Batemans Bay Bridge

Preferred route option report

August 2017

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Executive Summary

Overview

The bridge over the Clyde River at Batemans Bay is located on the A1 Princes Highway, 273 kilometres south of Sydney and 148 kilometres east of Canberra. It is located on the New South Wales (NSW) south coast, within the Eurobodalla local government area (LGA).

Batemans Bay is a major regional centre and is the closest seaside town to Canberra, making it a popular holiday destination for residents of the ACT and surrounding areas.

The Princes Highway at Batemans Bay is the main north-south coastal transport corridor. Commercial, industrial and residential zones are located on the southern side of the Clyde River extending to the coastal south-east. Tidal wetlands and mangroves have prevented development to the south-west. North of the river includes residential development and holiday accommodation.

Roads and Maritime Services is replacing the bridge over the Clyde River at Batemans Bay. Replacing the bridge will provide reliable connectivity across the Clyde River, improve traffic flow, improve access to Batemans Bay and the surrounding areas and reduce delays during peak holiday and weekend periods for local and through traffic. It will also provide access for larger heavy vehicles and freight connectivity along the Princes Highway.

Following early studies and a Value Management Workshop with technical experts and key stakeholders, a preferred option for a new bridge has been selected to the west of the existing bridge.

The current situation

The existing Batemans Bay Bridge was built in 1956 to replace a ferry, with a lift span to accommodate commercial marine traffic. The normal vertical clearance for marine traffic is 3.6 metres when the lift span is not raised, but can be increased to a maximum clearance of about 23 metres when the lift span is operating.

The timber-related and fishing industries which initially navigated through the bridge have been mostly replaced by commercial and recreational water traffic. Most lifts are made for a local tourist ferry, but the lift span also operates for other commercial vessels, yachts, motor cruisers and for maintenance of the bridge.

Issues with the existing bridge include an annual maintenance cost of up to $1 million, no access for larger heavy vehicles due to weight and height restrictions, lack of reliable access across the Clyde River due to failures in operating the lift span and restricted access to the Clyde River for river vessels due to the bridge's height when the lift span is down. The lift span and nearby intersections cause long traffic queues during peak holiday periods. These issues can be increased due to the lift span’s occasional operational issues.

The solution

A preferred option for the new bridge has been selected to the west of the existing bridge. The preferred option is on display for community comment until **Friday 1 September 2017**.

The preferred option is to remove the existing bridge entirely after the new bridge is open to traffic. Benefits of removing the bridge include permanent access to the Clyde River for commercial and recreational vessels of an increased height and opportunities to increase public access and connectivity along the river foreshore.

Access to the replacement bridge would be via an improved Princes and Kings Highway intersection to the north of the river and north of North Street to the south of the river. Roads and Maritime will be working closely with property owners that would be impacted by this option. The preferred option would impact the Princes Highway and Wharf Road intersection to the north of the bridge. Access to Wharf Road would be via Peninsula Drive. To the south of the bridge, access to Clyde Street would be via North Street. A proposed underpass will provide access to Clyde Street.

The selection process

Early investigations carried out by Roads and Maritime identified a series of issues and constraints. These were used to inform the initial development of options for the possible vertical and horizontal alignments for a new bridge and included traffic, environmental, heritage, water and land use investigations.

Roads and Maritime used early studies to develop broad options including business as usual, alternative infrastructure, upgrading the existing bridge or replacing the bridge. These options were assessed by the project team at a workshop in January 2017.

Following initial studies and assessment of options, three options were taken forward for consideration and further investigation. These options were presented to a Value Management Workshop and included:

- East Option - this bridge option passes to the east of and is the closest to the existing bridge structure across the Clyde River.
- Central Option- this bridge option passes closer to the west of the existing bridge structure across the Clyde River, than the western option.
- West Option- this bridge option passes to the west of the existing bridge structure across the Clyde River.

The three options are outlined below in Figure 0-1.

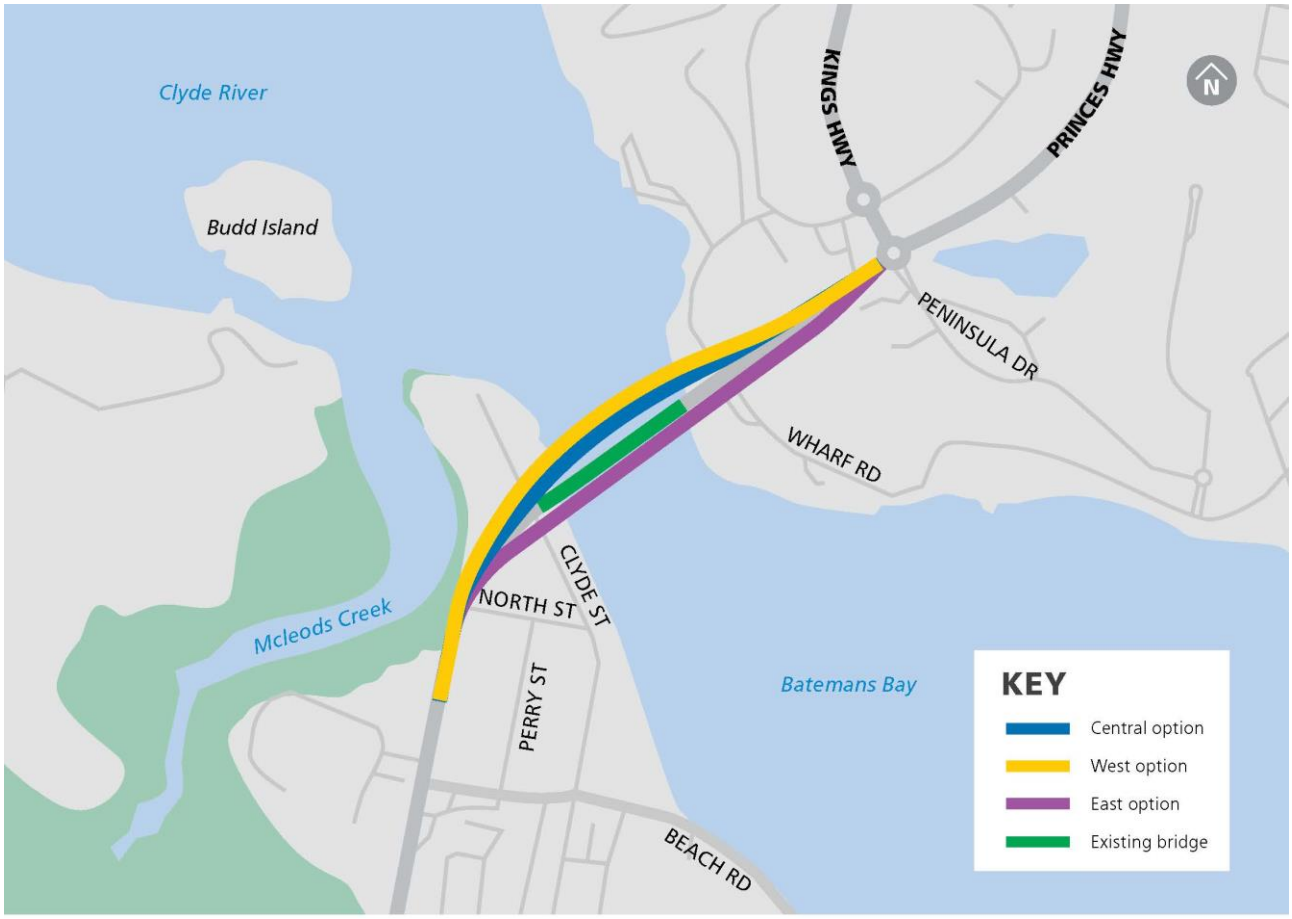


Figure 0-1 Design options for further assessment

The Value Management Workshop was held in June 2017 and brought together a wide range of technical specialists, project stakeholders and community members to review the findings of the preliminary investigations against the project objectives and agreed assessment criteria. Two members of the community were invited to take part in the workshop to represent the views of the wider community.

The workshop participants recommended the West Option (as shown in Figure 0-2) as the preferred option. It was agreed that compared with the other options it provides the best outcomes for community and stakeholders including road users, river users and pedestrians. It would also provide the best connectivity, functionality and socio-economic outcomes and the greatest flexibility for construction. It has less impact on private properties than the East Option.

The participants of the workshop discussed navigational clearance heights and concluded that further investigations were needed. Roads and Maritime is carrying out further work to inform discussions around the bridge height and will consult with relevant stakeholders and the community throughout this process.

A number of factors will need to be considered in further developing the bridge design. These include potential impacts on population and demography, access and connectivity, local business, tourism, social and recreational infrastructure, and community values. Roads and Maritime will use community feedback to further refine the design of the preferred option and prepare an environmental assessment that will assess the potential environmental and social impacts of the project. The environmental assessment for the Batemans Bay Bridge project will be on display for community comment later in 2017. We will continue to keep the community updated as the project progresses.

Figure 0-2 Preferred option for Batemans Bay Bridge replacement

Contents

1. Context

1.1 Background

The bridge over the Clyde River at Batemans Bay is located on the Princes Highway, 273 kilometres south of Sydney and 148 kilometres east of Canberra. It is located on the New South Wales (NSW) south coast, within the Eurobodalla local government area (LGA). The location of the existing bridge is shown in Figure 1-1.

Batemans Bay is a major regional centre and is the closest seaside town to Canberra, making it a popular holiday destination for residents of the ACT and the surrounding areas. The area is popular with retirees and attracts young families seeking affordable housing and a seaside lifestyle.

The Princes Highway at Batemans Bay is the primary north-south coastal transport corridor. Commercial, industrial and residential zones are located on the southern side of the Clyde River extending to the coastal south-east, while tidal wetlands and mangroves have constrained development to the south-west. North of the river there is residential development and holiday accommodation.

In 1956, the existing bridge was built to replace a ferry which had previously enabled the crossing of the Clyde River. The bridge was built with a lift span to accommodate the various heights of commercial marine traffic.

The structure is about 287 metres long and has ten spans; four steel girder spans and six truss spans, one of which is the lift span. The normal vertical clearance of the bridge to mean high water springs (MHWS) for marine traffic is 3.6 metres, but can be raised to a maximum clearance of about 23 metres through the operation of the lift span.

The existing Batemans Bay Bridge requires an upgrade to address the following issues:

- limited freight access due to restrictions for HML semi-trailers and B-double vehicles
- a height restriction of 5.1 metres for over-height vehicles
- bridge elements which are currently in poor condition with ongoing maintenance costs of up to $1 million annually
- unreliable connectivity to essential services for all road users. This has an economic and social impact due to traffic delays and closures
- poor journey reliability and long traffic delays between Berrima Parade and Beach Road. There is little opportunity for future traffic growth without corridor and intersection improvements
- low road user safety due to the width of the bridge and existing traffic barriers
- lack of reliable access across the Clyde River due to the operation of the lift span and restricted access to the Clyde River for river vessels due to the bridge's height.

