



Transport
Roads & Maritime
Services

NOWRA BRIDGE PROJECT

Site options assessment value management
workshop report

MAY 2014

RMS 14.373
ISBN:978-1-925093-92-6

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1. Workshop Overview

1.1 Background

In 2012 Roads and Maritime Services started investigations into improving conditions on the Princes Highway over the Shoalhaven River in Nowra.

The Princes Highway is the main north-south transport corridor linking Sydney and Wollongong to the NSW South Coast and north-eastern Victoria. The highway is an important freight, bus and tourist route for the south coast, particularly beyond Bomaderry where the rail service terminates. Key tourist destinations accessed by the highway include Wollongong, Nowra and the south coast, with peak traffic volumes experienced on weekends and during holiday periods.

The Princes Highway crosses the Shoalhaven River in Nowra around 120 kilometres south west of Sydney. This crossing has a 1880s two lane iron “Whipple” truss bridge carrying southbound traffic and a three lane 1980s concrete bridge carrying northbound traffic.

The city of Nowra is situated on the southern bank of the Shoalhaven River with the towns of Bomaderry and North Nowra on the northern bank. The current twin-bridge river crossing is an essential element in the regional transport network and provides a critical link for the residents of Bomaderry and North Nowra to access the commercial centre of Nowra. Almost 50,000 vehicles cross the Shoalhaven River on an average day with most traffic focused around morning and afternoon peaks.

The Nowra Bridge project is being developed because of the increasing maintenance needs of the southbound iron truss bridge. The structure is over 130 years old and like any bridge of its age requires substantial maintenance. The maintenance needed to keep the bridge safe for the traveling public requires the bridge be closed, and due to high traffic volumes during the day, this can only be done during limited night shift hours.

The iron truss bridge structure also restricts some heavy vehicle access, and is at high risk of damage to the truss structure in the event of a collision with an oversized vehicle. Such an impact could close the bridge for an extended period until the damage is repaired.

Due to the high traffic volumes crossing every day, any extensive closures of the iron truss bridge due to maintenance or emergency repairs would cause major delays to the network around Nowra. The Nowra Bridge project is investigating options for a new bridge to make sure this crossing can cope with traffic now and into the future.

As part of the early project planning and development, a site options study is being carried out to recommend a preferred bridge location so that Roads and Maritime can focus its planning. Investigations to date have included technical studies, early environmental investigations, community consultation and some early design work.

As a result of these investigations, five potential site options have been identified:

- **Option A** – Western bypass option involving construction of a new bridge as part of a potential future western bypass of Nowra. This crossing would be part of an alignment that skirts to the west of Nowra along the proposed Regional Services Corridor
- **Option B** – West of the existing crossing involving construction of a new bridge immediately west (upstream) of the existing northbound concrete box girder bridge on the Princes Highway
- **Option C** – On the existing southbound bridge alignment which would involve construction of a new bridge on the alignment of the existing southbound iron truss bridge on the Princes Highway. This option would involve demolition of the existing iron truss bridge
- **Option D** – East of the existing crossing involving construction of a new bridge immediately east (downstream) of the existing southbound iron truss bridge on the Princes Highway

- **Option E** – Further east of the existing crossing and would involve construction of a new bridge further east (downstream) of the existing southbound iron truss bridge on the Princes Highway as well as further east of Option.

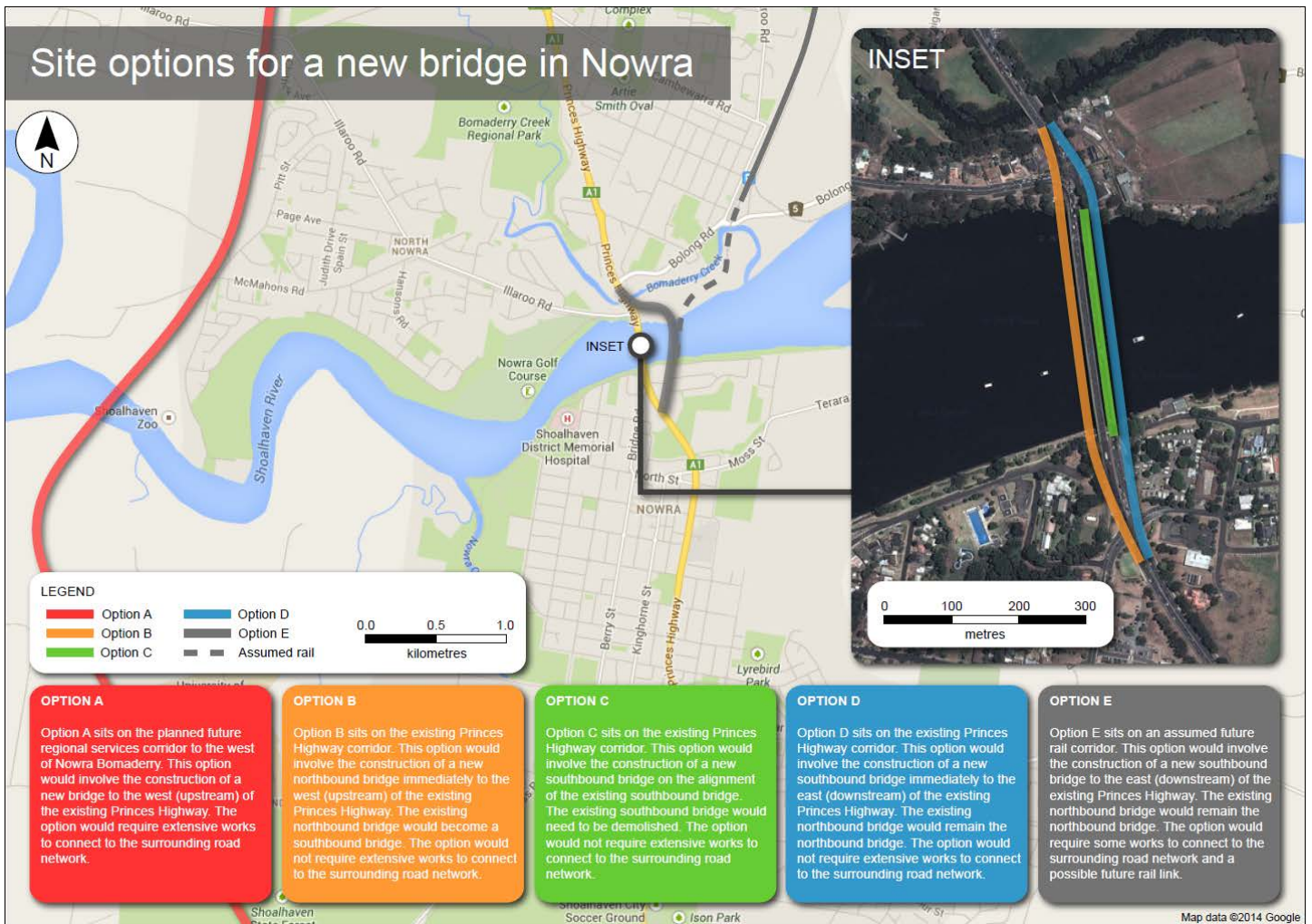


Figure 1.1 site options

To help the project team assess these locations, an independently facilitated value management workshop was held on Thursday 22 May 2014. The workshop brought together a range of stakeholders to review and assess the options against agreed criteria.

The focus of the workshop was to recommend a preferred location from the five site options put forward. It did not focus on the future of the existing iron truss bridge or on the design of the bridge or its approaches.

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

This report provides an objective overview of the project details discussed and the outcomes agreed on by the end of the workshop.

1.2 Workshop objectives

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

- Obtain a common understanding of the work undertaken to date on the Nowra Bridge project
- Review the five site options, evaluate them against agreed assessment criteria and recommend a preferred option(s) to progress the project.

1.3 Workshop activities

The workshop process built on the expertise of participants to clarify the purpose of the project and what the project must achieve to be successful. It identified appropriate criteria to reflect these project objectives and then used investigation results to assess each option against the criteria.

During the workshop, the background of the project was presented which included the project context, constraints and the planning undertaken to date (see Chapter 2).

The purpose of the project was reviewed and clarified. The project objectives were also discussed and clarified with the workshop group identifying what else was important to the project. The givens and constraints for the project were also shared from various perspectives.

Using this information, draft assessment criteria (developed prior to the workshop under three categories of Functional perspective, Socio-economic perspective and Environmental perspective) were discussed and refined. These criteria were then weighted in order of perceived importance for evaluation of the options (see Chapter 2).

The five site options were presented to the group and their opportunities and constraints discussed (information can be found in Chapter 3).

The group then qualitatively evaluated the site options against the assessment criteria as well as discussed their relative cost estimates and made their recommendations.

1.4 Workshop recommendations

- Roads and Maritime should focus planning for a new river crossing immediately west (upstream) of the existing bridges (Option B)
- Roads and Maritime should further develop Option D (immediately east of the existing bridges) as a contingency in the event that a design solution for Option B cannot be achieved
- Roads and Maritime ensure the project address traffic concerns at the intersections at Bolong Road, Illaroo Road and Bridge Road.

