realistic
2	Greater cooperation between Roads and Maritime & councils is supported and encouraged
3	Any assistance Roads and Maritime can provide with upskilling is encouraged.

Subgroup 2

#	Issue
1	Environmental controls and audits, and an apparent obligation on councils to comply with requirements
2	Will there be an obligation to use the technical solution?
3	Some councils are currently undertaking bridge works on loan funding
4	Clarity on funding for the program is required
5	Will the program focus on local roads?

Subgroup 3

#	Issue
1	Generally agree with the program objectives and Roads and Maritime working together with local government. However, this could cause bureaucratic challenges
2	Roads and Maritime should be seen as providing assistance rather than dictating standards
3	Bridge solutions should ensure fit for purpose and not be overly conservative
4	Possible resourcing challenges to manage the program and procure services
5	Concerns with a one size fits all concept. The weight of double tee could restrict

	usability. Can Roads and Maritime provide a suite of standard designs?
6	Support the principle of standardisation and trying to achieve economies of scale
7	Support the principle of having standard components readily available to order
8	Support the idea of developing and expanding bridge building skills within local workforce
9	Need to recognise there are proprietary products currently available that achieve similar outcomes at competitive prices
10	Is the Country Bridge Solutions program really an innovative solution? Are we achieving a fit for purpose design or is it over conservative?
11	Program focus is on timber bridges. Can the program be expanded to causeways and realignments?

Subgroup 4

#	Issue
1	The level of support Roads and Maritime will provide to councils
2	The need for a range of bridge solutions depending on level of services
3	The need for different design options depending on site conditions
4	Shorter spans less than 6m are not applicable
5	Level of training and supervision Roads and Maritime can provide initially.

Subgroup 5

#	Issue
1	Roads and Maritime specifications may not be suitable for councils as suppliers often increase prices as soon as they see heavy testing requirements under B80 spec. The need to broaden the specs required to suit different regions
2	Availability of high quality materials in remote locations is a concern eg B80 concrete
3	Support engagement of industry during program development.

3.4 Identifying issues, concerns and suggested improvements to the technical solution

Following the technical presentation of the concept for the Country Bridge Solution, workshop participants were asked to comment on the solution. This task was undertaken in subgroups with the following focus topics:

- Subgroup 1: superstructure
- Subgroup 2: substructure
- Subgroup 3: constructability issues with a focus on safety
- Subgroups 4: review of Roads and Maritime guidelines with a focus on areas to emphasise in the development of the guidelines and ideas for maintaining ongoing stakeholder involvement
- Subgroup 5: identify any risks to the successful implementation of the Country Bridge Solutions program.

The specific prompts for subgroups were:

Groups 1 & 2

- Positive aspects associated with the topic area presented in the technical solution

- Identify concerns associated with the topic area presented in the technical solution and offer suggestions you would like considered

Group 3

- Positive aspects associated with the solution in regards to constructability
- Concerns associated with the solution in regards to constructability and offer suggestions you would like considered

Group 4

- Areas of emphasis you would like Roads and Maritime to provide greater detail about in the guidelines for the technical bridge solution
- Offer ideas and suggestions how Roads and Maritime can continue to maintain stakeholder involvement

Groups 5

- Identify program risks.

Subgroup 1 – Superstructure

Positive aspects associated with superstructure solutions presented in the technical solution

#	Issue
1	The shape of units ensures stability during transportation to remote locations and during installation
2	Precast units fit on standard vehicles for transport
3	Barrier is standardised
4	Useability looks positive, however limited use of single design may not suit all situations
5	Generally support a precast standard solution
6	The potential to standardise the risk profile for non-standard road and bridge width applications.

Concerns associated with the superstructure solutions presented in the technical solution

The suggestions were presented to the group and were evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	Response
1	Weight issues generally. An 18 tonne unit on a 12m span seems to be on the upper limit of manageability. Concerns about limitations of craneage, particularly the panels at distance from crane	Shorten the length of the spans	Covered Roads and Maritime to focus on weight reduction during the detailed design stage
		Use more panels to limit unit weight by making the width narrower or by designing a double headstock arrangement	
		Potentially narrow the bridge ie 6.5m wide	
		May also be used as conduit	
2	Most bridges requiring replacement are 7.5m to 8m wide with some 6.5m with two lanes requiring	Provide voids as part of the T section and fill with concrete when in place	Consider further
		Consider rearranging panel configuration to provide more adaptable design components for	