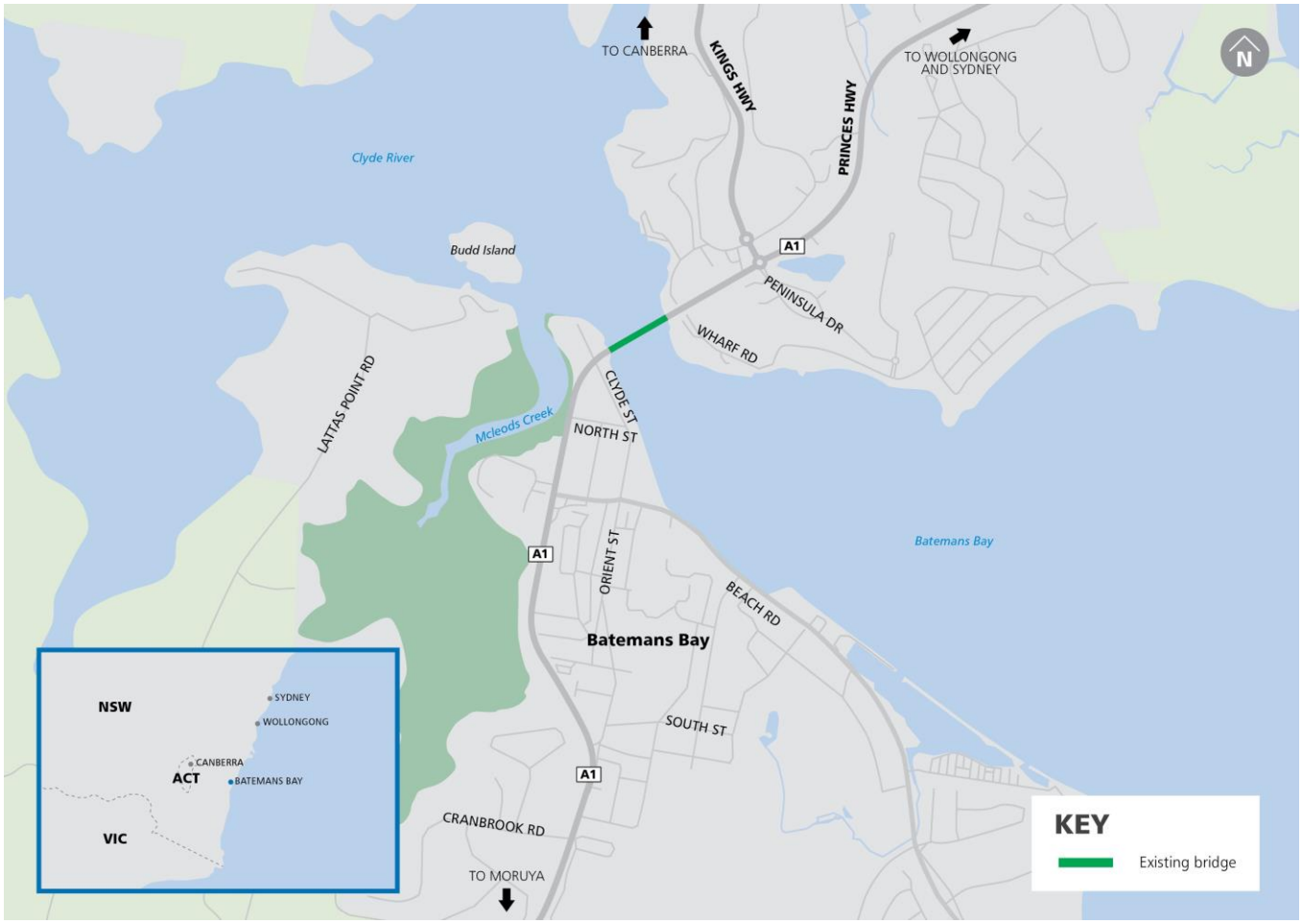


Figure 1-1 Location of the existing Batemans Bay Bridge

1.2 Project objectives

The purpose of the Batemans Bay Bridge project is to replace the existing bridge across the Clyde River at Batemans Bay. The project objectives are listed and described below.

Table 1-1 Project Objectives

Project objectives	Description
Remove barriers to highly productive use of the road freight network	The project will ensure the current Australian Standard 5100 design loading (i.e. SM1600 loading) is achieved and removes a restriction on HML semi-trailers and HML 19 metre, 23 metre, 25 metre and 26 metre B-doubles from crossing the Clyde River on the Princes Highway.

Project objectives	Description
Address poor bridge condition and reduce high ongoing maintenance costs	Routine inspections have identified structural and operational elements of the bridge as being in poor condition. These include corrosion of the piers, deck slab and steel trusses, deterioration of the protective paint system and an accumulation of damage to truss members from the impact of vehicles. The lift span equipment is complex, ageing and has poor reliability. Maintenance and operation costs are expected to increase in the future, given the existing poor condition and the coastal environment where the bridge is located.
Improve network connectivity	The project will reduce the risk of Batemans Bay residents being cut off from the road network, improve freight movement and wider connectivity of the travelling public across the Clyde River.
Improve journey reliability	The project will enable efficient and consistent traffic flow between Berrima Parade, North Batemans Bay and Beach Road, Batemans Bay.

Roads and Maritime will also work to achieve high quality project outcomes across customer service, time management, budget, environmental and work health and safety. These factors are fundamental to enable the design development, options evaluation and option selection for the Batemans Bay Bridge replacement project and are reflected and described below.

Table 1-2 Secondary project objectives

Secondary project objectives	Description
Provide the best benefit to our customers	Batemans Bay Bridge serves a wide variety of customers with a diverse set of requirements. The project will investigate these requirements and identify a preferred option which provides the best balance and overall benefit to our customers, the community and stakeholders.
Delivering the project within an acceptable timeframe	Construction will commence in early 2019 and to be complete by 2021.
Delivering the project within budget	The project will deliver a sustainable and innovative solution which achieves the project objectives and presents good value for money.
Prioritising the safety of our workers and our customers	The safety of our people and our customers will be a priority during the planning, construction and operational phases.
Minimise environmental impact	The Batemans Bay Bridge project has a variety of potential environmental impacts. The priorities of the customers, community and stakeholders will be recognised and will contribute to identifying a preferred option which best balances the overall environmental impact.

Secondary project objectives	Description
Deliver a project which fits sensitively with the built, natural and community environment	Batemans Bay Bridge is an important landmark within the local and regional context of Batemans Bay and the south coast of NSW. Project options will be identified and developed appreciating its role as the northern entry to Batemans Bay, and an experience of crossing the river widely recognised as a memorable aspect of the journey along this section of the Princes Highway.

To meet objectives of the project, there are a number of 'givens' that the design must achieve that need to be considered through the comparison of options. These are non-negotiable and are outlined below:

Project Scope

- in the northern area of the project, the limit of work is just south of the roundabout with the Kings Highway
- in the southern area of the project, the limit of work is just north of the intersection with North Street

New Bridge

- provide for up to four lanes (two lanes in each direction) and a shared user path (pedestrian and cyclist)
- achieve a design speed of 70 km/h for a posted speed of 60 km/h
- provide improved safety for pedestrians, cyclists and motorists
- reduce congestion and travel times, including at peak times and remove the HML restrictions
- needs to provide navigational clearamce without the need for a lift span
- must be able to be constructed without closing the Princes Highway as there are no suitable alternative routes available without a significant detour
- the bridge will be a concrete structure with an asphalt road surface
- must tie into the current alignment of the Princes Highway.

Existing Bridge

- the existing bridge and approaches need to remain operational for both southbound and northbound traffic while the new bridge is being constructed
- the existing bridge and its abutments are to be removed after the new bridge has opened and is fully operational

1.3 Purpose of this report

The purpose of this report is to describe how the preferred route for a new river crossing in Batemans Bay was selected. The report describes the assessment of strategic options, and describes the shortlist of three options that were developed and assessed at a Value Management Workshop in June 2017.

The report analyses the three options against assessment criteria and identifies a preferred option to be taken forward for further development, community consultation and environmental investigation.

2. Issues and constraints

2.1 Preliminary environmental investigations

Early investigations carried out by Roads and Maritime have identified constraints that informed the development of the horizontal and vertical alignment for the replacement bridge. The key project constraints, environmental issues and their implications are described below.

The study area for this project is about 105 hectares and stretches 1.8 kilometres along the Princes Highway, beginning 75 metres north of Guy Street, Batemans Bay and ending 150 metres north of the Kings Highway and Princes Highway intersection, North Batemans Bay. The eastern limit extends about 200 metres and the western limit extends about 350 metres, running parallel to the existing highway. The study area is shown in Figure 2-1.

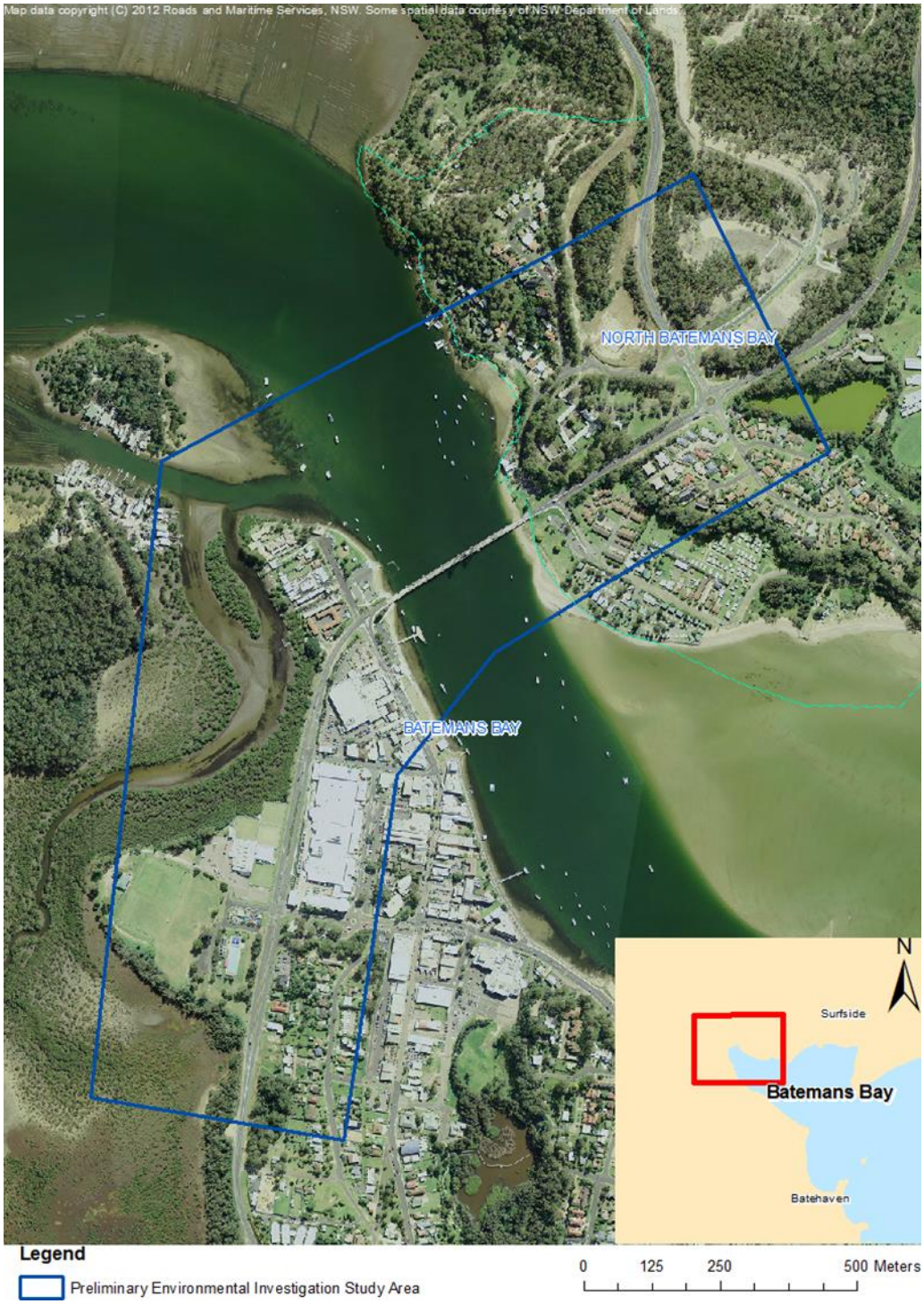


Figure 2-1 Preliminary Environmental Investigation Study Area

2.1.1 Traffic, transport and access

Road traffic

The Princes Highway is a major road link which connects Eurobodalla Shire to Sydney, Illawarra, Far South Coast and Victoria. The Princes Highway provides a link for the following purposes:

- commuter route between Batemans Bay and the surrounding areas
- local route for residents
- major tourist route for destinations on the NSW South Coast and Australian Capital Territory (ACT)
- important freight route for the NSW South Coast.

The section of the Princes Highway within the study area is typically free of traffic congestion and has good levels of service (LoS) during normal weekday peak periods but is known to deteriorate considerably during holiday periods, particularly over summer.

During peak holiday periods, northbound and southbound traffic queues are experienced by road users, after the lift span has been opened for marine traffic.

A review of available historical traffic and crash data within the study area shows:

- the Princes Highway north of the Kings Highway intersection (Permanent counter 08.352) carried an average annual daily traffic (AADT) of 7922 vehicles per day in 2016
- the average daily traffic (ADT) on the Princes Highway at Batemans Bay Bridge (Site 08.003) was 13,476 with 7.5 per cent heavy vehicles in June 2015. Note the permanent counter is currently inactive
- the Princes Highway at Batemans Bay has an annual traffic growth rate of 0.9 per cent per year

Traffic modelling investigations carried out by Roads and Maritime observed heavy and towing light vehicles slowing down when crossing the existing bridge due to the narrow lane width and proximity to the bridge structure. They also observed low utilisation of the kerb side lane at the northbound approach to the Princes Highway and Kings Highway intersection.

Pedestrian and cyclist movements

Facilities for pedestrians and cyclists within the proposal area generally include footpaths and shared paths. A separate dedicated cycleway on the A1 Princes Highway on the Batemans Bay Bridge also provides cyclists with access over the Clyde River between Batemans Bay and North Batemans Bay.