1.5 Summary of the workshop and outcomes

By the end of the workshop, the participants had:

- Gained a shared understanding of the purpose of the project which was:
 - To address the high maintenance impacts associated with the existing southbound structure (including traffic efficiency, community, safety and cost) while ensuring that traffic can flow satisfactorily during maintenance activities. This will lead to improved future traffic flows and the long term reliability of the road network
- Agreed on what the project must achieve to be successful. These were seen as opportunities that the project could address. They were discussed and clarified as:

- Provide a quality asset that services future travel demand and growth while reducing maintenance costs
 - Improve travel conditions and reduce traffic congestion on the surrounding road network within Nowra
 - Improve road safety and connectivity between north and south Nowra for all road users
 - Increase freight productivity by improving access for oversize or large vehicles
 - Provide an option for a new crossing that minimise physical, social and environmental impacts
 - Ensure the traffic can flow satisfactorily during construction
 - Minimise the project's ongoing maintenance "whole of life" cost
 - Ensure any new bridge structure is compatible with the long-term transport network in the Nowra region
 - Work with the local community to improve the transport network in the region and increase customer satisfaction
- Discussed what else was important about the project :
 - The design and form of any new bridge should be appropriate to its setting (ie. context sensitive)
 - The project needs to allow certainty for future land use development as well as other future planning in the area
 - The project should allow for easy and improved connectivity north and south of the crossing
 - The project needs to provide an opportunity to improve community connections to the foreshore in line with council future planning
 - Reflected on the givens that the project was working within and the constraints that needed to be taken into account. These provided the context within which the project was being considered (see Chapter 2)
 - Identified and weighted assessment criteria which could be used to differentiate and evaluate the options:

From a Functional perspective

- Improve safety for pedestrians, cyclists and motorists
- Easily constructed under existing and forecast traffic conditions
- Improve through traffic efficiency
- Improve local connectivity
- Minimise impact on major public utilities
- Allow easy maintenance of the existing southbound bridge.

From a Socio-economic perspective

- Minimise direct impacts to properties
- Minimise changes to visual and landscape character
- Best fits with existing and future planning
- Minimise impact on urban business/service patronage
- Minimise traffic disruption during construction
- Minimise impacts to river users.

From an Environmental perspective

- Minimise impact on biodiversity
- Minimise impact on Aboriginal heritage
- Minimise impact on Non-Aboriginal heritage
- Ease of managing flooding implications on the bridges and approaches
- Ease of managing the impact of new noise.

- Reviewed information on Options A, B, C, D & E as the site options for the location of a new crossing and discussed their differences under various topic headings in order to obtain a common understanding of their differences, opportunities and constraints for later evaluation (see Chapter3)
- Agreed that Option E should not progress to the assessment stage because:
 - Option E would primarily allow the crossing to align with a future rail crossing of the Shoalhaven River. However, there is uncertainty around any future rail strategy extending the line across the river. It was also not clear if a road crossing would meet the needs of a rail crossing and if this was the most appropriate location for rail.
 - The location of Option E would cause greater property acquisition and land severance and impact on future connectivity requirements for Nowra
 - It is a very poor location for providing connections to the Nowra town centre

- It is a costly option and would need to have more work carried out on strengthening foundations to cater for future rail use (if appropriate).
- Evaluated Options A, B C and D against the assessment criteria in three categories and compared the outcomes against their relative cost estimates (see Chapter 3)
- Recommended that Option B should move forward as the preferred option to focus planning because:
 - It ranked as the best option in the three categories (functional, socio-economic and environmental) and provides relatively better value for money at this point in time
 - It best addresses the objective for maintenance and allows the retaining of the heritage iron truss bridge and/or the ease of its demolition if required
 - It has the least impact and allows easier access to the heritage iron truss bridge for future uses and maintenance
 - Visually, the two newer bridges will be more pleasing side by side
 - Minimises impacts to businesses on the eastern side of each bank of the river
 - It may prove easier to construct due to more suitable launching facilities and foundation conditions
 - Best option in terms of limiting impacts to properties.
- Agreed that option D should also move forward at this stage of project development as a fallback option. It was felt by some that this option could provide more flexibility in addressing issues related to the intersections on the immediate approaches to the bridge as well as better integrating with council's foreshore planning and CBD access strategy.
- Highlighted a number of issues that Roads and Maritime needs to address for Option B in the planning stage:
 - Investigating potential impacts and improvements to traffic efficiency and north/south connectivity issues on the immediate approaches to the new bridge
 - Undertaking further investigation into public utility impacts and consideration of additional costs
 - Further investigations into the potential environmental, cultural and social impacts
 - Liaising with Council to ensure the project can integrate with their long term plans and long term uses for the iron truss bridge
 - Clarifying the adjoining Aboriginal land claim issues
 - Minimising the risk of disruption to road users during construction
- Made the following conclusions from the workshop:
 - The existing southbound iron truss bridge and its setting on the Shoalhaven River is of high value to the local community
 - Based on the information available Options B, C and D provided better technical and environmental outcomes than Option A, whereas Option B provided the best socio-economic outcome. The relative costs estimates for Options B and D were similar, whereas Option C was 50% more expensive
 - The workshop participants recommended Option B as the preferred option because it provided on balance the better option from a functional, socio-economic and environmental perspective and was equal to the lowest cost leading to a better value for money outcome. However, further investigation is required in areas identified in the workshop
 - There was some support for Option D to also move forward at this stage of project development as a fallback option
 - Even though Option A was not considered the preferred option to meet the objectives for this project, it should not be ruled out as a long term option to improve land use development and economic growth in the region
 - As part of this project, Roads and Maritime needs to investigate the potential impacts and attempt to improve the road network around the immediate approaches to any new bridge (access to the CBD, Illaroo Road, Bolong Road and Bridge Road) to ensure the project is a success
 - The workshop group recommended that Option C should not be further pursued because it is more costly than Options B and D and would require demolition of the existing iron truss bridge which is considered a heritage item
 - The workshop group recommended that Option E should not be further pursued because it is around five times more expensive than Options B and D and would have greater impact on land severance, increase travel times and complicate connections to the existing road network and entrance into Nowra. The main benefit of Option E was its potential to integrate with a future rail

crossing of the Shoalhaven River, however investigations indicated that this is likely to be a very long term goal and the future rail crossing location is uncertain.

1.6 Next steps

- A *Value Management Workshop Report* capturing the process and outcomes of the workshop to be prepared and reviewed by the project team
- Roads and Maritime need to contact property owners that may be directly impacted by the project and keep them informed of the workshop recommendations. Assistance was asked of the participants to allow Roads and Maritime to undertake this as a courtesy to property owners before the recommendations of the workshop were released
- As mentioned during the workshop, a recommendation on the preferred option will be made to Roads and Maritime management and to the Minister. The final decision on the preferred option will be made by the Minister who will consider the community consultation, the technical studies gathered during the option investigations and the recommendations achieved at the VM workshop
- Funding has been announced in the Federal Budget to continue planning and development of the project which will include further investigations into the issues raised in the workshop
- The project team aims to position the project for an announcement on the preferred location in the middle of the year and then proceed quickly into concept design and environmental assessment.

2. Project information and analysis

The information presented in chapter two is a summary of the general analysis and perceptions by the workshop group as they shared information about the Nowra Bridge project. This allowed the participants to later make relative comparisons of the five site options based on what the project needed to achieve to be successful (ie. the project purpose, objectives and items of importance) and its cost.

2.1 Project background and overview

In order to allow the participants to obtain a common understanding of the project and planning undertaken to date, Nick Boyd, Project Development Manager, Roads and Maritime Services, outlined the project background including the site option identification and investigation process. A brief summary of information presented included:

- Project Background:
 - The Princes Highway crosses the Shoalhaven River at Nowra on two bridge structures – an 1880s iron “Whipple” truss bridge for southbound traffic and a 1980s concrete bridge for northbound traffic. The southbound bridge requires regular maintenance to ensure it continues to operate safely, however almost 50,000 vehicles cross the Shoalhaven River each day. Any large maintenance tasks have the potential to create heavy traffic queues and delays to traffic on the highway and surrounding roads. There is also a risk of damage to the iron truss structure from an impact with an over-height vehicle which could potentially close the bridge to all traffic until repaired
 - A new bridge crossing is primarily needed to address the maintenance issue, however a new bridge provides an opportunity to address a number of other issues associated with the current river crossings including the opportunity to improve traffic conditions in the area. Also a new bridge would provide an opportunity to remove current restrictions on the movement of some freight vehicles
 - It is not assumed that a new river crossing can only be considered in the immediate vicinity of the current Princes Highway corridor. A wider study area is being considered which includes the three transport corridors through Nowra-Bomaderry: the current Princes Highway road corridor, the proposed future western bypass corridor, and a corridor to the east that may assist the future extension of the South Coast rail line
 - This Value Management workshop is part of a wider *Site Options Development Study* to recommend a preferred site for a new crossing of the Shoalhaven River. It draws upon recent technical investigations and community consultation to refine the project objectives and inform the site option

development process. The results of this workshop will be used to formulate a final recommendation of the *Site Options Development Study*