	replacement and some single lane bridges down to 4.5m There are very few 8.5m wide bridges built on rural local roads	narrower designs. (Note Sydney Harbour Bridge 2.5m lane widths for comparison 70km/h and vehicles per hour AADT on local roads.)	
3	400mm x 400mm driven piles seen to be a limitation. Many timber bridges are socketed into rock, is this feasible?	Alternate pile systems are all applicable and site specific	Consider further
4	In-situ stitch 850 wide is a wide stitch	Potentially use U bars reinforcement (for safety purposes)	Consider further
5	Adaptability of unit design	Consider a castellated kerb for low level structures	Consider further
6	Weight of precast headstocks a concern, however close to possible crane location	Narrow bridge width lowers the weight of the head stock Alternatively consider in-situ casting of the headstock	Consider further
7	Potentially discard the longitudinal stitching	Butt up the panels and accept the longitudinal joints particularly on low volume traffic roads	Consider further as an additional option

Subgroup 2: Substructure

Positive aspects associated with the superstructure solutions presented in the technical solution

#	Issue
1	Most existing timber bridges will have driven timber pile so should be able to be driven piles
2	Can build out from one side with large enough crane
3	Some councils are replacing single span bridges under 10m with box culverts
4	Options for reuse of existing timber piles
5	Ability to use another unit to provide a pedestrian footway.

Concerns associated with the substructure solutions presented in the technical solution

The suggestions when presented to the group were evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	Response
1	Difficult to cater for many substructure variables with a standard design	Develop a number of standard foundation solutions	Consider further
2	Difficult to get a grout proof seal on headstock stitch		Detail to be considered

	pour		further
3	Many existing timber bridges are single lane and serve very low traffic volumes ie less than 100 AADT	Develop a single lane bridge option	Consider further
4	Issues with barrier rails and floods	Can Roads and Maritime provide a no rail option if required?	Issue to be covered by risk assessment. Consider further
5	Will need to construct abutments inside existing to ensure no clash of old pile locations		Noted
6	Who will provide technical input for choosing correct solution?		Council and Roads and Maritime via the development of the guidelines
7	Is this solution suitable for end of life/recycling when the bridge needs replacement again?		Noted
8	Issues with joint in vertical abutment lining up to stop material falling through		Detail to be considered further
9	Hog control is important if no in-situ pour is proposed		Noted

Subgroup 3: Constructability

Positive aspects associated with the solution presented in regard to constructability

#	Issue
1	Construction animations look great
2	Precast is generally agreed in relation to the benefits provided in relation to construction time and tolerances
3	Not too many tie downs – amount of tie downs appears sufficient
4	Barrier rails on before craning in place – good safety outcome
5	Low maintenance solution
6	Head stock support frame

Concerns associated with the solutions presented in regard to constructability

The suggestions were presented to the group and evaluated on the basis that:

- the idea has been previously covered by Roads and Maritime and does not warrant further consideration, or
- the idea has merit and is worthy of further consideration.

#	Issue	Suggestions	
1	Weight of the units (cranes required and availability can be an issue). Crane size, access and reach restrictions	Reduce weight of the concept design by considering including voids in precast units, headstocks half width, steel material with concrete infill	Roads and Maritime to focus on weight reduction during the detailed design stage
		Consider ability to crane from already erected bridge deck spans	Discard
		Headstock is likely to be the biggest lift. Potentially the longest reach at approx. 15t. Suggest reducing weight of the headstock, possibly by a two part headstock	Consider further
2	Ability to replace bearings and access during construction for screws to adjust position tolerances	Consider a solution that doesn't require access	Consider further
3	Access for strip pour	Provide tie in dowels and tie in the formwork before erecting second girder	Consider further
4	Pile Tolerance +- 75mm unreasonable	Increase tolerance in headstock	Consider further
5	Provisions for drainage	Consider allowing for a castellated kerb or scuppers	Covered
6	Access for construction and maintenance for the tie bolts and the need for ongoing maintenance to keep bolts tight	Consider for vertical tie at abutments	Consider further
		Consider moving the tie bolts lower down	Consider further
7	Cost of construction	Need to know the estimated cost of construction up front for various construction circumstances	Noted
8	Provisions to allow traffic flow to continue during construction	Consider a two part headstock or cater for pour in place, headstock to allow partial opening of existing bridge	Consider further
9	Ability to run traffic continually while constructing on line will have issue with trying to cure the concrete in the stitch pour, damage due to	Consider the possibility of using higher early strength concrete to reduce time before traffic can resume	Consider further

	vibrations	
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Subgroup 4: Roads and Maritime guidelines - areas of emphasis

#	Issue
1	Greater detail on safety in design aspects
2	Guidance on width considerations. Can the solution be tailored to a single lane option?
3	Document how the design meets standards and options for modification eg barrier options
4	Construction guide – step by step guide with specific detail and attention to aspects that need to be done correctly eg stitch pour or jacking sequence
5	Provision of standard drawings for single land and dual lane bridge
6	Foundation investigation guideline
7	Specification for D&C, construct only and manufacture
8	Water way assessment guidelines
9	Roads and Maritime to provide design service?
10	Low traffic single lane – no stitch pours?
11	Suite of designs eg kerb only options with gaps
12	Bridge assessment guidelines regarding load rating - variable answers from different consultants, industry risks?