Property access

Property access within the study area includes:

- residential properties located off the Princes Highway and Kings Highway along the study area on smaller regional or local roads including Old Punt Road, Bay Ridge Drive, Peninsular Drive, Wharf Road and Beach Road
- residential properties located off Lattas Point Road on the western portion of the study area
- commercial properties located on and off the Princes Highway along the study area.

Project implications

Current and future traffic and transport considerations are a key element when determining the preferred option. The success of the project will largely be determined by how well the traffic is managed and its ability to deliver efficiency, capacity and functionality across the entire road network during normal and peak holiday periods.

2.1.2 Maritime transport and users

The Clyde River has a variety of users who use the navigational channel under the Batemans Bay Bridge lift span. Currently, the 23 metre wide navigational channel offers maritime users a minimum vertical clearance at MHWS of around 3.6 metres and a maximum clearance of about 23 metres when the lift span is raised to its limit.

Discussions with Maritime Service of NSW representatives have identified the type, location and requirements of vessels which frequently use the lift span facilities. The key users of the bridge and their requirements from a Maritime perspective are summarised below:

- the local tourist ferry which conducts return trips up the Clyde River to Nelligen and travels under the bridge almost daily
- two houseboat operators, with a total of nine vessels located upstream of the bridge which require annual maintenance and inspection at the dry dock located downstream
- a local mooring contractor who operates a barge to install moorings up and downstream of the bridge
- privately moored yachts. The majority of yachts are moored downstream of the bridge with mooring areas nearing capacity up and downstream
- privately moored motor cruisers. The majority of motor cruisers are located upstream and traverse the bridge to sea or for routine maintenance at the dry dock
- eleven privately owned houseboats moored upstream and requiring access to the dry dock for routine maintenance
- transiting vessels who find safe anchorage upstream of the bridge.

Roads and Maritime has also identified the potential increase in the use of transportable sail boats and yachts in the Clyde River as their popularity with tourists increases. Facilities for maritime users in the vicinity of Batemans Bay Bridge include a dry dock, privately leased moorings, two boat ramps, trailer parking and fish cleaning tables. In addition to this, a proposal by Roads and Maritime to construct pump out facilities on the Clyde River Houseboats' wharf upstream of the existing bridge is expected to attract larger transiting vessels and yachts to the Clyde River in the future.

The types of vessels and their known clearance requirements are summarised in Table 2-1.

Table 2-1 Typical lift span users and clearance requirements

User Category	Vessel Type	Minimum Required Safe Clearance at MHWS (metres)	Approximate Number of Vessels
Commercial operators	"Escapade" Tourist Ferry	8	1
	Houseboat	8.5	9
	Barge	8	1
Private mooring licensees	Yacht	17 (downstream of bridge)	45-50
		11 (upstream of bridge)	7
	Houseboat	7	11 (at least)
	Motor Cruiser	7	15 (at least)
Tourist / Visiting	Transportable Sail Boat / Yacht	12	-

User Category	Vessel Type	Minimum Required Safe Clearance at MHWS (metres)	Approximate Number of Vessels
	Yacht	18 (known regular users)	-
	Yacht or other	up to 23 (potentially)	-

During normal operation the lift span opens twice daily for the tourist ferry operations at around 11:45am and 2:20pm. Additional openings can be accommodated with prior notice but are banned in the peak traffic periods of 8:00am to 10:00am and 2:30pm to 6:00pm.

Records indicate that demand for the lift span is highly seasonal, generally peaking in December and January of each year (Figure 2-2). The records show a stepped reduction in demand following the last review of lift span operations which occurred during 2012.

In the period between June 2012 and May 2016 about 72 per cent of lifts included commercial marine traffic such as houseboats and the tourist ferry, about 15 per cent included private and tourist vessels with motor cruisers accounting for 7 percent and yachts 8 percent, while 17 per cent per cent of lifts were for maintenance purposes.

Table 2-2 Average number of lifts per month for the period June 1995 to May 2016

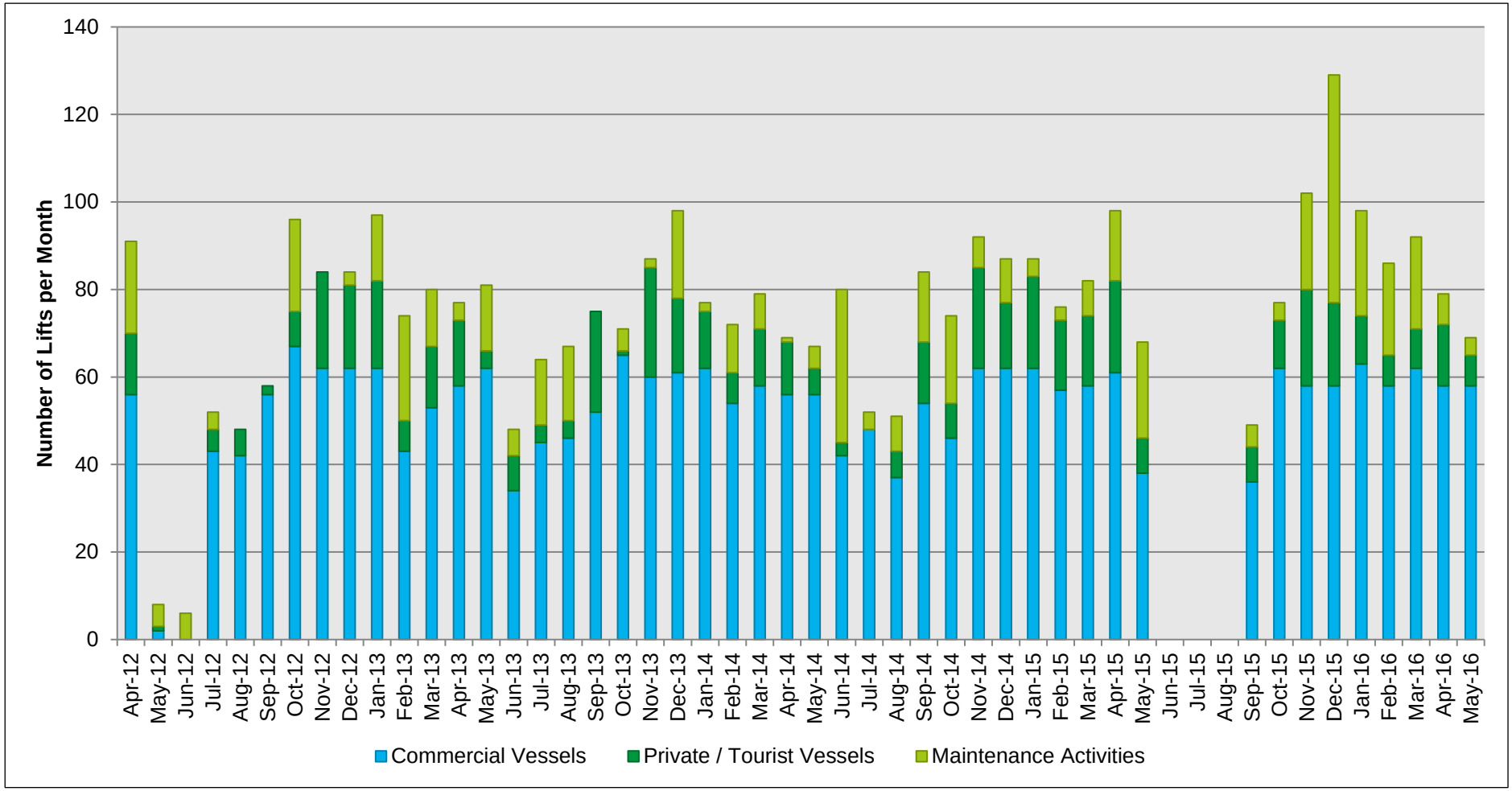
Period (inclusive)	Average Number of Lifts Per Calendar Month
June 1995 to May 2000	97
June 2000 to May 2004	94
June 2012 to May 2016	69

Note: All months where the number of lifts was less than 10 were excluded from average calculation due to the likelihood of mechanical repairs being completed on the lift span during that month.

Project implications

Current maritime users operate both upstream and downstream of the bridge and require access for various reasons. The vertical clearance requirements of Maritime customers will be a key consideration for the development of the preferred option and will include feedback from the community and river users.

Figure 2-2 Lift span records for April 2012 to May 2016



2.1.3 Biodiversity

Roads and Maritime carried out a Preliminary Environmental Investigation (PEI) to identify potential environmental constraints within the project study area. This identified the following key features in the study area:

- In the study area, the Clyde River Estuary and entry to Mcleods Creek is listed as a Nationally Important Wetland from the Directory of Important Wetlands in Australia (2001). Part of the estuary and tidal floodplain within the study area is designated under the State Environmental Planning Policy No.14 – Coastal Wetlands (SEPP 14).
- The study area is located within the Batemans Marine Park. Work within the study area will need to be in accordance with the Marine Estate Management (Management Rules) Regulation 1999. Roads and Maritime is consulting with the Department of Primary Industries Fisheries.

Targeted biodiversity field surveys were completed by Roads and Maritime in February 2017 for all flora and fauna species and ecological communities identified in the PEI as having a moderate to high likelihood of occurrence. The key findings of the field survey include:

- The Clyde River estuary footprint contains high quality habitats and complex ecotones of intertidal saltmarsh, mangroves and fringing forests. A total of nine plant community types are present, with an additional seagrass meadow community within the study area. Of the nine plant community types, four are listed as Threatened Ecological Communities (TECs):
    - Subtropical and Temperate Coastal Saltmarsh (mapped in the south of the study area) (Vulnerable – EPBC Act)
    - Coastal Saltmarsh in the NSW North Coast, Sydney Basin and South East Corner Bioregions (mapped in the south of the study area) (Endangered – TSC Act)
    - Freshwater Wetland on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (mapped in the north-east of the study area) (Endangered – TSC Act)
    - Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregions (mapped in the south-west and north-east of the study area) (Endangered – TSC Act)
    - River-flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (mapped in the south-west within the study area) (Endangered – TSC Act).
- Thirteen threatened and migratory fauna species are present in the study area. They include:
    - Caspian Tern
    - Eastern Curlew
    - Eastern Freetail Bat
    - Eastern Osprey
    - Grey-headed Flying-fox
    - Little Egret
    - Little Lorikeet
    - Pied Oystercatcher
    - White-bellied Sea Eagle
    - Sooty Oystercatcher
    - Southern Myotis

    - Yellow-bellied Glider
    - Yellow-bellied Sheathtail Bat.
- Four threatened and migratory species, populations and communities listed under the EPBC Act were recorded during field surveys. These being:
    - Eastern Curlew, Critically Endangered, Listed Marine, CAMBA (China-Australia Migratory Bird Agreement), JAMBA (Japan-Australia Migratory Bird Agreement), ROKAMBA (Republic of Korea-Australia Migratory Bird Agreement)
    - Caspian Tern, JAMBA and Listed Marine
    - Little Egret, Listed Marine
    - Coastal Saltmarsh, Vulnerable.
- The Eastern Curlew is likely to represent the highest potential level of constraint given that it is listed as Critically Endangered. It is likely that further Eastern Curlew are present in the Clyde River Estuary and therefore the biodiversity field survey defines the study area to contain Nationally Important Habitat for Eastern Curlew
- A large number of features were also identified that could be utilised by threatened biota
- The majority of the Clyde River estuary bed comprises mobile sands and where mangroves occur, loam sediments. The study area contains Class 1 Major Key Fish Habitat and extensive areas of mangroves and some smaller areas of seagrass meadow
- The study area has the potential to provide some habitat for Australian Grayling but not on a permanent basis.

Project implications

The PEI and Biodiversity Field Survey identified a number of ecologically sensitive areas within the study area. Notably the presence of Coastal Saltmarsh and Swamp Oak Floodplain Forest EECs, SEPP14 wetlands and 13 threatened and migratory species will be a major consideration for the project in terms on managing both direct and indirect impacts during construction and operation.

An environmental impact statement (EIS) will be prepared for impacts to SEPP14 wetlands in addition to a project review of environmental factors (REF).

2.1.4 Aboriginal Heritage

As part of the PEI, Roads and Maritime conducted an Aboriginal Cultural Heritage Due Diligence Assessment. The assessment confirms evidence of Aboriginal occupation and behaviour in the form of scarred trees, burial sites, artefact scatters and shell middens with consultation confirming the study area contains sites and landforms of high cultural significance to the local Aboriginal community.

A search of the Aboriginal Heritage Information Management System (AHIMS) register found 15 sites within 500 metres of the study area. No Aboriginal places within the study area are listed on the Atlas of Aboriginal Places and no other places or items of relevance to Aboriginal occupation were found during searches of the applicable registers.