- Key issues related to Traffic include:
 - Volumes crossing the existing bridges are comparable to Mt Ousley (around 50,000 per day)
 - Commuter peak periods are around 3,000 – 3,500 vehicles/hour
 - Three intersections on the bridge approaches largely contribute to these traffic issues
 - Completion of the current Princes Highway Upgrades (ie. Gerringong and Foxground to Berry Bypass) will alter traffic volumes and patterns at the northern intersections
 - Holiday peaks intensify the traffic issues
 - Through traffic (traffic likely to use a bypass) is only around 5-15 per cent of total traffic crossing the bridges
- Key issues related to Freight include:
 - There are constraints crossing the existing southbound bridge for some freight vehicles. These freight movements require lane closures / escorts / contra flows, etc
 - Risk of damage to the truss structure from an impact with heavy vehicles which may put the bridge out of service
 - Network severance risks should something happen on either bridge
- Key issues related to Road Safety include:
 - Rear end collisions are the dominant crash type
 - Collision with roadside objects is also a dominant crash type
 - Casualty crash rate is comparable to similar roads
 - Stage 5 road safety audit will be required
- Key issues related to Maintenance include:
 - The southbound iron truss bridge is over 130 years old and requires regular maintenance
 - The most recent condition assessment identified:
 - Corrosion
 - Loose components
 - Missing components
 - Pavement / deck issues
 - A bearing needing replacement
 - A pier needing strengthening
 - It is an old bridge requiring substantial work to remove rust, strengthen and tightening of the structure
 - Maintenance and inspection works are becoming more challenging due to high traffic volumes
- The primary objective of the Nowra bridge Project is to:
 - Address the high maintenance costs associated with the existing southbound structure while ensuring that traffic can flow satisfactorily during maintenance activities
- The project objectives (opportunities) that may arise as a result of the project are:
 - Provide a quality asset that services future travel demand and growth while reducing maintenance costs
 - Improve travel conditions and reduce traffic congestion on the surrounding road network within Nowra
 - Improve road safety and connectivity between north and south Nowra for all road users
 - Increase freight productivity by improving access for oversize or large vehicles
 - Provide an option for a new crossing that minimise physical, social and environmental impacts
 - Ensure the traffic can flow satisfactorily during construction
 - Minimise the project's ongoing maintenance "whole of life" cost
 - Ensure any new bridge structure is compatible with the long-term transport network in the Nowra region
 - Work with the local community to improve the transport network in the region and increase customer satisfaction
- Specific opportunities that the project needs to consider include:
 - Consideration of a bypass of Nowra
 - Consideration of a possible long term rail extension
 - Improving Illaroo Road and Bolong Road intersections
 - Providing a iconic feature for Nowra and enhancing the foreshore for the community

- A range of site options have been considered with five options shortlisted for further consideration. A number of options for a crossing have been discarded for a range of reasons including:
 - Alignments not on a transport corridor
 - Immediate extension of the rail line
 - Double or triple deck bridge options
 - Tunnels
- As a result of investigations, the known constraints related to the Environment include:
 - Several known Aboriginal heritage sites, mostly to the west
 - Several Non-Aboriginal heritage items in the area
 - Potential for Endangered Ecological Communities (EEC), mostly to the west
 - Seagrass may present a constraint to the east
 - The river, foreshore and open space areas are a social and visual asset to the community
- As a result of investigations, the known constraints related to Property include:
 - Property impacts are likely regardless of which option is preferred
 - There are sensitive land uses in some areas
 - There is an Aboriginal land claim to the west of the existing bridges which needs clarification
- As a result of investigations, the known constraints related to Design include:
 - Subsurface conditions are favourable to the west
 - The depth to rock is likely to be an issue for all options
 - Future maintenance issues surrounding old bridge need to be considered
- As a result of investigations, the known constraints related to Constructability include:
 - Limited space for construction activities on most of the options
 - The length of spans may limit the use of large precast units
 - Incremental launching (preferred method of construction) would be easier for some options over others
 - Maintaining traffic flow during construction is essential
- As a result of investigations, the known constraints related to Illaroo Road, Bolong Road and Bridge Road include:
 - Currently traffic improvements are a secondary objective
 - How much improvement to traffic conditions is enough?
 - There are difficult design and constructability issues to be resolved
 - Roads and Maritime preference would be to separate or stage the resolution of these issues
 - Value Management workshop may decide to recommend prioritising additional works as a subsequent stage
- As a result of investigations, the known constraints related to the heritage bridge structure include:
 - The iron truss bridge is listed on RMS Section 170 Heritage Register
 - Choice of option may influence or defer the decision on the future of the iron truss bridge
 - We are not in a position to decide the fate of the old bridge at this time
 - A preferred option may need to be subject to a subsequent decision on the iron truss bridge.

2.2 The problem

The workshop group reflected on the problem with the current situation and agreed:

- The Princes Highway currently crosses the Shoalhaven River at Nowra on two bridge structures. The two-lane iron truss bridge was constructed in the 1880s and requires regular maintenance to ensure it continues to operate safely
- With 50,000 vehicles crossing the river each day, any large maintenance tasks have the potential to create heavy traffic queues and delays to traffic on the highway and surrounding roads
- The iron truss bridge structure restricts the southbound movement of some freight vehicles
- An opportunity exists with the consideration of a new bridge to improve traffic conditions in the area as well as address the maintenance and freight vehicle restrictions.

2.3 Purpose of the project

The workshop group reflected on the purpose of the project. After discussion, the group concluded:

The purpose of the project is to address the high maintenance impacts associated with the existing southbound structure (including traffic efficiency, community, safety and cost) while ensuring that traffic can flow satisfactorily during maintenance activities. This will lead to improving future traffic flows and ensure the long term reliability of the road network.

2.4 Project objectives

The workshop group reflected on the project objectives (ie. what must the project achieve to be successful). These were seen as opportunities that the project could address. They were discussed and clarified as:

To be successful the project should:

- Provide a quality asset that services future travel demand and growth while reducing maintenance costs
- Improve travel conditions and reduce traffic congestion on the surrounding road network within Nowra
- Improve road safety and connectivity between north and south Nowra for all road users
- Increase freight productivity by improving access for oversize or large vehicles
- Provide an option for a new crossing that minimise physical, social and environmental impacts
- Ensure the traffic can flow satisfactorily during construction
- Minimise the project's ongoing maintenance "whole of life" cost
- Ensure any new bridge structure is compatible with the long-term transport network in the Nowra region
- Work with the local community to improve the transport network in the region and increase.

2.5 What else is important to the project

The workshop group shared from their various perspectives what else was important to the project. The points raised by the group included:

- The design and form of any new bridge should be appropriate to its setting (ie. context sensitive)
- The project needs to allow certainty for future land use development as well as other future planning in the area
- The project should allow for easy and improved connectivity north and south of the existing crossing
- The project needs to provide an opportunity to improve community connections to the foreshore in line with council future planning.

2.6 Givens and constraints

The givens and constraints within which the project was being planned were presented to the workshop group. These were added to and amended where necessary by the workshop participants. The givens and constraints outlined below were agreed to by the workshop group.

2.6.1 Givens we are working within

- A new bridge is required and this workshop is about recommending a preferred location of a new bridge
- The workshop will examine and evaluate the five site options that have been identified and investigated to recommend the location of a new bridge
- The actual design of the bridge has yet to be investigated, assessed or determined
- Three of the options are located next to the existing bridge structure with an additional upstream western bypass option and a downstream eastern option
- The ongoing use/ reuse/ demolition of the existing bridge has yet to be investigated, assessed or determined
- The existing bridge would be either retained or replaced

- Depending on the location, the new crossing may carry northbound or southbound traffic, or a combination of both
- Funding has been announced for planning of the project over the next 2-3 years (but not for construction)
- Current traffic flows across the bridge are to be maintained
- There is a need to ensure that emergency services and local residents can cross the river during construction particularly in the case of an emergency.

2.6.2 Constraints we need to take into account

- The iron truss bridge which, although is not listed on the State Heritage Register, is considered to be of State significance. The Roads and Maritime has a statutory requirement to maintain the bridge under the Roads and Maritime Section 170 listing
- Existing bridge(s) and approaches are to remain operational for both southbound and northbound traffic whilst the preferred option is being constructed
- The location of the existing Princes Highway and extent of the South Coast Rail Line need to be considered
- Water quality and flooding implications for the Shoalhaven River need to be considered
- Sensitive land uses in the vicinity of the existing bridge include community facilities, low density and potential future high density residential areas, areas designated for public recreation, potential future development sites and agricultural land
- Large areas of bushland, National Parks and agricultural properties to the west of the existing bridge need to be considered (ie. Option A – Western Bypass Option)
- Location of Aboriginal and Non-Aboriginal heritage sites need to be considered
- There is uncertainty around the future road network needs in Nowra as the long term needs have yet to be defined
- There is a need to consider the navigational requirements of river users.

2.7 Assessment criteria

Using the project objectives, some draft assessment criteria were proposed to evaluate the functional, socio-economic and environmental performance of the options, and to help the workshop group differentiate between them. It was noted that costs were not included as a criteria at this stage but would be added later in the workshop process to assist in identifying which option would provide the better “value for money”.

As a result of the information shared in the workshop to date, the group reviewed the draft assessment criteria that could be used to qualitatively evaluate the various.

These assessment criteria (in the three categories of functional, socio-economic and environmental perspectives) reflect the project objectives and items of importance and hence what the project should achieve to be successful.

2.7.1 Draft assessment criteria

Initially the draft assessment criteria proposed were:

Functional Perspective:

- F1 – Easily constructed and maintained under existing and forecast traffic conditions
- F2 – Improve safety for pedestrians, cyclists and motorists
- F3 – Improve traffic efficiency (reduce congestion and travel time)
- F4 – Improve local access to/from the Princes Highway
- F5 – Enhance connectivity in the local area for other freight, public and active transport
- F6 – Minimise impact on major public utilities
- F7 – Maximise the use of existing infrastructure for construction and operation
- F8 – Compliment existing bridge and improve the operation of the overall road network.

Socio-economic Perspective:

- S1 – Minimise the number of houses impacted
- S2 – Minimise the number of lots impacted/agricultural land
- S3 – Minimise changes to visual and landscape character
- S4 – Maintain access to community facilities & limit severance of the township.
- S5 – Minimise impact on future growth
- S6 – Minimise impact on rural activities
- S7 – Minimise impact on urban business/service patronage.