Ideas and suggestions how Roads and Maritime can maintain stakeholder involvement

#	Issue
1	Set up industry working group or roads directorate bridge working group
2	Repair program consultative committee
3	Provide a funding program to stimulate industry buy in, especially if it is a 5 to 10 year program
4	If this option is not more cost effective it will not stimulate the interest required.

Subgroup 5: Risk identification

Aspects that could impact the successful implementation of the Country Bridge Solution

#	Risks – What could go wrong!
1	Change of government and realigned priorities
2	Inability to reach agreement on a preferred funding model leaving the program as a good idea but one that can't be implemented
3	The funding model proves to be inappropriate and inflexible with councils not able to achieve their requirements
4	Lack of commitment by stakeholders eg precast yards uncooperative or councils "sceptical" and not taking up the offer
5	Impact of "upgrades" on depreciation costs – potentially overcapitalise (minor issue)
6	Constrained by scale and the need for options such as single lane bridge to ensure that it gets taken up in as many cases as possible

7	Human resource risks including availability of engineers and bridge crews
8	Solution may be more expensive than currently available options
9	Scope risk – how many bridges will this solution apply to? How much of the problem will it fix?
10	Early asset replacement – bridges with life remaining may be replaced because an opportunity is available, rather than because the bridge has failed
11	Concrete may not be the only solution and may limit other cost effective options
12	Constructability risks generally including WHS risks, tolerances of components (eg piles), heavy craneage requirements etc

3.5 Next steps

Towards the end of the workshop, Mr Mahar outlined the next steps and sought commentary from councils on whether they wanted to maintain ongoing involvement and if so, the best way for that to occur.

Mr Mahar advised the workshop outputs will be finalised in a report. The report and the presentation material will be uploaded to Roads and Maritime's publically accessible website.

At the Wagga Wagga workshop all councils expressed keen interest in having strong and continued involvement, particularly in the prioritisation process.

Councils support the initiative and sought further information regarding possible funding arrangements. Some councils indicated they would be unlikely to be able to provide a 50/50 split. Others suggested a block grant funding arrangement based on asset numbers. It was suggested there should be some mechanism or additional concession to councils that are unable to meet the funding requirement.

It was noted the regional roads program is based on a 50/50 funding arrangement.

It was noted there is currently no funding commitment by the State Government to this program.

Concerns were raised regarding implications on contract prices should a large number of timber bridges be approved at the same time.

Roads and Maritime will invite submissions from councils using a similar process to the Fixing Country Roads and Bridges Renewal Scheme. The importance of councils correctly completing submissions was emphasised, as this information will be used to complete the bridge prioritisation process. Councils will be asked to put forward the bridges they would like considered by January 2015.

After considerable discussion, participants agreed the best way forward towards prioritisation is to establish a working party as suggested at the Wagga Wagga workshop, comprising the IPWEA Bridge Working Party with additional representation from each eligible ROC.

It was agreed the working party should be asked to identify and recommend funding options for the allocation of funds to prioritised bridges or a block type funding arrangement to councils. It was suggested councils be asked to nominate a ROC representative to the working party.

The key concern expressed by participants was the need to ensure representation for all councils.