Three of the registered sites recorded within 500 metres of the study area were subject to an Aboriginal Heritage Impact Permit (AHIP) while four registered sites are likely to contain areas of potential archaeological deposits as well as surface artefacts. The Clyde River Burial Site (AHIMS ID: 58-4-0540) is of high cultural and archaeological sensitivity and significance and should be avoided by the project.

Investigations indicate there is a strong likelihood unrecorded Aboriginal sites exist within the study area, particularly along the banks of the Clyde River to the north of the study area and near the oyster farms located in the southern end. No additional Aboriginal sites or areas of potential archaeological deposit were identified during the site inspection.

A bulk land claim on the South Coast was submitted in December 2016 that includes Crown land in Batemans Bay. This issue is currently subject to court proceeding and remains unresolved. Roads and Maritime will need to manage this with the development of a preferred option moving forward.

Project implications

Due to the location of known Aboriginal sites, the strong likelihood that unrecorded Aboriginal sites exist within the study area and the given nature of the infrastructure required by the project, it may not be possible to avoid direct impact to all Aboriginal heritage sites. Known Aboriginal heritage sites and the potential for previously unrecorded Aboriginal sites will be carefully considered during design development, in order to minimise potential impact. Detailed investigations will enable any impact to be more accurately assessed and specific measures developed to minimise them during construction and operation of a new bridge.

2.1.5 Non-aboriginal Heritage

The PEI carried out by Roads and Maritime identified seven listed heritage items within the study area, with a further four items situated within 500 metres of the study area. All heritage items within and near the study area are listed on the Eurobodalla Local Environmental Plan (LEP) 2012 as being of local significance. No heritage items are listed on state or national heritage registers. The heritage items include:

- Batemans Bay Bridge
- former car ferry ramps
- site of Coal Bunker Wharf
- the boatshed and jetty
- Bay View Hotel
- Roman Catholic Cemetery
- Presbyterian Cemetery
- former Courthouse, Police Station and police residence
- former teachers residence
- former Public School
- Ocean View House.

The Batemans Bay War Memorial, located on the southern foreshore of the Clyde River, was identified in the PEI as an additional (unlisted) potential heritage item.

Project implications

Construction of the project has the potential to impact non-Aboriginal heritage items. As part of the Batemans Bay Bridge replacement, the existing bridge will be removed. Roads and Maritime will consider how to minimise potential impacts on non-Aboriginal heritage items in the project design. Roads and Maritime will consult the community on how to preserve the history of the impacted heritage items, including the existing bridge and how to make use of the opened foreshore from the bridge removal.

2.1.6 Hydrology, aquaculture and water quality

The study area is located within the Clyde River and Jervis Bay catchment which extends along the south coast of NSW from Lake Wollumboola near Culburra in the north, to near Moruya in the south. The Clyde River and Batemans Bay are the two major waterbodies located within the study

area and form part of the Batemans Marine Park. The marine park includes areas protected as Habitat Protection Zones and Special Area Zones. Areas of SEPP14 Wetlands are also present and are considered as Critical Fish Habitat.

The Clyde River and Batemans Bay are sensitive to pollution or degradation of water quality as they contain:

- nationally important wetlands and SEPP14 wetlands
- Batemans Marine Park
- threatened ecological communities associated with aquatic ecosystems
- known and potential habitats for threatened fish
- key fish habitats
- recreational fishing areas
- areas which are available or used for aquaculture and commercial fishing.

The Clyde River and Mcleods Creek west of Batemans Bay Bridge contain priority oyster aquaculture areas designated in accordance with the Healthy Rivers Commission in its Healthy Oysters, and Healthy Rivers report (DPI, 2016). Oyster farming in the Clyde River produced 471,588 dozen Sydney Rock Oysters with a total value of $3,179,722 during the 2014-15 reporting period.

Batemans Bay CBD has been identified to be at a substantial risk from coastal inundation combined with local catchment runoff. The susceptibility of the study area to flooding is not accurately known at this time and needs to be confirmed following completion of an updated flood study by Eurobodalla Shire Council.

The Eurobodalla Shire Council carries out water quality monitoring at six locations in the Clyde River. One water quality monitoring site is located within the study area, west of Batemans Bay Bridge. During the reporting period of July 2014 to June 2015, it was found that chlorophyll levels were good and turbidity fair (Eurobodalla Shire Council, 2015).

Overall, the Clyde River was considered to be suitable for swimming most of the time for the July 2014 to June 2015 reporting period. However, it may be occasionally susceptible to pollution from potential sources of faecal contamination (Eurobodalla Shire Council, 2015).

Project implications

The Clyde River and Batemans Bay contain an oyster industry of regional significance. The management of water quality during construction and operation will need to be considered in the development and assessment of the project due to the potential impacts to biodiversity and aquaculture within and near the study area. The project is unlikely to have an impact on the localised flood risk however these impacts would need to be investigated and considered during the development of the preferred option.

2.1.7 Noise, vibration and air quality

The background noise environment of the study area is generally influenced by the movements of road traffic. The potential noise and air quality sensitive receivers within the study include:

- five parcels of medium density properties
- two parcels of low density residential properties
- two parcels of large lot residential properties
- Coonida Retirement Village
- passive recreation areas including Lions Park, Mackay Park, Korners Park, the Clyde River and areas of open space along either side of Clyde River foreshore

- other social infrastructure.

Commercial properties which provide accommodation services may be particularly sensitive to noise impacts. Commercial properties which may be particularly sensitive to noise impacts include those located along Clyde Street, Wharf Road and Wray Street, as well as those businesses operating within the Clyde River. There may also be potential for other residential receivers to be located within mixed use properties within the Batemans Bay CBD.

Project implications

The minor realignment of the existing highway, which is required as the replacement bridge ties into Princes Highway, would alter the sound profile of sensitive receivers during construction and operation. The position of the road and bridge alignment will be assessed as a noise and vibration source and their impacts will be considered during the design process. Suitable mitigation measures for construction and operational noise and vibration sources will be identified and their effectiveness assessed during the design process and environmental assessment.

2.1.8 Landscape and visual amenity

Batemans Bay is a coastal town strongly defined by its riverside setting amongst undulating hills. The area is known for its coastal beauty, access to beaches and for being a relaxed and easily accessible holiday destination for tourists from Canberra and surrounds.

The key landscape character zones situated in Batemans Bay and surrounding areas include:

- Batemans Bay town centre
- recreation and sports facilities at Mackay Park which includes a sports oval, athletics club, swimming pool, bowling club (non-operational) and children's play area
- tidal wetlands and mangroves
- forest
- waterfront and marine facilities along the southern edge of the Clyde River
- residential and Open Space which includes the established urban area
- light Industrial
- northern foreshore and residential which includes an open space picnic area, caravan park and low rise residential apartments and townhouses
- residential escarpment which includes areas of existing residential development and new sub-divisions.

The Batemans Bay Bridge itself has a distinctive visual character which makes it a landmark within the local and regional context of Batemans Bay and the south coast of NSW. The bridge forms the northern entry to Batemans Bay with the experience of crossing the river on the bridge widely recognised as a memorable aspect of the journey along this section of the Princes Highway.

Project implications

The project provides an opportunity to retain the distinctive gateway nature of a replacement bridge or to create a new landmark. Due to its high visual exposure a new bridge should be elegant with clean lines and contribute positively to the riverscape by keeping to urban and landscape design principles. The impact to existing water views from numerous vantage points will need to be considered during the design process.

2.1.9 Land use

The land uses in the study area include:

- Residential properties in North Batemans Bay and Batemans Bay

- Road infrastructure. Key roads include the Princes Highway, Kings Highway, Clyde Street, Beach Road and Wharf Road.
- Utility easements, including overhead powerlines and telecommunications easements, and water and sewer pipes.
- Clyde River and Batemans Bay with recreational and commercial users
- Batemans Bay CBD including commercial and tourism services.

A large amount of property within the study area is privately owned for commercial and residential purposes. Other parcels of land are owned by the State of NSW and the Eurobodalla Shire Council for public recreational purposes. No Commonwealth land is located within the study area.

The Princes Highway corridor through Batemans Bay is constrained and has limited space. All strategic bridge replacement options considered require acquisition of land adjacent to the existing corridor.

Project implications

The study area contains a wide range of social infrastructure and a number of open spaces. Opportunities to minimise the project's impact to these areas will need to be investigated and considered during the design process.

2.1.10 Socio-economic

The Eurobodalla LGA has been identified as a predominantly rural area, with growing residential and resort areas. In 2014, Eurobodalla LGA had an estimated residential population of about 34,643 people with 7,905 estimated to reside in Batemans Bay. Annual population growth in Batemans Bay was about 0.7 per cent between 2009 and 2014 which is above the average rate of growth for Eurobodalla LGA but approximately half that of NSW.

The communities of Batemans Bay generally have:

- older populations compared to NSW, with higher median ages, lower proportions of children and higher proportions of older people
- higher proportions of Aboriginal people, and lower proportions of overseas born and people who speak a language other than English at home
- higher proportions of people with assistance needs in at least one of the three core activities of self-help, mobility or communication compared to NSW and the wider Eurobodalla LGA
- higher rates of unemployment and households with lower incomes compared to both NSW and the Eurobodalla LGA.

Batemans Bay is the main commercial centre for the Eurobodalla LGA. It is a popular tourist destination with the region's population increasing substantially during peak holiday periods to about 100,000 people. Key employment industries include cafes, restaurants and takeaway food services, accommodation, school education, supermarket and grocery stores and residential care services with the main mode of transport to and from work being by car as a passenger or driver.

Project implications

A number of key socio-economic factors will need to be considered for the development and assessment of the road and bridge alignment. These include the potential impact on population and demography, access and connectivity, local business, tourism, social and recreational infrastructure, and community values. In particular, accessibility for people requiring assistance and older people located in housing near the bridge will be a key consideration in the design refinement.

2.1.11 Work health and safety

As part of its investigations Roads and Maritime conducted a Health and Safety in Design (HSiD) workshop on the 1 July 2016 to identify the Major Hazard Creators for each strategic option and develop a risk profile for comparison purposes. The workshop was attended by subject matter experts and stakeholders who could represent the view of the workers.

The workshop identified a number of work, health and safety risks that are introduced or can be influenced by the design process. The Major Hazard Creators common across all renewal and replacement options include:

- a wide and deep river requiring working over water
- major and local roads with live traffic lanes
- space constraints within the existing road corridor
- overhead, underground and submarine utilities
- proximity to human activity.

Project implications

The Major Hazard Creators identified in the strategic Health and Safety in Design workshop will be used to refine the options during the strategic and concept design. The design process will eliminate these hazards as far as possible or identify and implement suitable controls in accordance with relevant legislation, standards and codes.

2.2.12 Topography, geology, soils and contamination

The landform covered by the southern portion of the study area generally comprises relatively flat land associated with a littoral zone. The southern portion of the study area is characterised by steep hills below the escarpment (Great Dividing Range) which become lower toward the coast with a slight upturn along the coastal margin.

The Ulladulla 1:250,000 Geological Series Sheet S1 56-13 (Geological Survey of NSW, 1966) indicates that the study area is predominately underlain by ordovician siltstone, sandstone, claystone, and quartzite.

The study area is made up of soils representative of a tidal flat area under a littoral complex of sand and alluvium. The majority of the study area has a slight erosion hazard, is poorly drained and has no salting evident. The western portion of the study area near Budd Island shows evidence of salinity within the soils.

Acid sulfate soils

The Acid Sulfate Soil Risk Maps from the NSW Natural Resource Atlas database indicated that the risk of encountering acid sulfate soils is considered high in the south and south west portion of the study area including a high risk in the sediments of the waterways. There is a low risk on the northern portion of the study area and an unknown risk throughout the remaining study area.

Contamination

A search of the NSW EPA Contaminated Sites Register and Record of Notices (under Section 58 of the Contaminated Land Management Act 1997) was carried out and indicated that there was one registered site within one kilometre of the study area. The site includes the former Caltex Service Station about 100 metres north of the study area (87-89 A1 Princes Highway, Batemans Bay) which is currently under assessment.

Other potential contaminated areas (not currently registered to the NSW EPA) include:

- Sediment surrounding the Batemans Bay Bridge, which was previously painted with lead based paint
- Stockpile sites including:

- Roads and Maritime South Batemans Bay stockpile site located about two kilometres south of the study area in a vehicle stopping bay along the Princes Highway
- Roads and Maritime Cullendulla stockpile site located about three kilometres north of the study area.

In addition, anti-fouling agents and other contaminants from the use of the Batemans Bay Marina (located about 1.5 kilometres south-east of Batemans Bay Bridge) have the potential to occur within or near the study area.

3. Options development

This section explains the steps taken by Roads and Maritime to identify possible strategic options for design development and assessment. The options are across the broad categories of alternative infrastructure, bridge renewal and bridge replacement. A business as usual option was also addressed.