Environmental Perspective:

- E1 – Minimise impact on vegetation communities and areas of ecological value
- E2 – Minimise impact on threatened fauna species and sensitive environmental areas
- E3 – Minimise impact on Aboriginal heritage
- E4 – Minimise impact on Non-Aboriginal heritage, including removal of existing iron truss bridge
- E5 – Minimise impact on water quality and flooding implications for the Shoalhaven River.

2.7.2 Agreed assessment criteria

For each of the draft assessment criteria identified, the group clarified what it meant, ensured it reflected the purpose and that it would assist in differentiating between the various options. The group clarified, combined, amended and added to the draft assessment criteria to reflect what was considered appropriate.

After much discussion, the workshop group agreed to the amended assessment criteria below to be used to evaluate the options for the project.

Functional Perspective:

- F1 – Easily constructed under existing and forecast traffic conditions *(to ensure free flow traffic)*
- F2 – Improve safety for pedestrians, cyclists and motorists
- F3 – Improve through traffic efficiency *(reduce congestion and travel time including at peak times)*
- F4 – Improve local connectivity *(ie. access to/from Princes Highway for freight, public and active transport including to community facilities)*
- F6 – Minimise impact on major public utilities
- F9 – Allow easy maintenance of the existing southbound bridge.

Socio-economic Perspective:

- S1 – Minimise direct impacts to properties *(including lots, houses, businesses, agricultural land, etc)*
- S3 – Minimise changes to visual and landscape character
- S5 – Best fits with existing and future planning *(including regional development and local planning foreshore planning, etc)*
- S7 – Minimise impact on urban business/service patronage
- S8 – Minimise traffic disruption during construction *(including social impacts)*
- S9 – Minimise impacts to river users.

Environmental Perspective:

- E1 – Minimise impact on biodiversity *(ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, etc)*
- E3 – Minimise impact on Aboriginal heritage
- E4 – Minimise impact on Non-Aboriginal heritage
- E5 – Ease of managing flooding implications on the bridges and approaches
- E6 – Ease of managing the impact of new noise.

Points of note made during discussion of the assessment criteria included the following:

- In the Functional Perspective category:
 - The group clarified that criteria F3 - Improve traffic efficiency referred to through traffic whereas the draft criteria F4 and F5 were combined to a new F4 which related to the connectivity of local traffic
 - As criteria F1 was related to the construction of a new bridge, another criteria needed to be added to assess how the options performed in terms of allowing the existing southbound bridge to be maintained. This criteria became F9 - Allow easy maintenance of the existing southbound bridge traffic
- In the Socio-economic Perspective category:
 - The group combined the draft criteria S1, S2 and S6 to be S1 - Minimise direct impacts to properties
 - The draft criteria S4 was seen to be a duplication of criteria F4 and removed
 - The draft criteria S5 was reworded to reflect a wider perspective as S5 - Best fits with existing and future planning and would address not only local planning but a wider regional planning
 - Two additional criteria were added being S8 - Minimise traffic disruption during construction and S9 - Minimise impacts to river users
- In the Environmental Perspective category:
 - The group combined draft criteria E1 and E2 to be E1 - Minimise impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, etc)
 - As water quality impacts could not be differentiated between the options, draft criteria E5 was reworded as E5 - Ease of managing flooding implications on the bridges and approaches
 - An additional criteria was added being E6 – Ease of managing the impact of new noise
- Finally, although important to be achieved by the project, some of the assessment criteria considered were unlikely to differentiate between the options (as they would be the same for each option). These were agreed as:
 - Remove existing constraints to freight vehicles
 - Ensure bridge height is no lower than existing bridge deck
 - Provide travel conditions consistent with the function and role of the Princes Highway
 - Support regional and economic development.

As a result of going through the project objectives and other statements made in the workshop, it was felt that the refined assessment criteria were the most appropriate criteria to evaluate the site options for a new bridge.

Again, it was noted that costs would not be included at this stage of the analysis in order to separate the concept of “value” of the options from “money”. Later in the process, costs would be included so that participants could make a judgement as to which options provided better “value” for the money being expended.

2.8 Weighting of the assessment criteria

Relative weightings for the assessment criteria within each perspective were carried out by the whole group using a paired comparison technique.

This technique helps work out the relative importance of different options or statements by comparing these statements against each other in pairs.

It should be noted that the paired comparison process resulted in some criteria receiving a score of zero. While this criteria is important and requires careful consideration during the next stage of the project’s development, the assessment of the preferred option would not rely on its performance against this criteria.

The discussion around the paired comparison process was extensive and allowed the group to understand and appreciate the various perspectives represented within the workshop. The final weightings were reached as a consensus. The group’s workings and their weightings of the assessment criteria for each perspective are shown below.

2.8.1 Functional perspective

| No | Assessment | Raw Score | Relative Weightings |
|----|---|-----------|---------------------|
| F1 | Easily constructed under existing and forecast traffic conditions | 1 | 7% |
| F2 | Improve safety for pedestrians, cyclists and motorists | 5 | 33% |
| F3 | Improve through traffic efficiency | 2 | 13% |
| F4 | Improve local connectivity | 3 | 20% |
| F6 | Minimise impact on major public utilities | 0 | 0% |
| F9 | Allow easy maintenance of the existing southbound bridge | 4 | 27% |
| | Total | 15 | 100% |

Scoring Matrix

The workings for the relative assessment when compared to each other are shown below.

| | F2 | F3 | F4 | F6 | F9 |
|----|----|----|----|----|----|
| F1 | F2 | F3 | F4 | F1 | F9 |
| F2 | | F2 | F2 | F2 | F2 |
| F3 | | | F4 | F3 | F9 |
| F4 | | | | F4 | F9 |
| F6 | | | | | F9 |
| F9 | | | | | |

Summary

The weighting of the assessment criteria from a Functional Perspective using the paired comparison approach indicated that the “Improve safety for pedestrians, cyclists and motorists” was the most important criteria followed by “Allow easy maintenance of the existing southbound bridge” and then “Improve local connectivity” in terms of importance. The next most important assessment criteria was “Improve through traffic efficiency” followed by “Easily constructed under existing and forecast traffic conditions”. “Minimise impact on major public utilities” was not considered as important as the other criteria when compared in pairs, and scored zero.

2.8.2 Socio-economic perspective

| No | Assessment | Raw Score | Relative Weightings |
|----|---|-----------|---------------------|
| S1 | Minimise direct impacts to properties | 1.5 | 10% |
| S3 | Minimise changes to visual and landscape character | 3 | 20% |
| S5 | Best fits with existing and future planning | 5 | 33% |
| S7 | Minimise impact on urban business/service patronage | 4 | 27% |
| S8 | Minimise traffic disruption during construction | 1.5 | 10% |
| S9 | Minimise impacts to river users | 0 | 0% |
| | Total | 15 | 100% |

Scoring Matrix

The workings for the relative assessment when compared to each other are shown below.

| | | | | | |
|-----------|-----------|-----------|-----------|-----------|-----------|
| | S3 | S5 | S7 | S8 | S9 |
| S1 | S3 | S5 | S7 | S1/S8 | S1 |
| | S3 | S5 | S7 | S3 | S3 |
| | | S5 | S5 | S5 | S5 |
| | | | S7 | S7 | S7 |
| | | | | S8 | S8 |
| | | | | | S9 |

Summary

The weighting of the assessment criteria from a Socio-economic Perspective using the paired comparison approach indicated that the “Best fits with existing and future planning” was the most important criteria followed by the “Minimise impact on urban business/service patronage” then “Minimise changes to visual and landscape character” and then “Minimise direct impacts to properties” and “Minimise traffic disruption during construction” in terms of importance. “Minimise impacts to river users” was not considered as important as the other criteria when compared in pairs, and scored zero.

2.8.3 Environmental perspective

| No | Assessment | Raw Score | Relative Weightings |
|----|--|-----------|---------------------|
| E1 | Minimise impact on biodiversity | 3 | 30% |
| E3 | Minimise impact on Aboriginal heritage | 3 | 30% |
| E4 | Minimise impact on Non-Aboriginal heritage | 3 | 30% |
| E5 | Ease of managing flooding implications on the bridges and approaches | 1 | 10% |
| E6 | Ease of managing the impact of new noise | 0 | 0% |
| | Total | 10 | 100% |

Scoring Matrix

The workings for the relative assessment when compared to each other are shown below.

| | | | | |
|-----------|-----------|-----------|-----------|-----------|
| | E3 | E4 | E5 | E6 |
| E1 | E1/E3 | E1/E4 | E1 | E1 |
| | E3 | E3/E4 | E3 | E3 |
| | | E4 | E4 | E4 |
| | | | E5 | E5 |
| | | | | E6 |

Summary

The weighting of the assessment criteria from an Environmental Perspective using the paired comparison approach indicated that the “Minimise impact on biodiversity”, “Minimise impact on Aboriginal heritage” and “Minimise impact on Non-Aboriginal heritage” were the most important criteria followed by the “Ease of managing flooding implications on the bridges and approaches”. “Ease of managing the impact of new noise” was not considered as important as the other criteria when compared in pairs, and scored zero.