Appendix 1 Workshop Participants

Workshop 1 Wagga Wagga

Name	Organisation
Darren Sturgiss	Bathurst Regional Council
Graeme Williams	Bega Valley Council
Malcolm Fraser	Bega Valley Council
Geoff Paton	Blayney Council
Nathan Skelly	Blayney Council
Adam Stewart	Boorowa Council
Geriant Jones	Cardno
Steven Wood	Civilbuild
John Kauter	EMC Works
Royce Toohey	Eurobodalla Shire Council
Steve Martin	GHD
Christian Jombert	GHD
Mir Akbar	Gilgandra Shire Council
Greg Stewart	Hay Shire Council
Keith Dawe	Lachlan Shire Council
John Di Trapani	Ladex Construction Group
Allen Brierley	Lake Macquarie City Council
Brenton Moore	Lake Macquarie City Council
Alan Laurence	Narrabri Shire Council
Mursaleen Shah	Singleton Council
David Field	Snowy River Shire Council
Edward Greig	Tumut Shire Council
Andrew Vaz	Tumut Shire Council
Phil Newham	Upper Lachlan Council
Onesimo Mukodi	Wakool Shire Council
Joel Turner	Wakool Shire Council
Bill Twohill	Weddin Shire Council
Dirk Wymer	Young Shire Council
Peter Mahar	Roads and Maritime
Mark Bennett	Roads and Maritime
Lindsay Brown	Roads and Maritime
Amie Nicholas	Roads and Maritime
Alan Pottie	Roads and Maritime
Jonathon Tasker	Roads and Maritime
Chris Laird	ACVM

Workshop 2 Grafton

Name	Organisation
David Maunder	Armidale Shire Council
Greg Nelson	Armidale Shire Council
Peter Brown	Ballina Shire Council
Neville Buckley	Bridge Doctors
Peter Davis	Cessnock Shire Council
Tom Rayner	Civil Team
Greg Powter	Coffs harbour City Council
Keith Appleby	Glen Innes Shire Council
Malcolm Donnelly	Glen Innes Shire Council
Gil Gendron	Gloucester Shire Council
Peter Gradwell	Gravity Wall Systems
Gamini Weththasinghe	Greater Taree City Council
Grant Calvin	Greater Taree City Council
Grant Tickle	Greater Taree City Council
Richard Baxter	Gunnedah Shire Council
Richard Jane	Gwydir Shire Council
Darrell Hughes	Inverell Shire Council
Justin Pay	Inverell Shire Council
Jeff Hirst	Kempsey Shire Council
Tony Green	Kempsey Shire Council
Ian Walker	Kyogle Shire Council
Lindsay Passfield	Kyogle Shire Council
Gavin Mulcahy	Lismore City Council
Steven Bennetts	Lismore City Council
Clint Fitzsummons	Nambucca Shire Council
Duncan Clarke	Port Macquarie Hastings Council
Murray Russell	Tamworth Regional Council
Gary Chorely	Tenterfield Shire Council
Jeff Bush	Upper Hunter Shire Council
Alan Harvey	Uralla Shire Council
Allan Reeve	Tweed Shire Council
Nigel Dobson	Tweed Shire Council
Matthew Fanning	Walcha Shire Council
John Perriott	Clarence Valley Council
Peter Mahar	Roads and Maritime
Lindsey Brown	Roads and Maritime
Mitchel Ingram	Roads and Maritime
Peter Young	Roads and Maritime
Steven Mitchelhill	Roads and Maritime
Chris Laird	ACVM

Appendix 2 Workshop Agenda

8.00 am	Arrival Coffee/Tea	
8.15 am	Introduction <ul style="list-style-type: none"> Welcome Introduction to workshop/confirm agenda/introductions 	Peter Mahar Chris Laird
	Information about the Country Bridge Solutions program and project objectives <i>Presentation # 1</i> <i>Program and project overview, program and project objectives and work completed to date</i> <i>Presentation # 2</i> <i>Overview of the “givens” for the Country Bridge Solutions program</i>	Peter Mahar
	Identifying issues and concerns <ul style="list-style-type: none"> Identify issues and concerns with the program and project objectives for the bridge design solution Report back 	Focus Groups All
	Review of the technical bridge design solution <i>Presentation # 3:-</i> Detailed overview of the bridge design solution	Lindsay Brown
	Identifying issues, concerns and suggested improvements <ul style="list-style-type: none"> Identify issues and concerns with the bridge design solution Identify ideas and options to address the issues and concerns and/or improve value Ideas and opportunities to be considered within focus topic areas including: <ul style="list-style-type: none"> Superstructure Substructure Constructability issues with a focus on safety Review of Roads and Maritime guidelines with a focus on areas to emphasise in the development of guidelines, and ideas to maintain ongoing stakeholder involvement 	Focus groups
12.30 pm	Lunch	
	Assessing suggested improvements (whole group) Findings from each focus group will be presented for the whole group to assess the ideas and options and determine the best course of action to progress the program (adopt, investigate further/action plan or discard)	All
	Risk identification Identify major hazards likely to impact implementation of the bridge design solution	Focus groups
	The Way Forward <ul style="list-style-type: none"> Summary of workshop outcomes, decisions and actions Where to from here? What is the best way to keep councils involved 	All Peter Mahar