3.1 Option identification process

A number of strategic options for a Clyde River crossing were developed by Roads and Maritime including:

- business as usual – the 'do nothing' option
- provision of alternative infrastructure
- bridge replacement.

Roads and Maritime held a shortlisting workshop on 30 January 2017 to develop a set of shortlisting criteria based on the project objectives. The shortlisting criteria were then used to assess each strategic option. The assessment of the strategic alternatives is discussed below.

For the bridge replacement options, the following process was followed:

1. a list of criteria was developed to assess the horizontal alignment, vertical profile and clearance, cross section and bridge type
2. if an option failed on any of the criteria, it was discarded unless there was a notable reason to keep it on the shortlist
3. options were considered to fail against a criterion if impacts were considered to be unacceptable, and it was determined these impacts could not be minimised to an acceptable level, either through design refinement or mitigation measures
4. options requiring significant design requirements to minimise impacts were identified and retained pending further assessment during the initial stages of the concept design phase

The initial assessment of the options used information from preliminary traffic modelling, Roads and Maritime design guidelines, the location of major public utilities and an understanding of the key project constraints.

3.1.1 Evaluation of business as usual option

The business as usual option was not considered for further assessment as it fails to address the project objectives.

3.1.2 Evaluation of alternative infrastructure options

Six alternative infrastructure options were assessed by the project team. They were considered in relation to whether they would provide additional benefit to the business as usual, bridge renewal and bridge replacement options. Table 3-1 shows the result of this assessment.

Table 3-1 Assessment of alternative infrastructure options

Alternative Infrastructure Option	Business As Usual	Bridge Renewal	Bridge Replacement
Intersection improvements at the Princes Highway and Kings Highway intersection	✓	✓	✓
Intersection improvements at Wharf Road, Clyde Street, North Street and Beach Road intersections with Princes Highway	✓	✓	✓
Installation of camera detections systems and approach portals for over height vehicles	✓	✓	✗
Relocation of ferry operations west of the existing bridge	✓	✓	✗*
Relocation and redistribution of mooring licences	✓	✓	✓
Amending or ceasing lift span operations	✓	✗	✗

✓ Option is considered to provide additional benefits to the bridge treatment option.

✗ Option is considered to provide no additional benefits to the bridge treatment option.

* The shortlisting criteria for the vertical clearance of a new bridge include catering for existing commercial marine traffic.

3.1.3 Evaluation of Bridge Renewal Option

The bridge renewal option was assessed using shortlisting criteria based on the project objectives and whether the option is feasible in terms of engineering design. Table 3-2 shows the result of this assessment.

Table 3-2 Assessment of bridge renewal option

Shortlisting criteria	Four lane
Is the option feasible in terms of engineering design?	✓
Does the option remove barriers to highly productive use of the road network?	Δ
Does the option address poor bridge condition and reduce ongoing maintenance costs?	Δ
Does the option improve network connectivity and journey reliability?	Δ

✓ Option cannot be eliminated as impacts are either considered likely to be acceptable; or could potentially be reduced to acceptable levels through design refinements

Δ Option is considered to require significant design refinements to eliminate or reduce impacts to an acceptable level but cannot be eliminated at this stage.

× Option fails against criterion and should be eliminated.

The project team drew the following conclusions regarding the renewal option:

- the renewal option would strengthen elements of the bridge to remove the constraint to HML vehicles but not remove the height and width constraints
- the renewal option would improve bridge condition with maintenance costs reducing initially but increasing as the bridge elements age and deteriorate
- the renewal option includes an upgrade of the lifting mechanism and controls. Improvements in network connectivity and journey reliability would improve initially but decrease as the lift equipment ages and reliability decreases.

3.1.4 Evaluation of bridge replacement options

The following section sets out results of the shortlisting assessment for each bridge replacement option.

Horizontal Alignment

Seven options for the horizontal alignment were considered during the shortlisting workshop. Each horizontal alignment was assessed against the following shortlisting criteria:

- Is the option feasible in terms of engineering, including road and bridge design, and constructability?
- Is the option feasible in terms of traffic performance?
- Is the option able to be constructed within or as near as possible to the existing Princes Highway corridor?
- Does this option demonstrate it can minimise environmental impacts?

The figures below outline the seven horizontal alignment options.

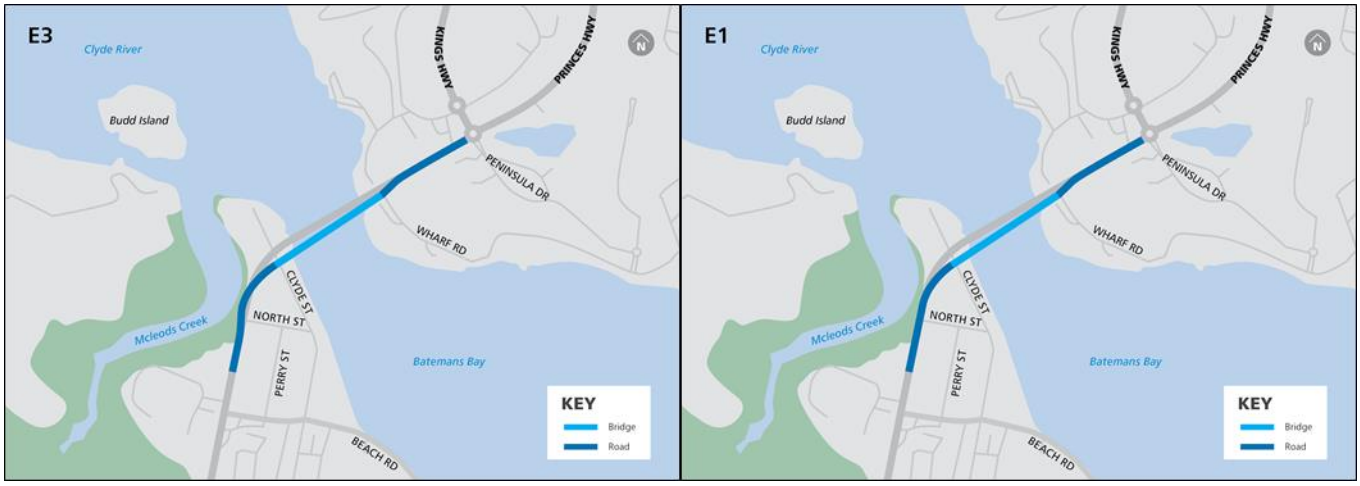


Figure 3-1 Eastern horizontal alignment options – bridge replacement

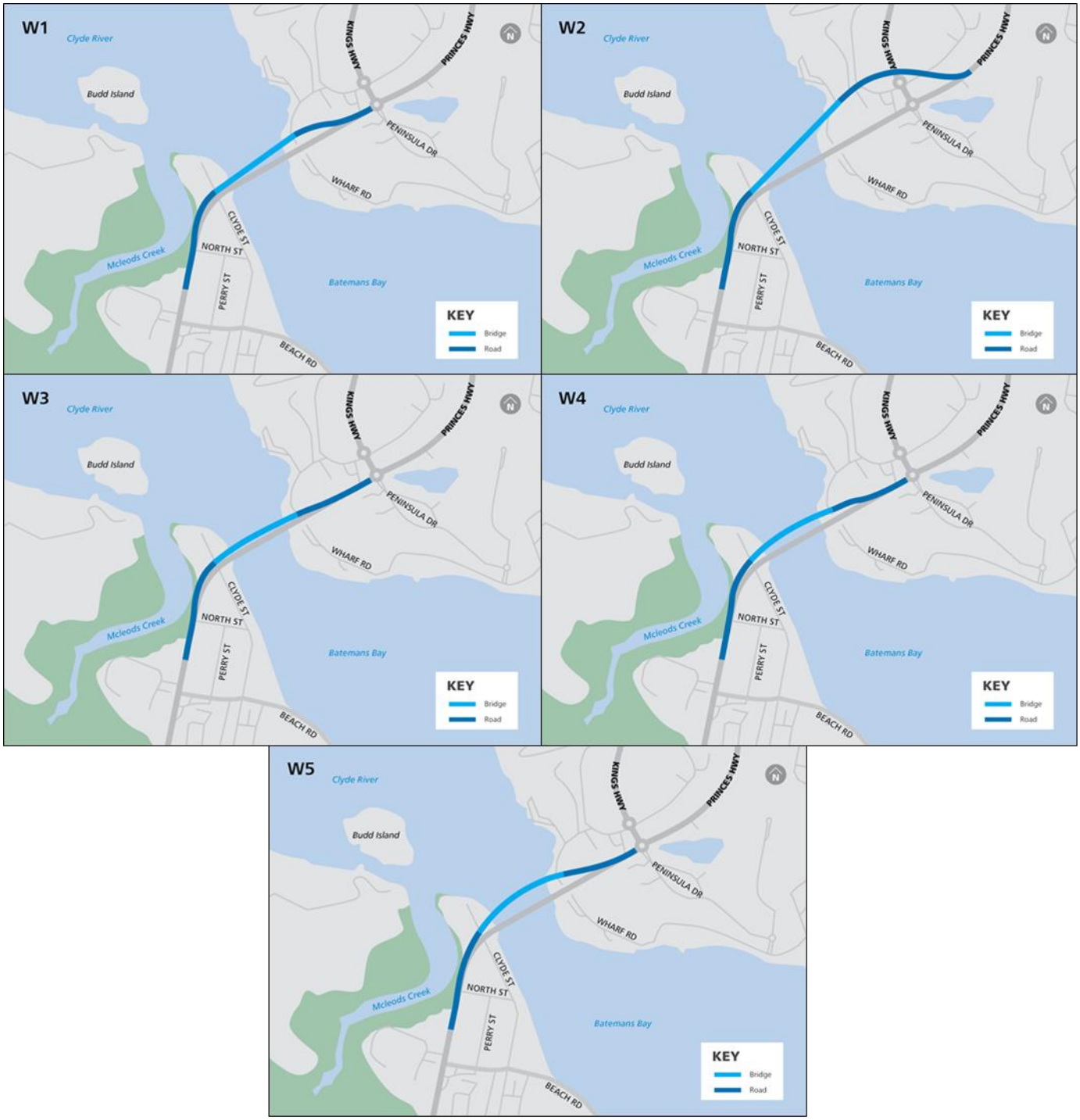


Figure 3-2 Western horizontal alignment options – bridge replacement

The project team's consensus was each horizontal alignment option met all of the required criteria with the exception of Option W2.

Although Option W2 demonstrated some benefits in terms of a reduced impact to the SEPP14 wetlands located adjacent to Mcleods Creek and a bridge alignment which utilises the natural height near Old Punt Road, it was the project team's view that the benefits were far outweighed by:

- a significant increase in project length
- an increase in bridge length and the number of piers required
- the potential impact to a significant Aboriginal heritage site

- greater impact to properties adjacent to the proposed road corridor
- being a poor fit with the existing Princes Highway corridor.

Based on these disadvantages, Option W2 was not carried forward for further consideration.

Vertical profile and clearance

The workshop assessment considered six vertical profile and clearance options feasible from an engineering and constructability perspective. The assessment criteria focussed on the impact to commercial marine traffic, urban design objectives and maximum grades for heavy vehicles and pedestrian access. The criteria used during the assessment process included:

- Does the vertical profile have a maximum grade of less than or equal to six percent to meet current state road network planning targets?
- Does the vertical profile have a maximum grade of less than or equal to five percent for pedestrian and mobility access?
- Does the vertical profile and clearance cater for all existing commercial marine traffic?
- Does the option meet urban design objectives and principles for the project setting?

Table 3-3 presents the outcomes of the assessment of the vertical profiles against the shortlisting criteria.

Table 3-3 Assessment of proposed vertical profiles

Shortlisting criteria	Vertical Clearance (metres)					
	3.6	7	12	14	18	23
Does the vertical profile have a maximum grade ≤ 6 per cent to meet current planning targets?	✓	✓	✓	✓	✓	✓
Does the vertical profile have a maximum grade ≤ 5 per cent for pedestrian and mobility access?	✓	✓	✓	✓	Δ	Δ
Does the vertical clearance cater for all existing commercial marine traffic?	×	×	✓	✓	✓	✓
Will the option meet urban design objectives and principles for the project setting?	✓	✓	✓	✓	Δ	Δ
Status	Eliminated	Eliminated	Retained	Retained	Retained	Retained

✓ Option cannot be eliminated as impacts are either considered likely to be acceptable; or could potentially be reduced to acceptable levels through design refinements.

Δ Option is considered to require significant design refinements to eliminate or reduce impacts to an acceptable level but cannot be eliminated at this stage.

× Option fails against criterion and should be eliminated.