2.8.4 Assessment summary

A summary of the weightings of the assessment criteria within the various themes as determined by the group appears below.

| Assessment Criteria | | | | | |
|---|-----|---|-----|--|-----|
| Functional | | Socio-economic | | Environmental | |
| Criteria | Wt | Criteria | Wt | Criteria | Wt |
| Easily constructed under existing and forecast traffic conditions | 7% | Minimise direct impacts to properties | 10% | Minimise impact on biodiversity | 30% |
| Improve safety for pedestrians, cyclists and motorists | 33% | Minimise changes to visual and landscape character | 20% | Minimise impact on Aboriginal heritage | 30% |
| Improve through traffic efficiency | 13% | Best fits with existing and future planning | 33% | Minimise impact on Non-Aboriginal heritage | 30% |
| Improve local connectivity | 20% | Minimise impact on urban business/service patronage | 27% | Ease of managing flooding implications on the bridges and approaches | 10% |
| Minimise impact on major public utilities | 0% | Minimise traffic disruption during construction | 10% | Ease of managing the impact of new noise | 0% |
| Allow easy maintenance of existing southbound bridge | 27% | Minimise impacts to river users | 0% | | |

These weighted assessment criteria would later be used to evaluate the site options for the project.

Having built a foundation and common understanding of the issues, what is important to the project, the givens and the assessment criteria for option evaluation, the group was now in a position to broadly review the five site options for the project.

3. Site options review

3.1 Option description and comparison

Stuart Dalziel, Project Manager, AECOM presented the five identified site options (Options A, B, C, D and E). These options would later be evaluated against the assessment criteria.

A brief description of the options as presented:

- **Option A** – Western bypass option. Option A would involve construction of a new bridge as part of a potential future western bypass of Nowra. This crossing would be part of an alignment that skirts to the west of Nowra along the proposed Regional Service Corridor
- **Option B** – West of the existing crossing. Option B would involve construction of a new bridge immediately west (upstream) of the existing northbound concrete box girder bridge on the Princes Highway
- **Option C** – On the existing southbound bridge alignment. Option C involved construction of a new bridge

on the alignment of the existing southbound iron truss bridge on the Princes Highway. This option would involve demolition of the existing iron truss bridge

- **Option D** – East of the existing crossing. Option D would involve construction of a new bridge immediately east (downstream) of the existing southbound iron truss bridge on the Princes Highway
- **Option E** – Further east of the existing crossing. Option E would involve construction of a new bridge further east (downstream) of the existing southbound iron truss bridge on the Princes Highway. This would be further east of Option D.

As questions were asked by the workshop group about the various options, the project team presented investigations and findings to date.

Finally, the workshop group reviewed a summary table of constraints and opportunities for the five site options in the VM Background Paper. Additions and amendments to key constraints and opportunities presented were made and are shown on the next page.

The purpose of the review was for the workshop group to gain a common understanding of the options and their differences, constraints and opportunities so that they could be evaluated against the various assessment criteria previously developed and weighted earlier in the workshop.

3.1.1 Option A – Western Bypass

Constraints presented

| | |
|--|--|
| <p>Functional</p> <ul style="list-style-type: none"> • Estimated that only 16 per cent of all river crossing traffic would use the western bypass bridge • Resulting in limited relief to traffic issues at the existing crossings • Large amount of supporting infrastructure required to connect to Princes Highway and local road network | <p>Socio-economic</p> <ul style="list-style-type: none"> • Greater potential for acquisition, lot fragmentation and property severance • Potential for business impacts due to the loss in highway generated trade • Changes to the predominately rural and bushland landscape • Crossing location is largely devoid of any major infrastructure or development |
| <p>Environmental</p> <ul style="list-style-type: none"> • Potential to have a greater ecological impact than the other options, including the number and diversity of threatened species • Contains multiple culturally sensitive landforms, which all have a higher sensitivity for Aboriginal heritage • West Nowra Recycling and Waste Facility may present a moderate risk in terms of potential contamination | <p>Other considerations</p> <ul style="list-style-type: none"> • Eastern Gas Pipeline is located within the study area and should be avoided if possible – or the number of crossings limited • The Shoalhaven River west of Nowra is deeply incised and a bridge structure at this location could have considerable impacts on both velocity and water level |

Opportunities presented

| | |
|---|---|
| <p>Functional</p> <ul style="list-style-type: none"> • Provides an alternative north-south transport corridor and connectivity to western suburbs | <p>Socio-economic</p> <ul style="list-style-type: none"> • Minimises impacts to sensitive land uses and community infrastructure within the Nowra-Bomaderry town centres • Improves general connectivity to future developments • Presents an opportunity to maintain and preserve the existing iron truss bridge structure |
|---|---|

| | |
|---|---|
| <p>Environmental</p> <ul style="list-style-type: none"> Minimises non-Aboriginal heritage impacts within the Nowra-Bomaderry town centres | <p>Other considerations</p> <ul style="list-style-type: none"> Potentially more favourable geotechnical conditions by avoiding relatively shallow sandstone and deep alluvium |
|---|---|

Further discussion by the workshop group and focus groups:

- Although this option goes much further than what is required to address the core objective of the Nowra Bridge project, it needs to be acknowledged that it is a long term solution of regional significance by linking major transport generators or “hubs” of residential land uses and employment generating land uses. It allows through traffic and others to bypass the more urban and commercial areas of Nowra
- HMAS Albatross and South Nowra industrial area are the major HML destinations south of Nowra. It was suggested that over 40% gross revenue in Nowra is a result of having HMAS Albatross in the area
- This option should not be seen as just a Shoalhaven City Council option as it was identified from extensive consultation and feedback across the region
- A view was expressed that even if Option A were built, the problems experienced with the existing road network (ie. traffic capacity crossing the river and existing approach intersections) would remain unsolved
- With projections that Option A would carry only 16% of total traffic in 2036, it was questioned whether it truly addressed the objectives of the Nowra Bridge project.

3.1.2 Option B – West (immediately upstream) of the existing crossing

Constraints presented

| | |
|---|--|
| <p>Functional</p> <ul style="list-style-type: none"> Requires grade-separation of existing intersections on the Princes Highway north and south of the river crossing | <p>Socio-economic</p> <ul style="list-style-type: none"> Impacts to existing recreational uses, which are focused on the southern foreshore, as well as residential, community facilities, tourist and businesses activities Potential sterilisation or the generation of residual land given the smaller lot sizes |
| <p>Environmental</p> <ul style="list-style-type: none"> The study area includes a potential habitat for threatened species and endangered ecological communities (EEC) and seagrass communities Contains a number of locally listed heritage items An area of high contamination risk has been identified within the southwest section- potential residues associated with the former Nowra Gasworks site | <p>Other considerations</p> <ul style="list-style-type: none"> N/A |

Opportunities presented

| | |
|---|---|
| <p>Functional</p> <ul style="list-style-type: none"> Would accommodate 100 per cent of all river crossing traffic | <p>Socio-economic</p> <ul style="list-style-type: none"> Presents an opportunity to maintain and preserve the existing iron truss bridge structure Consolidates river crossing infrastructure within the vicinity of the existing bridges, and in doing so retains upstream and downstream open landscape qualities. |
|---|---|

| | |
|---|---|
| <p>Environmental</p> <ul style="list-style-type: none"> • Relatively low potential impacts to Aboriginal heritage sites and areas of archaeological sensitivity • Presents an opportunity to avoid or limit impacts to items of State significance • Generally contains fewer areas of environmental concern compared to more industrialised areas in the eastern options | <p>Other considerations</p> <ul style="list-style-type: none"> • Potentially more favourable geotechnical conditions by avoiding relatively shallow sandstone and deep alluvium • Appears to have the least overall impact on existing properties and the most practical location for construction • New crossing locations within the immediate vicinity of the existing river crossing present the least risk of changing river flow patterns and flood behaviour |
|---|---|

Further discussion by the workshop group and focus groups:

- The relative cost estimate for Option B was questioned because there was doubt the challenges at the immediate intersections were clearly understood and reflected. There was discussion around the nature of the cost estimates which was unlikely to be a deciding factor between some of the comparable options
- Grade separation was mentioned as a way of potentially addressing the immediately adjacent local roads issues near the current bridges. It was clarified that the option does not “require” grade separation of the adjacent intersections, however workshop participants felt strongly that it should be considered
- Questions were asked about whether the river crossing portion of any new bridge would closely follow the profile of the 1980s concrete bridge to avoid visually screening the 1880s iron truss bridge
- There is an Aboriginal land claim within the study area which will need to be resolved
- A participant stated that this option would encounter construction difficulties at Illaroo Road due to levels and utilities, and that the option would prevent future construction of another bridge proposed under the Nowra Bomaderry Structure Plan
- The statement made in the constraints table presented for Option B that ‘an area of high contamination risk has been identified within the southwest section - potential residues associated with the former Nowra Gasworks site’ was challenged as it may not be true and/or the risk may be small. The statement was clarified as being a potential area of high risk and was acknowledged that the wording of this statement could cause unnecessary concern to local residents
- It was clarified that in the “opportunities” table under “other considerations”, while the option appeared to be the most practical for construction, it would not necessarily have the least overall impact on properties (Option C would have less impact on properties).

3.1.3 Option C – Existing southbound bridge alignment

Constraints presented

| | |
|---|--|
| <p>Functional</p> <ul style="list-style-type: none"> • Requires grade-separation of existing intersections on the Princes Highway north and south of the river crossing | <p>Socio-economic</p> <ul style="list-style-type: none"> • Similar socio-economic constraints to Option B and Option D. However, the potential or extent of impacts on property and land use would be reduced • Would involve the removal of the existing iron truss bridge structure |
| <p>Environmental</p> <ul style="list-style-type: none"> • Generally has the same environmental constraints to Options B, D and E • Requires demolition of the existing iron truss bridge | <p>Other considerations</p> <ul style="list-style-type: none"> • Appears to be problematic in terms of constructability |

Opportunities presented

| | |
|---|--|
| <p>Functional</p> <ul style="list-style-type: none"> • Would accommodate 100 per cent of all river crossing traffic | <p>Socio-economic</p> <ul style="list-style-type: none"> • A new bridge on the existing alignment may present an opportunity to minimise socio-economic impacts and disturbance to foreshore land uses • Consolidates river crossing infrastructure within the vicinity of the existing bridges, and in doing so retains upstream and downstream open landscape qualities |
| <p>Environmental</p> <ul style="list-style-type: none"> • Relatively low potential impacts to Aboriginal heritage sites and areas of archaeological sensitivity | <p>Other considerations</p> <ul style="list-style-type: none"> • New crossing locations within the immediate vicinity of the existing river crossing present the least risk of changing river flow patterns and flood behaviour |

Further discussion by the workshop group and focus groups:

- Issues with constructability would be a major constraint for this option
- Construction under traffic without causing considerable and lengthy disruption to traffic flows would be virtually impossible if the existing 1880s iron truss bridge was demolished – much more than in either Options B or D
- Replacement or renewal of the piers will be a challenge
- The space between the 1880s iron truss bridge and the 1980s concrete bridge is around six metres as there were concerns around the stability of the southbound bridge footings given the lack of knowledge/information on its construction
- A workshop participant proposed that this option could be constructed by building half new bridge on the alignment – move traffic onto it and then build the other half. This could alleviate some of the traffic impacts during construction. There was discussion about whether this could be achieved in such close proximity to the existing bridges and footings
- It was clarified that the option does not “require” grade separation of the adjacent intersections, however the workshop felt strongly that it should be considered
- Participants with knowledge of heritage issues stated that it would be extremely difficult to obtain approval to demolish the existing iron truss bridge.

3.1.4 Option D – East (immediately downstream) of the existing crossing

Constraints presented

| | |
|---|---|
| <p>Functional</p> <ul style="list-style-type: none"> • Requires grade-separation of existing intersections on the Princes Highway north and south of the river crossing | <p>Socio-economic</p> <ul style="list-style-type: none"> • Similar socio-economic constraints to Option B and Option C. However, the impacts to individual properties and land uses would likely differ – particularly to agricultural land on the northern bank • Tourist cruising activities depart from the wharf immediate to the east of the existing iron truss bridge |
| <p>Environmental</p> <ul style="list-style-type: none"> • Generally has the same environmental constraints to Options B, C and E • Location may box-in and reduce the historical value of the existing iron truss bridge • Greater potential for impacts to the State heritage item Graham Lodge, and the locally listed Inter-war Weatherboard Building and Timber Wharf | <p>Other considerations</p> <ul style="list-style-type: none"> • Appears to have more property impact and be slightly less practical to construct in comparison to Option B |

Opportunities presented

| | |
|--|---|
| <p>Functional</p> <ul style="list-style-type: none"> • Would accommodate 100 per cent of all river crossing traffic | <p>Socio-economic</p> <ul style="list-style-type: none"> • Presents an opportunity to maintain and preserve the iron truss bridge structure - which will depend on the impact of the new crossing • Consolidates river crossing infrastructure within the vicinity of the existing bridges, and in doing so retains upstream and downstream open landscape qualities |
| <p>Environmental</p> <ul style="list-style-type: none"> • Relatively low potential impacts to Aboriginal heritage sites and areas of archaeological sensitivity • Presents an opportunity to avoid or limit impacts to items of State significance, but may reduce historical value of the existing iron truss bridge | <p>Other considerations</p> <ul style="list-style-type: none"> • New crossing locations within the immediate vicinity of the existing river crossing present the least risk of changing river flow patterns and flood behaviour |

Further discussion by the workshop group and focus groups:

- Participants with knowledge of heritage issues stated that it would be extremely difficult to obtain approval to intentionally impact on the heritage values of the existing iron truss bridge
- The risk of visually “boxing in” the 1880s iron truss bridge created a concern for participants if this option proceeds. It was suggested that the context, vista and setting for the 1880 iron truss bridge needs to be protected as far as possible
- The 1880s iron truss bridge is seen by many as the familiar gateway to Nowra. This could be threatened if the newer bridges are seen to visually and physically dominate the 1880s iron truss bridge
- There was discussion of the potential difficulties of launching a bridge structure from the southern bank, and potentially increased property impacts as a result
- It was clarified that the option does not “require” grade separation of the adjacent intersections, however the workshop felt strongly that it should be considered
- The relative cost estimate for Option D compared to Option B was discussed as the likely additional costs for property acquisition for Option D were unable to be quantified in detail. There was discussion around the nature of the estimates which was unlikely to be a deciding factor between some of the comparable options.

3.1.5 Option E – Further east (further downstream) of the existing crossing

Constraints presented

| | |
|---|--|
| <p>Functional</p> <ul style="list-style-type: none"> • Requires grade-separation of existing intersections on the Princes Highway north and south of the river crossing | <p>Socio-economic</p> <ul style="list-style-type: none"> • Greater potential for community severance and/or loss of properties given the introduction of an additional crossing at a distance to the current bridges • Increases the fragmentation of the agricultural property on the northern bank of the river • Connectivity to spaces isolated between the existing and future eastern crossing would be a key constraint |
|---|--|

| | |
|--|---|
| <p>Environmental</p> <ul style="list-style-type: none"> • Generally has the same environmental constraints to Options B, C and D • Larger study area has a greater potential for in-situ archaeological deposits to be present • Broad study area contains a number of locally listed heritage items, and two State heritage items Graham Lodge and Bomaderry Rail Station | <p>Other considerations</p> <ul style="list-style-type: none"> • May present a risk of changing river flow patterns and flood behaviour – will depend on the location of the new crossing |
|--|---|

Opportunities presented

| | |
|--|--|
| <p>Functional</p> <ul style="list-style-type: none"> • Would accommodate 100 per cent of all river crossing traffic | <p>Socio-economic</p> <ul style="list-style-type: none"> • May improve consistency with land use zone objectives • Presents an opportunity to maintain and preserve the iron truss bridge structure |
| <p>Environmental</p> <ul style="list-style-type: none"> • Presents an opportunity to avoid or limit impacts to items of State significance | <p>Other considerations</p> <ul style="list-style-type: none"> • N/A |

Further discussion by the workshop group and focus groups:

- This option could tie into a future rail corridor (if the future rail corridor was known)
- The cost involved in building a bridge to carry future rail as well as traffic was viewed as a very expensive investment. With no forward planning available for rail to cross the river, the timeline for rail development south of the river appears too far in the future to commit to such a crossing
- The risk of assuming a future location for a rail extension was discussed, with a high risk identified of placing the bridge in the wrong location for future rail, or of placing the bridge in a location that may present difficulties for a future rail extension
- There appears to be a significant, deep hole in the river bed which is used by the commercial fishing industry for harvesting prawns in the proximity of this option
- There will be impacts on existing agricultural pursuits near the river banks for this option
- It was clarified that the option does not “require” grade separation of the adjacent intersections, however the workshop felt strongly that it should be considered.

3.2 Initial cull of options

In order to concentrate the workshop group’s efforts on the more feasible site options the workshop group was asked to nominate if there were any options that did not warrant further evaluation and the reasons why.

After discussion the group unanimously agreed that Option E (the crossing further east of the existing crossing and further east of Option D) did not warrant further assessment because:

- The option’s main driver was to allow the crossing to align with a future rail crossing of the Shoalhaven River. However, there was major uncertainty on the future rail strategy of crossing the river and whether such a crossing for road purposes would also meet the need for rail purposes or whether such a location for the rail crossing was appropriate at all
- The location of Option E being further east of Option D would cause greater property acquisition and land severance. It would cause greater fragmentation as well as impact on future connectivity requirements for Nowra
- It is a very poor location for providing connections to the Nowra town centre and the future proposed western bypass
- It complicates the north-south travel corridor and because of its greater length, it is likely to increase travel time
- It is a costly option and would need to have more work undertaken on strengthening foundations to cater for future rail use (if appropriate).

3.3 Assessment of options

Having reviewed the options, gained a common understanding of their differences and shortlisted the most feasible four site options, the group was now in a position to evaluate them against the weighted assessment criteria previously developed.

The group (in three focus groups) evaluated the options using the assessment criteria for each of the key perspectives. For instance, one focus group assessed the options against the functional perspective, while a second focus group assessed the options against the environmental perspective, and the third group assessed the options against the socio-economic perspective.

It should be noted that each focus group was (as much as possible) a representative cross section of the workshop participants (ie. a mix of community, council, project team and Roads and Maritime, etc).

The options were assessed relatively and qualitatively as to how each option performed against each criteria. The approach was to review the relevant information related to each criteria for each option, then to decide which of the options performed better against this criteria. The best performing option against each criteria would be scored a "4".

The next step would be to assess how much better the best performing option was relative to the other options. 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".

Where more information on a particular issue was needed, the group used the collective wisdom and expertise of the participants undertaking the evaluation to determine the relativity of the options against the criteria in question. The group assessed the options against each criteria "on balance" of the considerations of the various points.

Once the evaluation was complete, the results were scored using the appropriate weighting. This enabled a relative overall ranking for each option for the three criteria categories (from '1' to '4' with '1' being the best).

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

Each focus group discussed their findings and recorded their observations and conclusions as a result of their deliberations.

The findings of each focus group were presented to the whole group for discussion, amendment (if necessary) and finally endorsement (if appropriate) to assist the group move forward. Their findings as presented (together with any amendments) and as agreed by the whole group are listed below.