As a result of the shortlisting workshop, two vertical clearance options (3.6 metres and 7 metres) were eliminated as they did not meet the criteria of providing a vertical clearance suitable for all existing commercial marine traffic that has a required clearance of around 8 metres. This decision was based on information provided by Maritime representatives.

The 18 metre and 23 metre vertical profiles were assessed as requiring significant design refinement to achieve a maximum grade of less than 5 per cent for pedestrian and mobility access. This would likely involve lengthening the approaches on either side and impacting the intersection of the Princes Highway and Kings Highway. It was agreed that while further design to reduce the impact is feasible, it would increase costs and the 18 metre and 23 metre options require significant design refinement to meet the urban design principles. The 18 and 23 metre clearances were eliminated as a result.

The shortlisting process identified that the 12 and 14 metre vertical profile and clearance options should be considered for further assessment.

Bridge cross section

Three bridge cross sections were assessed at the shortlisting workshop against the criteria given below:

- Is the option feasible in terms of engineering design?
- Does the cross section maintain or improve current safety risks to customers and workers during operation?
- Is the cross section consistent with the Princes Highway corridor within the project setting?
- Does the option meet current network targets for lane and shoulder widths?

Each of the bridge cross section options were considered by the project team with the assessment results shown in Table 3-4.

Table 3-4 Assessment of proposed bridge cross sections

Shortlisting criteria	Two lane	Three lane	Four lane
Is the option feasible in terms of engineering design?	✓	✓	✓
Does the option maintain or improve current safety risks to customers and workers?	✓	×	✓
Is the cross section consistent with the Princes Highway corridor within the project setting?	✓	×	✓
Does the option meet current network targets for lane and shoulder widths?	✓	✓	✓
Status	Retained	Eliminated	Retained

✓ Option cannot be eliminated as impacts are either considered likely to be acceptable; or could potentially be reduced to acceptable levels through design refinements

× Option fails against criterion and should be eliminated.

The shortlisting workshop resulted in the three lane cross section being eliminated. The three lane cross section's reversible lane was considered to be a traffic management solution more suited to an inner city main road rather than the project's coastal town urban setting. The shortlisting workshop also concluded the reversible lane would considerably increase the safety risks to customers and workers during operation when compared to the existing bridge and other renewal and cross section options. The decision to eliminate the three lane option is also supported by traffic modelling carried out by Roads and Maritime which identified a two lane option which is expected to accommodate the forecast 2026 and 2036 demand.

A four lane cross section was considered most appropriate to be carried forward for development when considering the preferred option as it would best provide for future growth in traffic and

minimise the risk of requirements for upgrades to the bridge in the future as traffic volumes increase.

Bridge Type

Roads and Maritime identified three bridge types to construct a new bridge given the project's context. The bridge types identified include:

Concrete Haunched Girder

The concrete haunched girder enables long span lengths which minimises the number of piers required and allows through views. The girders would be more dominant and may screen the landscape beyond from some viewing locations, yet the elegance of the structure makes the bridge a feature which would respect the river setting.

The concrete haunched girder is typically constructed using the balanced cantilever technique. The method consists of the developing the bridge in segments which are concreted into travelling formwork. Construction begins at each pier with segments built outward and continuing until a joining midpoint is reached and a balanced pair is closed.

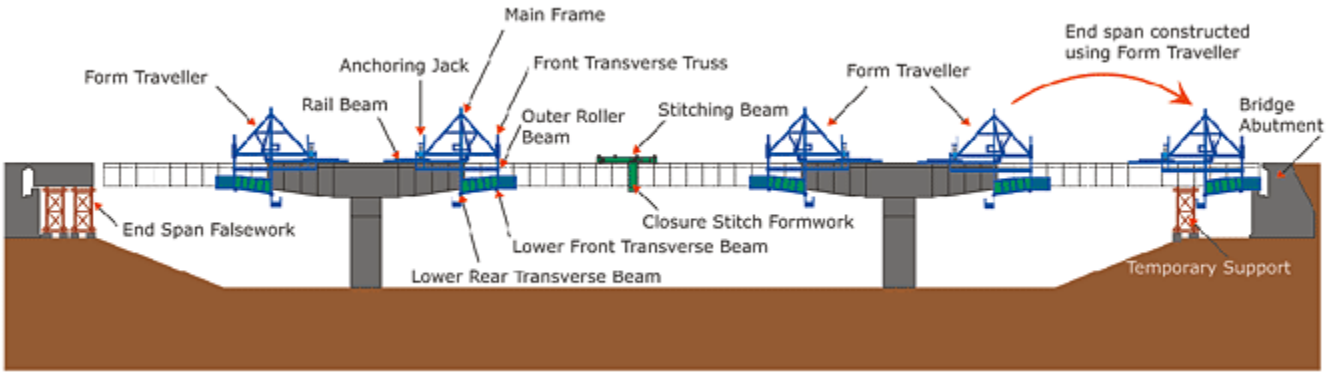


Figure 3-3 Balanced cantilever bridge construction methodology (Source: VSL systems http://en.vsl.cz/free-cantilever-method/)

Concrete Box Girder

A concrete box girder would likely utilise span lengths up to 60 metres, and although there are more piers compared to the haunched girder option, they are generally less bulky. The result is a structure which provides good visual permeability and generous deck cantilevers to provide an elegant structure.

The concrete box girder bridge is typically constructed using the incrementally launched technique. The method involves building the bridge deck segments in a casting yard located behind one bridge abutment. Each segment is then joined to the segment previously built, with the whole structure then pushed forward a distance equal to the length of the segment. The process is then repeated until the bridge is in its final positon.

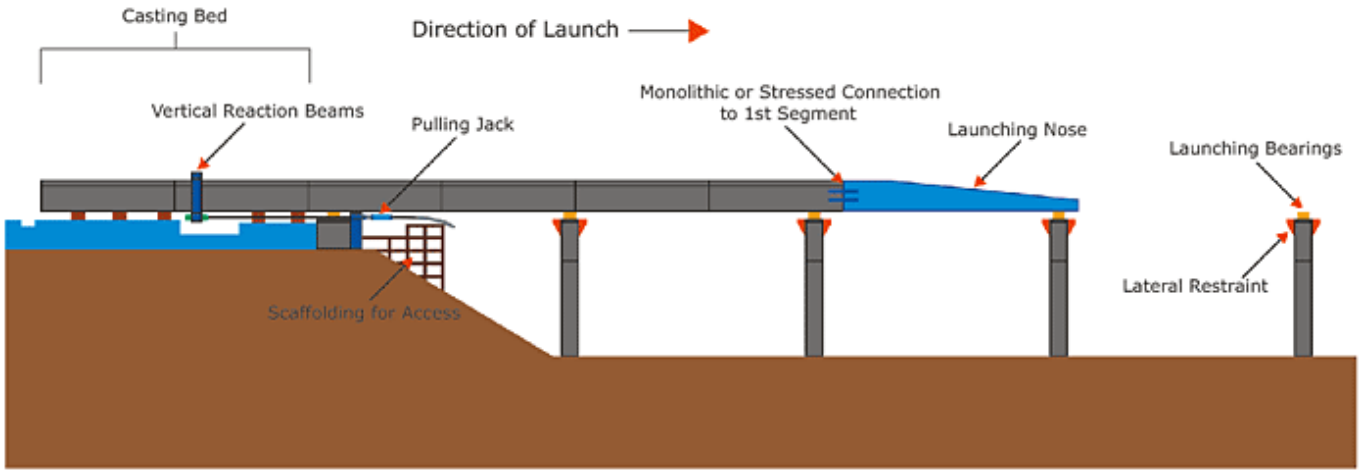


Figure 3-4 Incrementally launched box girder construction methodology (Source: VSL Systems http://en.vsl.cz/incremental-launching-method/)

Concrete Super-Tee Girder

The concrete Super-Tee option consists of precast girders spanning about 38 metres between the more numerous but least bulky piers. The Super-Tee arrangement limits the cantilevers of the bridge deck from the girder making the arrangement typically less elegant than the other options considered.

The Super-Tee option is constructed using precast girders manufactured offsite. The precast girders are then lifted into place on the piers and headstocks.

The shortlisting workshop considered the three bridge types which were assessed against the following shortlisting criteria:

- Is the option feasible in terms of engineering design?
- Does the option meet the urban design objectives and principles for the project setting?

Table 3-5 Assessment of proposed bridge types

Shortlisting criteria	Concrete Super-Tee	Concrete Haunched Girder	Concrete Box Girder
Is the option feasible in terms of engineering design?	✓	✓	✓
Does the option meet the urban design objectives and principles for the project setting?	Δ	✓	✓
Status	Eliminated	Retained	Retained

✓ Option cannot be eliminated as impacts are either considered likely to be acceptable; or could potentially be reduced to acceptable levels through design refinements

Δ Option requires significant design refinements to eliminate or reduce impacts to an acceptable level but cannot be eliminated at this stage

× Option fails against criterion and should be eliminated.

The shortlisting workshop noted the Super-Tee bridge type would require substantially more design refinement to achieve the urban design principles and objectives than the haunched girder and box girder bridge types in this project setting. It would also introduce more piers in the water that presents a greater maintenance liability and hazard to marine traffic. The Super-Tee bridge type was eliminated by the project team on this basis.

3.1.6 Options shortlist

The shortlisting process identified a number of options suitable for further design and assessment during concept design. The retained options can be summarised as follows:

- replacement of the existing bridge with:
    - a new bridge constructed to the east of the existing bridge
    - a new bridge constructed to the west of the existing bridge.

The bridge replacement options include the following sub options:

- concrete box girder and concrete haunched girder bridge types
- demolition of the existing bridge.

3.2 Options considered for assessment

Three options were taken forward for investigation and presented to a Value Management workshop held on June 15 2017. These are:

- East
- West
- Central

East was based on E1 alignment from the strategic design options. This was chosen ahead of E3 as it proposed the least amount of impact to the surrounding environment and best met road design standards.

West was based on W4 alignment from the strategic design options. This was refined and chosen ahead of W1, W2, W3 and W5 as it provided the desired urban design outcomes along with minimal impact to the surrounding environment.

Central option was developed on the basis of using the available land on the south eastern side of the existing bridge and the north western land of the existing bridge. The aim was to develop a compliant design with minimal impact to the surrounding environment while also considering urban design, constructability and costing.

These three options were considered in the value management process and are further outlined in Section 3.3.

3.3 Overview of options

3.3.1 Common design elements

In order to compare the three relative options on a like-for-like basis, the alignments have been developed with the following common design elements:

- Cross section:
    - All options have the provision to cater for four lanes of traffic and a shared use path for pedestrians and cyclists. The design speed for all options is 70 kilometres per hour.
- Alignment extents:
    - in the northern area of the project, the limit of work is just south of the roundabout with the Kings Highway
    - in the southern area of the project, the limit of work is just north of the intersection with North Street

- Minimum navigational clearance:
    - A nominal navigational clearance above Mean High Water Spring (MHWS) has been provided for all three options to be considered in the Value Management process. The final height of the bridge will be subject to further design development and consultation with key stakeholders, the community and river users.

3.3.2 East Option

This bridge option passes to the east of and is the closest to the existing bridge structure across the Clyde River.

3.3.3 Central Option

This bridge option passes closer to the west of the existing bridge structure across the Clyde River, than the western option.

The option crosses over the existing Princes Highway alignment before the existing bridge on the southern side and ties in with the existing highway alignment at the northern side.

3.3.4 West Option

This bridge option passes to the west of the existing bridge structure across the Clyde River.

The three bridge options are outlined in the figure below.