3.3.1 Assessment of options using the functional perspective

| Assessment Criteria | Easily constructed under existing and forecast traffic conditions | Improve safety for pedestrians, cyclists and motorists | Improve through traffic efficiency | Improve local connectivity | Allow easy maintenance of existing southbound bridge | |
|---------------------|---|--|------------------------------------|----------------------------|--|------------|
| Weighting | 7% | 33% | 13% | 20% | 27% | |
| Option A | 4 | 4 | 4 | 4 | 4 | 4 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 28 | 33 | 52 | 20 | 27 | 160 |
| Option B | 4 | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 21 | 132 | 39 | 60 | 81 | 333 |
| Option C | 4 | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 7 | 132 | 39 | 40 | 108 | 326 |
| Option D | 4 | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 21 | 132 | 39 | 80 | 54 | 326 |

Key Observations

- With regards to “Easily constructed under existing and forecast traffic conditions” Option A was considered the best as it can be completely constructed off line. Options B and D were rated equally as the next best and could mostly be built off line. The worst option would be Option C as it would require major disruption to traffic flows and demolition of the existing southbound bridge
- With regards to “Improve safety for pedestrians, cyclists and motorists” Options B, C and D would all improve safety by roughly the same amount and were considered equal. Option A was considered relatively poorer by a major amount as it is too far from the existing demand
- With regards to “Improve through traffic efficiency”, Options A was considered the best as it provides an alternative route for through traffic for the current Princes Highway through Nowra. Options B, C and D were considered equal
- With regards to “Improve local connectivity”, Option D was considered the best option subject to detailed investigation and improvements to the approach road intersections. If this is not included it

cannot be appropriately ranked. Option B was considered the next best with a minor difference to Option D. Option C followed with Option A being the poorest against this criteria

- With regards to “Allowing easy maintenance of the existing southbound bridge”, Option C rated the best as it is assumed in Option C that the old bridge is removed and therefore no maintenance is required. Option B is rated the next best (ie. if the existing southbound iron truss bridge remains and the bridge is used only for pedestrians and cyclists). This is followed by Option D which is rated slightly poorer as it “boxes in” the old bridge and then Option A was considered the worst option.

3.3.2 Assessment of options using the socio-economic perspective

| Assessment Criteria | Minimise direct impacts to properties | Minimise changes to visual and landscape character | Best fits with existing and future planning | Minimise impact on urban business/service patronage | Minimise traffic disruption during construction | |
|---------------------|---------------------------------------|--|---|---|---|------------|
| Weighting | 10% | 20% | 33% | 27% | 10% | |
| Option A | 4 | 4 | 4 | 4 | 4 | 4 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 10 | 20 | 99 | 81 | 40 | 250 |
| Option B | 4 | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 30 | 80 | 132 | 108 | 20 | 370 |
| Option C | 4 | 4 | 4 | 4 | 4 | 2 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 40 | 40 | 99 | 108 | 10 | 297 |
| Option D | 4 | 4 | 4 | 4 | 4 | 2 |
| | 3 | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | 1 | |
| Sub-total | 20 | 40 | 132 | 108 | 20 | 320 |

Key Observations

- With regards to “Minimise direct impacts to properties”, as it is on the current alignment and no extra properties are required, Option C performs the best. Option B requires less property acquisition than Option D. Clarification of the Native Title Claim is required for Option B. Option A has the greatest impact on property compared to the other options

- With regards to “Minimise changes to visual and landscape character”, Option B performs the best as it is on the western side of the northbound concrete bridge and can be designed to minimise visual impact. Option C removes the iron truss bridge and the old bridge character is lost with no added infrastructure (ie. replaces a bridge with a bridge). It needs to be acknowledged that there is a lot of local connection to the existing old iron truss bridge and its character. Option D is also seen as a medium difference to Option B as it “boxes in” the old iron truss bridge and could make it less visible. Option A is seen as the poorest option as it introduces a new feature to a “greenfield” high quality landscape area
- With regards to “Best fits with existing and future planning”, Options B and D performed the best in terms of local short term needs and traffic planning. Option B also introduces alternative opportunities for the old iron truss bridge. Option C does not allow for increasing future capacity for crossing the river (ie. it replaces a bridge with a bridge). However Option C would not disrupt any future foreshore planning. It needs to be acknowledged that Option A is a future bypass option and would perform a role in the broader regional context but does not provide for the short term need of the local community
- With regards to “Minimise impact on urban business/service patronage”, Options B, C and D (central options) were rated the same and the best against this criteria. Option A was considered the worst but by how much was debatable as it is not clear how much (percentage) business is passing trade. There was concern over the impact of closing the old iron truss bridge
- With regards to “Minimise traffic disruption during construction”, Option A was considered the best against this criteria, followed by Options B and D with the issue being around the ties into the existing road approaches. Option C was considered the worst option against this criteria.

3.3.3 Assessment of options using the environmental perspective

| Assessment Criteria | Minimise impact on biodiversity | Minimise impact on Aboriginal heritage | Minimise impact on Non-Aboriginal heritage | Ease of managing flood implications on the bridges and approaches | |
|---------------------|---------------------------------|--|--|---|------------|
| Weighting | 30% | 30% | 30% | 10% | |
| Option A | 4 | 4 | 4 | 4 | 4 |
| | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | |
| Sub-total | 30 | 30 | 120 | 40 | 220 |
| Option B | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | |
| Sub-total | 90 | 90 | 90 | 30 | 300 |
| Option C | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | |
| Sub-total | 120 | 120 | 30 | 30 | 300 |

| | | | | | |
|-----------------|-----------|-----------|-----------|-----------|----------|
| Option D | 4 | 4 | 4 | 4 | 1 |
| | 3 | 3 | 3 | 3 | |
| | 2 | 2 | 2 | 2 | |
| | 1 | 1 | 1 | 1 | |
| | 90 | 90 | 60 | 30 | |

Key Observations

- With regards to “Minimise impact on biodiversity”, Option C performs the best as it will be constructed within the existing footprint and in a disturbed corridor. Options B and D are marginally worse although similar to each other. Both are largely within a disturbed corridor. Option A is significantly worse due to its impact in an undisturbed land and river environment further upstream
- With regards to “Minimise impact on Aboriginal heritage”, Option C is considered the best against this criteria again because it will be constructed within the existing footprint and in a disturbed corridor. Options B and D are marginally worse although similar to each other. Both are largely within a disturbed corridor. Option A is significantly worse due to its impact in an undisturbed land and river environment further upstream. There are known and potential heritage sites within sensitive landforms in this area
- With regards to “Minimise impact on Non-Aboriginal heritage”, Option A is considered the best against this criteria as there are no known heritage impacts or potential likely impacts. Option B is considered the next best. There is potential for impact on the flood boat shelter but it is still marginally better than Option D. Option D is more constrained and there is a greater likelihood of impact on heritage items such as the wharf and Grahams Lodge. There is also a greater visual impact on the existing iron truss bridge than Option B. Option C has the greatest impact on the iron truss bridge (ie. demolition) which is on the Roads and Maritime Section 170 Heritage Register
- With regards to “Ease of managing flood implications on the bridges and approaches”, Option A performs the best as a high level bridge can be constructed, not constrained by the 1 in 100 year flood level and there are no constraints with the number and location of the pylons. Options B, C and D are considered the same and differ from Option A by a small amount as they are all affected by the 1 in 100 year flood level and the limitation on location of pylons.

3.4 Relative cost estimates

The group was presented with relative cost estimates for the four options to gain some comparison between options. It was noted that the magnitude of costs (at this stage) were indicative and could only be used for relativity purposes.

Absolute value estimates for each option are likely to change as the project progresses. However the relative order of magnitude between the options can be assumed as the same. Further work on costs would need to be carried out as more information is received and the project progresses.

A summary of the cost information presented for comparison purposes is shown below.

| Options | Relative Costs |
|----------------|-----------------------|
| Option A | \$10X |
| Option B | \$X |
| Option C | \$1.5X |
| Option D | \$X |

3.5 Value matrix

A summary of the rankings of the options based on the qualitative assessment together with the relative cost estimates was tabled in a Value Matrix so that the group could draw some conclusions as to which option provided best “value for money”. The matrix appears below.

Value Matrix

| Options | Assessment Perspective | | | |
|----------|------------------------|----------------|---------------|----------------|
| | Functional | Socio-economic | Environmental | Cost Estimates |
| Option A | 4 | 4 | 4 | \$10X |
| Option B | 1 | 1 | 1 | \$X |
| Option C | 1 | 2 | 1 | \$1.5X |
| Option D | 1 | 2 | 1 | \$X |

3.6 Recommending a preferred direction

As a result of the work carried out at the workshop, the group (in five focus groups) was asked which option should move forward as the preferred option to be progressed. The focus groups were also asked to record their reasons why. However, the preference would be subject to certain identified issues being addressed.

A fallback option and the reasons why was also requested. The focus groups’ conclusions as presented to the whole group are recorded below.

3.6.1 Focus group 1

We recommend Option B – Immediately west (upstream) of the existing northbound crossing as the preferred option to be progressed because:

- There is a feeling that the old bridge should not be removed
- It leaves the heritage bridge clear and allows easy access to it for future uses and maintenance
- Visually, having two concrete bridges side by side would be more pleasing than one either side of the iron truss bridge
- It minimises impacts to businesses on the eastern side of each bank of the river.

Subject to:

- Undertaking further investigation into public utility impacts
- Liaising with Council to ensure the project can integrate with their future plans
- Clarifying the adjoining Aboriginal land claim issues.

Our fallback option would be Option D – Immediately east (downstream) of the existing southbound crossing because:

- It may be a more flexible option to resolve some of the town planning issues that may be caused by Option B
- It may be a more flexible option to resolve some of the adjoining intersection issues on the approaches.

3.6.2 Focus group 2

We recommend Option B – Immediately west (upstream) of the existing northbound crossing as the preferred option to be progressed because:

- It ranked as the best option in the three categories (functional, socio-economic and environmental) and provides relatively better value for money at this point in time.

Subject to:

- Clarifying the adjoining Aboriginal land claim issues

- Traffic efficiency on the approaches being incorporated into the project (ie. intersections with Bolong Road, Illaroo Road, Bridge Road, etc)
 - Carrying out further investigation into public utility impacts and consideration of additional costs.
- Our fallback option would be Option D – Immediately east (downstream) of the existing southbound crossing because:
- It is the next best performing option
 - It does not demonstrate a “significant heritage risk” to the existing iron truss bridge and minimises the risk of construction under traffic.

3.6.3 Focus group 3

We recommend Option B – Immediately west (upstream) of the existing northbound crossing as the preferred option to be progressed because:

- It ranks as the best option (from a functional, socio-economic and environmental perspective) at the equal lowest cost
- Represents the least impact on the existing heritage listed iron truss bridge
- It best addresses the objective for maintenance and allows the retaining of the heritage iron truss bridge and/or the ease of its demolition if required
- It may prove easier to construct due to more suitable launching facilities and foundation conditions on the western side.

Subject to:

- Carrying out further investigation into public utility impacts
- Further investigating potential impacts and improvements to the issues related to the north/south connectivity on the immediate approaches to the new bridge
- Further investigations into the potential environmental, cultural and social impacts.

Our fallback option would be Option D – Immediately east (downstream) of the existing southbound crossing because:

- It is the next best ranked option.

3.6.4 Focus group 4

We recommend Option B – Immediately west (upstream) of the existing northbound crossing as the preferred option to be progressed because:

- The option performed the best against the socio-economic criteria and was equal with Option D in functional and environmental performance
- It is the best option for limiting impacts to properties
- It performed the best in relation to integration of infrastructure
- Best opportunity for enhancing community assets (ie. setting for iconic bridge – if retained, connection for public space/foreshore, etc).

Subject to:

- Liaising with Council to ensure the project can integrate with their long term plans and long term uses for the iron truss bridge.

Our fallback option would be Option D – Immediately east (downstream) of the existing southbound crossing because:

- It may work better with local traffic planning.

3.6.5 Focus group 5

We recommend Option B – Immediately west (upstream) of the existing northbound crossing and Option D – Immediately east (downstream) of the existing southbound crossing as the preferred options to be progressed because:

- Option B provides better opportunity to efficiently maintain the existing iron truss
- Option B does not “sandwich” the existing iron truss bridge between two other structures
- Option D provides more flexibility to address side road issues for improved local connectivity and traffic efficiency
- Option D has potentially better constructability

- Option B as compared to Option D does not fit as well with Council's planning for the foreshore, its CBD access strategy and hospital access.

Subject to:

- Considering improved adjacent intersection configurations (ie. hospital access, CBD access, development potential for pool precinct, etc)
- Option A not being eliminated as a future bypass long term option
- Investigating potential impacts and improvements to traffic efficiency and north/south connectivity issues on the immediate approaches to the new bridge.

4. Recommendations and conclusions

4.1 Recommendations from the workshop group

As a result of their deliberations, the workshop group unanimously recommended that Option B (new bridge immediately west and upstream of the northbound crossing) should move forward as the preferred option to progress planning.

The recommendation was based on the qualitative assessment of criteria which reflected what the project must achieve and the relative cost estimate compared to the other options. The recommendation was qualified and requires the satisfactory resolution of the following 'subject to' statements:

- Investigating potential impacts and improvements to traffic efficiency and north/south connectivity issues on the immediate approaches to the new bridge
- Undertaking further investigation into public utility impacts and consideration of additional costs
- Further investigations into the potential environmental, cultural and social impacts
- Liaising with Council to ensure the project can integrate with their long term plans and long term uses for the iron truss bridge
- Clarifying the adjoining Aboriginal land claim issues
- Minimising the risk of disruption to road users during construction.

It should be noted that there was some support for Option D (new bridge immediately east and downstream of the existing southbound iron truss bridge) and as such it was agreed that this option should also move forward at this stage of project development as a fallback option. It was felt by some that Option D could provide flexibility in addressing issues related to the local road network intersections on the immediate approaches to the bridge as well as integrating with council's planning for the foreshore and its CBD access strategy.

4.2 Conclusions

At the completion of the workshop, the workshop group concluded:

- The existing southbound iron truss bridge and its setting on the Shoalhaven River is of high value to the local community
- Based on the information available Options B, C and D provided better technical and environmental outcomes than Option A, whereas Option B provided the best socio-economic outcome. The relative costs estimates for Options B and D were similar, whereas Option C was 50% more expensive
- The workshop participants recommended Option B as the preferred option because it provided on balance the better option from a functional, socio-economic and environmental perspective and was equal to the lowest cost leading to a better value for money outcome. However, further investigation is required in areas identified in the workshop
- There was some support for Option D to also move forward at this stage of project development as a fallback option
- Even though Option A was not considered the preferred option to meet the objectives for this project, it should not be ruled out as a long term option to improve land use development and economic growth in the region
- As part of this project, Roads and Maritime needs to investigate the potential impacts and attempt to improve the road network around the immediate approaches to any new bridge (access to the CBD, Illaroo Road, Bolong Road and Bridge Road) to ensure the project is a success

- The workshop group recommended that Option C should not be further pursued because it is more costly than Options B and D and would require demolition of the existing iron truss bridge which is considered a heritage item
- The workshop group recommended that Option E should not be further pursued because it is around five times more expensive than Options B and D and would have greater impact on land severance, increase travel times and complicate connections to the existing road network and entrance into Nowra. The main benefit of Option E was its potential to integrate with a future rail crossing of the Shoalhaven River, however investigations indicated that this is likely to be a very long term goal and the future rail crossing location is uncertain.

5. Next Steps

Nick Boyd, Project Development Manager, Roads and Maritime outlined to the group the next steps in the planning process for the project. These included:

- A *Value Management Workshop Report* capturing the process and outcomes of the workshop will be prepared and reviewed by the project team
- There is a need to approach those property owners that may be directly impacted by the project and keep them informed of the workshop findings and processes to move forward. Assistance was asked of the participants to allow Roads and Maritime to undertake this as a courtesy to property owners before the outputs of the workshop were released
- As mentioned during the workshop, a recommendation on the preferred option will be made to Roads and Maritime management and to the Minister. The final decision on the preferred option will be made by the Minister who will consider the community consultation, the technical studies gathered during the option investigations and the direction achieved at the VM workshop
- Funding has been announced in the Federal Budget to continue planning and development of the project which will include further investigations into the issues raised in the workshop (ie. refining the location option, carrying out concept design of the crossing and approaches as well as intersection treatments needed to achieve the project objectives for traffic, connectivity, social integration, planning and environmental consideration, etc)
- The project team aims to position the project for an announcement on the preferred location in the middle of the year and then proceed quickly into concept design and environmental assessment.

Appendix 1. List of Participants

PRINCES HWY – NOWRA BRIDGE PROJECT

VALUE MANAGEMENT WORKSHOP – PARTICIPANTS LIST

Key Project Stakeholders

| | |
|-----------------|--|
| James Harris | Co-ordinator Strategic Northern Section, Shoalhaven City Council |
| Scott Wells | Manager Traffic and Transport, Shoalhaven City Council |
| Greg Pullen | Manager Economic Development, Shoalhaven City Council |
| Lisa Kennedy | Shoalhaven Planning Officer, Dept of Planning & Infrastructure |
| Diane Garrood | Regional Manager South Coast, Dept of Environment & Climate Change |
| Allan Lugg | Regional Manager, Dept of Primary Industries – Fisheries |
| Neill Miller | Senior Transport Planner, Transport for NSW |
| Calvin Harlison | Conservation Planning officer, NSW Environment and Heritage |
| Ian Henry | Local Community Representative |
| Rebecca Grills | Local Community Representative |
| Paul Condon | Inspector, NSW Police and Emergency Services |
| Deon Voyer | Manager Operations South, NSW Maritime |
| Tony Emery | Shoalhaven Business Chamber |

Roads and Maritime Services

| | |
|------------------|--|
| David Corry | Principal Manager Project Development, South and Western |
| Nick Boyd | Project Development Manager |
| Nicole Stevenson | Senior Network and Corridor Planner |
| Richie Phillips | Business Partner |
| Tanyia Tuckey | Manager, Communication and Strategy Engagement Officer |
| Lauren Gray | Communication and Strategy Engagement Officer |
| Scott Fayers | Project Development Manager |
| Robyn Lyster | Area Maintenance Manager |
| Mark Keech | Lead Designer (Road) |
| Danny Benedetti | Senior Network and Safety Officer |
| Joanne Damcevski | Aboriginal Cultural Heritage Officer |
| Ian Archer | Senior Project Manager, Project Delivery |
| Damian Mulcahy | Supervising Geotechnical Scientist |
| Daniel Percival | Cultural and European Heritage Officer |
| Michael Sheridan | Urban Designer |
| Laura Aboozaid | Project Officer |
| Bill Healy | Property Acquisitions Manager |

AECOM Project Team

| | |
|-------------------|--|
| Stuart Dalziel | Associate Director, Transport Advisory |
| Caitlin Bennett | Principal Environmental Planner |
| Stephen Callaghan | Technical Director, Design, Planning and Economics |

Workshop Facilitator

| | |
|-----------------|-------------------|
| Ross Prestipino | Facilitator, ACVM |
| Alan Butler | Facilitator, ACVM |