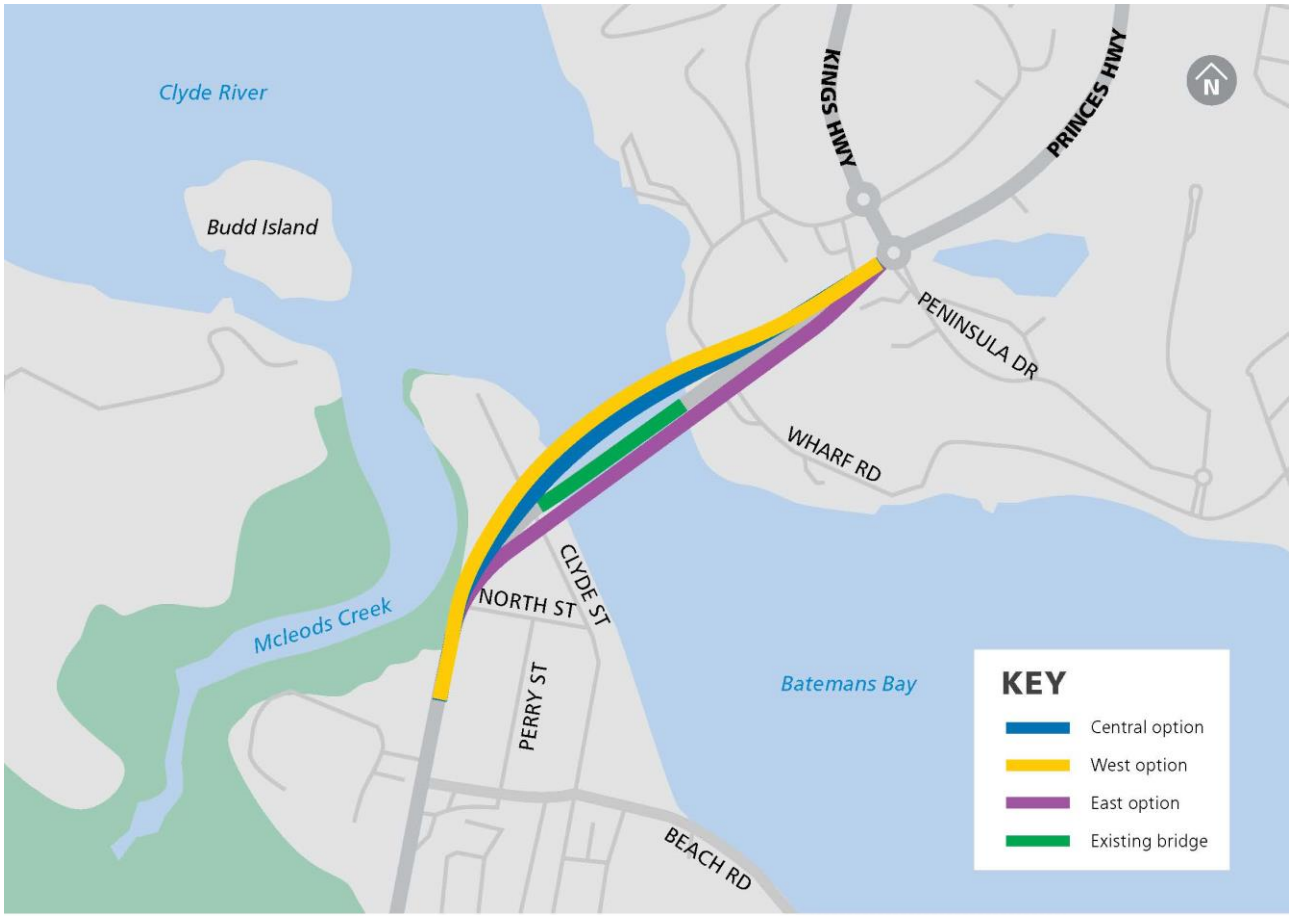


Figure 3-5 East, West and Central Options for replacement bridge

4. Value management process

A Value Management Workshop is a key stage in the development process for the new Batemans Bay Bridge. The objective of the workshop was to bring together a wide range of technical specialists, project stakeholders and community members to review the findings of the preliminary investigations that have taken place to date, against the project objectives and the agreed assessment criteria. Two members of the community were invited to take part in the workshop to represent the views of the wider community.

The workshop aim was to recommend a preferred option for the replacement of Batemans Bay Bridge that will be taken forward for further design development, community consultation and environmental assessment. More information on the Value Management process and the outcomes of the workshop are provided in Appendix B.

In summary, the objectives of the Value Management workshop were to:

- gain a common understanding of the work to date on the Batemans Bay Bridge project
- review the three strategic design options and evaluate them against agreed assessment criteria
- recommend a preferred option to progress the project

The workshop was held over one day on Thursday 15 June 2017 in Batemans Bay.

The workshop agenda is outlined in **Appendix A**.

4.1 Value management workshop

Participants of the workshop reviewed the detail of the three options and gained a common understanding of investigations carried out so far.

They then developed draft assessment criteria to qualitatively evaluate the functional, socio-economic and environmental performance of the east, central and west options. The criteria were used to help the workshop participants differentiate between the options.

The assessment criteria were developed using the project objectives, the givens and constraints. Discussion was also held about ‘what else is important’.

For each of the draft assessment criteria identified, the workshop group clarified what it meant, ensured it reflected the appropriate intent and that it would assist in differentiating between the various options. Each criteria also needed to reflect the project objectives.

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

The discussion during the comparison process was extensive and allowed the workshop group to understand and appreciate the various perspectives represented within the workshop and the relative importance of various criteria within each category. The final weightings were reached as a consensus. The whole group’s workings and their weightings of the assessment criteria for each perspective are described in **Appendix B**.

4.1.1 Assessment of options

The workshop group divided into three focus groups, being functional, socio-economic and environment, based on expertise or perspectives.

Each focus group was (as far as possible) made up of a representative cross section of the participants and stakeholders at the workshop (a mix of Roads and Maritime staff, council staff, community representatives and stakeholders).

The options were assessed relatively and qualitatively as to how each option performed against each criteria. The process followed is described in **Appendix B.**

The key observations for each area are described below, and the scores for each area are described in **Appendix B.**

Functional perspective:

- The focus group determined that the West Option would allow the use of a side track and therefore would be easier to build and allow better traffic flow. The Central Option would require a pier and abutment to be built within the existing Princes Highway alignment and would require more substantial temporary roadworks in order to maintain traffic flow on the Princes Highway during construction. It was considered the worst option as it required working closer to live traffic. The East Option was considered only nominally worse than the West Option due to the alignment being slightly closer to the existing bridge and therefore providing less room for a side track. This has the potential for greater impact on traffic and construction.
- The West and East Options were considered the best for flexibility in construction method and the Central Option was rated lower, as a balanced cantilever construction approach could not be used in this option.
- The West Option rated the best for ease of safe demolition, because of the greater distance to the existing bridge. The Central Option performed the next best and slightly poorer than the West Option as it has reduced space for demolition. The East Option was viewed as the worst against this criteria as it has the least space for demolition activities and storage as well as the least space under the new bridge to manoeuvre a crane.
- The East Option was considered the best to minimise the impact on major public utilities, since the East Option only impacts the water and sewer lines which can be more easily managed than relocation of optic fibre. The West Option would have a bigger impact on the optic fibre and Telecom cable.
- The focus group rated the West Option the best for safety for road users, because it has the potential for better pedestrian and cyclist options. The Central Option was rated the next best with the East Option rated as the worst against this criteria.

Socio-economic perspective:

- The Central Option was considered to have the least direct impact on properties, followed marginally by the West Option. The East Option was considered to have the greatest impact on properties.
- The West Option allows for the best connectivity followed marginally by the Central Option. The East Option reduces the amount of premium real estate (particularly on the eastern side) and was rated lowest.
- The Central Option was considered to have the least impact on businesses during construction and operation, followed marginally by the West Option. The East Option was considered the worst.
- The Central and West Options were considered best for minimising social impacts associated with traffic disruption during construction.
- The West Option was rated as the best for minimising access impacts to river users during construction and operation, followed by the Central Option. The East Option was considered to have issues on the southern side of the river.

Environmental perspective:

- The East Option was considered the best for minimising the impact on biodiversity, with only a minor difference to the Central and West Options

- All three options were rated the same to minimise encroachment and impacts on SEPP14 area, as they were relatively similar and difficult to differentiate
- The Central Option performed the best for minimising the impact on Aboriginal heritage, as it has a lesser impact on an archaeological site on northern bank of the Clyde River. Further investigations and consultation would be required for the East Option which is the least preferred. The West Option was rated between the Central Option and the East Option, and also requires more investigation.
- The East Option was considered the best to minimise impact on Non-Aboriginal heritage as it is clear of any potential impacts. The West and Central Options were rated the same and slightly worse than the East Option because they appear to have the potential to impact the punt ramp (there is an opportunity for interpretive alignment work and potentially subject to protection measures).
- The West Option was considered the best for providing a structure form that best fits with its surrounding landscape character and visual amenity, as it has a curve which appears more graceful. Both the West and Central Options fit into the landscape better on the northern side. The East Option was least preferred as it has a clunky landing on the northern bank with a straight alignment and then a curve on the southern side.
- The group considered that all options would have roughly the same impact regarding noise.

4.2 Value management outcomes

By the end of the Value Management Workshop, the group unanimously recommended that the West Option should move forward as the preferred option to progress the project planning as:

- It best achieves the assessment criteria for each perspective at a cost that is not “significantly” more than the cheapest option (Central Option)
- It provides the best connectivity and functionality
- It provides better opportunities for parking to support CBD growth and foreshore access
- It provides the greatest flexibility for construction
- It has superior geometry (which impacts on aesthetics and safety)
- It allows a better driver experience and a better aesthetic solution
- It will lead to better pedestrian accessibility
- It provides better opportunities for parking and boating facilities on northern side of the river.

The recommendation was based on the qualitative assessment against criteria which reflected what the project must achieve. The recommendations were subject to the following being resolved:

- Investigating further the Aboriginal heritage findings on the north west bank of the river and suitable mitigation being undertaken
- Resolving aspects of the bridge design
- Minimising environmental impacts
- Considering temporary construction access tracks on the south eastern side of the bridge work in order to decrease SEPP 14 wetland impacts
- Resolving satisfactorily with Council the pedestrian/cyclist connections to the CBD
- Determining an appropriate demolition staging of the existing bridge after the new bridge is operational
- Resolving and managing the relocation or protection of the impacted utilities

- Having the appropriate navigation clearance for water craft determined
- Considering the relocation of the boat ramps to utilise the space on the northern side of the river
- Managing the access and parking access to the boat ramps on the northern side of the river.

4.2.1 Navigational clearance height

The participants of the workshop discussed potential navigational clearance heights. The following issues were raised during the discussion;

- Greater clearance heights are unlikely to provide greater benefit for the greater costs involved
- Most coastal cruising is likely to stay east of the bridge and the future is likely to favour more motor cruising which will be in water craft of a lower height than yachts. Boat sizes are increasing but not much greater in height
- Higher clearances would open up greater stretches of the Clyde River for use to most boats moored in the marina (east of the bridge) and provide opportunities for a marina upstream of the bridge. Also with the entrance to the Clyde River being dredged more regularly and the potential for a greater bridge clearance could attract more boats heading up the coast and provide a greater economic benefit to Batemans Bay
- Higher clearances would require a bridge that would have a major change to the landscape in terms of greater visual impact, steeper grades for the road over the bridge to get to the increased height and then down the other side, it would require a greater footprint which in turn would impact on the SEPP14 wetlands and the difference in levels to obtain the grade would require major retaining walls very close to the CBD
- The oyster farming community would not support greater number of boats upstream due to the potential pollution risk to their industry
- When built in 1956, the existing lift span bridge was designed to cater for timber-related and fishing industries which initially navigated through the bridge. These have been mostly replaced by recreational water traffic and over the years there are fewer commercial craft using the waterway west of the bridge that require the greater clearance
- It was put that most boats are likely to stop downstream of the bridge and the extra funds for bridge clearance could be better used for greater water access to attract boats as a destination to the CBD

The conclusion reached by the group was that the clearance height needs to be resolved following further investigations including an assessment of the maritime traffic and discussions with relevant stakeholders. Roads and Maritime Services is carrying out further work to inform discussions around the bridge height and will consult with the community during the display of the preferred route.

5 Preferred option

5.2 Recommendation of preferred option

The West Option to replace Batemans Bay Bridge has been selected as the preferred option as it provides the best outcomes for community and stakeholders including road users, river users and pedestrians. It would also provide the best connectivity and functionality for a new bridge, the best socio-economic outcomes, and the greatest flexibility for construction. It has less impact on private properties than the East Option.

The West Option was preferred across a range of criteria including cost, connectivity and functionality, supporting growth of the CBD, flexibility for construction, superior geometry (which impacts on aesthetics and safety), driver experience, pedestrian accessibility, opportunities for parking and boating facilities. The West Option was unanimously agreed by all participants of the Value Management Workshop in June 2017.

5.3 Next steps

5.3.1 Actions following the workshop

Roads and Maritime Services is progressing work on the concept design for the Batemans Bay Bridge replacement and preparing the environmental assessment for the project. This will be on display later in 2017 for community and stakeholder feedback. As part of this work, recommendations from the Value Management Workshop will be addressed and considered by the project team. We will continue to keep the community and stakeholders updated as the project progresses.

5.3.2 Preferred option

Roads and Maritime is seeking community and stakeholder feedback on the preferred route option until **Friday 1 September 2017**. Feedback from this display period will be used to develop the environmental assessment and design of the new bridge.

We are also carrying out a survey on the features of the proposed new bridge. You can give your feedback via the Preferred Option Survey. This can be accessed at on the Batemans Bay Bridge project website.

5.3.3 Meet the project team

We invite you to meet the project team, provide feedback and understand more about the preferred option. The project team will be at the following locations.

Batemans Bay Community Centre
Thursday 10 August, 4pm to 7pm
Saturday 19 August, 10am to 1pm
2 Museum Place, Batemans Bay

Village Centre
Thursday 17 August, 3pm to 6pm
1 Perry Street, Batemans Bay

6 Appendices

Appendix A – Value management workshop agenda

Introduction

- Welcome and context of the project (2 mins)
- Description of the workshop process

Information phase

During this phase, a short presentation was made outlining project background, overview, what the project is meant to achieve, constraints the project is working within, other data and where Roads and Maritime are up to in the planning process.

Analysis phase

- Project purpose and objectives (what must the project achieve to be successful?)
- Givens/constraints we are working within
- What else is important that the project needs to consider?
- Review, identify and weight appropriate assessment criteria to evaluate strategic location options.

Review and assessment of the options

- Review of the Options
    - Presentation of the strategic location options
    - Analysis of the options (what's good about them, what's not so good)
- Evaluation of options using assessment criteria, project objectives and the relative strategic cost estimates.

The way forward

This part of the workshop pulls together all of the information to:

- recommend a preferred option(s) to progress the project
- summary of workshop outcomes
- where to from here?

Appendix B – Value management workshop report

A1 BATEMANS BAY BRIDGE PROJECT

Strategic design option assessment

Value management workshop report

JUNE 2017

Prepared by:-

The Australian Centre for Value Management

55 Albion Street
Surry Hills NSW 2010 Australia

Tel (61 2) 9211 6488
Fax (61 2) 9211 6499

acvm@acvm.com.au

Content

1. Workshop overview

1.1 Background

The bridge over the Clyde River at Batemans Bay is located on the A1 Princes Highway, 273 kilometres south of Sydney and 148 kilometres east of Canberra. It is located on the New South Wales (NSW) south coast, within the Eurobodalla Shire Council (ESC) local government area.

The bridge was constructed in 1956 to replace a ferry, with a lift span to accommodate commercial marine traffic. The bridge is about 287 metres long and has ten spans consisting of four steel girder spans and six truss spans, one of which is the lift span. The normal vertical clearance to mean high water springs (MHWS) for marine traffic is 3.6 metres, but can be raised to a maximum clearance of about 23 metres. MHWS is the average of all high water heights observed over a period of several years.

The timber-related and fishing industries which initially navigated through the bridge have been mostly replaced by commercial and recreational water traffic. Most lifts are made for a local tourist ferry, but the lift span also operates for other commercial vessels, yachts, motor cruisers and for maintenance of the bridge.

The A1 Princes Highway at Batemans Bay functions as the primary north-south coastal transport corridor, both at a local and regional level. Commercial, industrial and residential zones are located on the southern side of Clyde River extending to the coastal south-east while tidal wetlands and mangroves have constrained development to the south-west. North of the river includes residential development and holiday accommodation.

There are a number of issues associated with the current bridge over the Clyde River at Batemans Bay including:

- It has limited freight access to the south along the Princes Highway and to Batemans Bay due to a constraint to High Mass Limit (HML) semi-trailers and B-double vehicles up to 26 metres crossing the bridge
- Due to the truss height, there is a 5.1 metre constraint to over height vehicles
- Bridge elements are in poor condition which require high ongoing maintenance costs
- The connectivity for all road users to essential services is unreliable and there are associated economic and social impacts resulting from extended road closures or reduced capacity
- Journey reliability is poor and long traffic delays between Berrima Parade and Beach Road with little accommodation for future traffic growth without corridor and intersection improvements. This is frustrating for all road users not only through traffic but also the local residents of Batemans Bay
- There is less than desirable road user safety due to the width of the bridge and existing traffic barriers
- There is constrained access on the Clyde River for water craft due to the height of the bridge and reliance on lift span operation.

To address these issues, Roads and Maritime Services have been investigating upgrade options for the bridge and has concluded that there is a need to replace the current bridge in order to remove the barriers in the use of the road network for freight and improve network connectivity and journey reliability for all road users.

As part of the planning process, a value management workshop was seen as an appropriate tool to bring together a range of key project stakeholder interests, technical specialists and community members to review the strategic options developed and assess these options against agreed assessment criteria based on the project objectives and other items of importance that the project needs to consider in order to recommend a preferred option for further development and environmental assessment.

The Australian Centre for Value Management (ACVM) was commissioned to facilitate and report on the workshop which was held on **15 June 2017**. A list of participants who attended the workshop can be found in **Appendix 1**.

This report seeks to provide an objective overview of the project details discussed and the outcomes agreed by the end of the workshop.

1.2 Workshop objectives

The objectives of the workshop were to:

- Gain a common understanding of the work carried out to date on the Batemans Bay Bridge project
- Review the three strategic design options, evaluate them against agreed assessment criteria
- Recommend a preferred option to progress the project.

1.3 Workshop activities

The workshop process uses the knowledge and expertise of the participants to clarify the purpose of the project and its objectives (ie. what the project must achieve to be successful) as well as aspects considered important. Participants developed and agreed on appropriate assessment criteria to reflect these items/values and then used the investigations carried out so far to evaluate each option against these criteria.

During the workshop, the background of the project was presented which included the project context, constraints and the planning undertaken to date (see **Sections 2 and 3**).

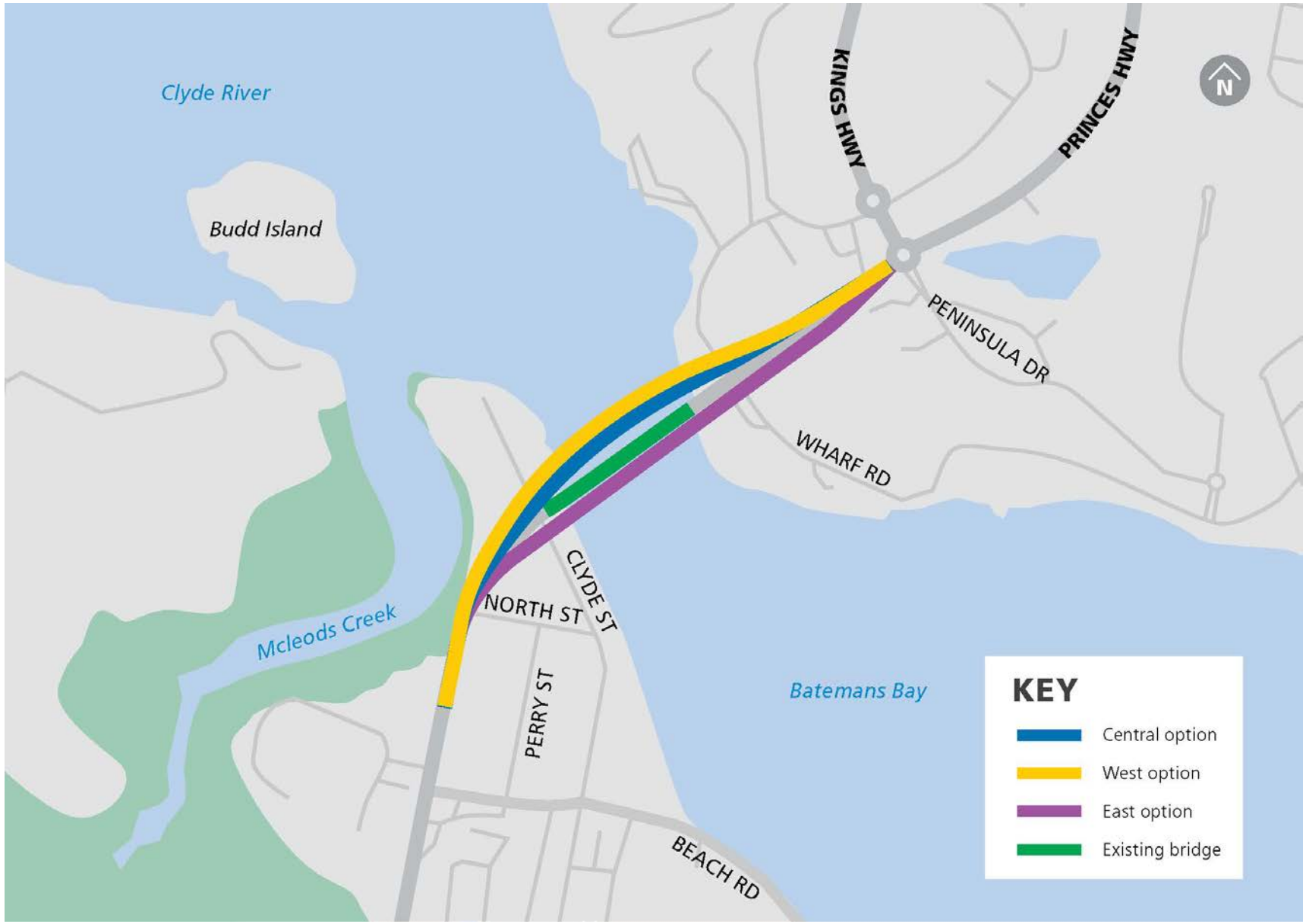
The project purpose and objectives were discussed and clarified. The workshop group identified what else was important that the project needed to consider. Also, the givens for the project were reviewed and shared from various perspectives (see **Section 2**).

Using this information, draft assessment criteria (developed prior to the workshop under the three categories of a functional perspective, socio-economic perspective and an environmental perspective) were discussed and refined. These criteria were then weighted in order of perceived importance for evaluation of the options (see **Section 2**).

The strategic design options (as shown in **Figure 1**) were:

- **East option –** This option passes to the east of and is the closest to the existing bridge structure across the Clyde River
- **Central option –** This option starts on the existing Princes Highway at the south and then crosses over the existing bridge before travelling to the west of the existing bridge
- **West option –** This option passes to the west of the existing bridge structure across the Clyde River.

Figure 1: Strategic Design Options



In order to compare the relative options on a like for like basis, the alignments were developed using the following design elements:

- Cross section – All options have the provision to cater for four lanes and a shared use path. The design speed for all options is 70 kilometres per hour. The structural depth of the bridge on each option would be 3.5 metres
- The geometry of all options allows for a launched bridge construction method with the flexibility for other options. The bridge spans will be between 50 metres and 55 metres depending on the bridge height and final outcome of urban design input
- A shared use path/cycleway will be provided on the ocean side of the new bridge
- Alignment extents – The northern project limit of works is just south of the roundabout with the Kings Highway and the southern project limit of works is just north of the intersection with North Street
- Minimum navigational clearance – Options were developed for a nominal navigational clearance above Mean High Water Spring (MHWS) to assess the impacts. A decision on the final height of bridge will decided following consultation with the broader community. The presentation material including material to assist in differentiating the options can be found in **Appendix 2**.

The workshop group then qualitatively and relatively evaluated the options against the assessment criteria before comparing their relative cost estimates and making their recommendations.

1.4 Summary of the workshop outcomes

By the end of the workshop, the participants had:

- Reflected on the project purpose and what the project must achieve to be successful. They were discussed and clarified as:

  The purpose of the project is to:

  - Replace the current bridge across the Clyde River at Batemans Bay.

  The project objectives (ie. what must the project achieve to be successful?) are to:

  - Remove barriers to highly productive use of the road freight network
  - Address poor bridge condition and reduce ongoing maintenance costs by providing a new bridge and demolishing the existing bridge and its piers
  - Improve network connectivity
  - Improve journey reliability.

  The secondary project objectives are to:

  - Provide the best benefit to our customers (all road users, pedestrians, cyclists and maritime users)
  - Deliver the project within an acceptable timeframe
  - Deliver the project within budget
  - Prioritise the safety of our workers and our customers
  - Minimise environmental impact
  - Deliver a project which fits sensitively with the built, natural and community environment (including providing good urban design)
  - Improve river navigation on the Clyde River.
- Reflected on the givens that the project was working within. This provided the context within which the project was being considered (see **Section 2.4**).
- Shared from their various perspectives what else was important that the project needed to consider (see **Section 2.5**).
- Identified and weighted assessment criteria which could be used to differentiate and evaluate the alignment options. The agreed assessment criteria were:

  Functional perspective:

  - Construction staging to provide effective passage under existing and forecast traffic conditions (to ensure free flow traffic)
  - Provides for flexibility in construction method – Launch or Balanced Cantilever

- Ease of safe demolition of existing structure while the replacement bridge is operational
- Minimises impact on major public utilities (flexibility in pier locations to optimise)
- Inherently safer for road users (road user experience).

Socio-economic perspective:

- Minimises direct impacts to properties (including lots, houses, businesses and community facilities)
- Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)
- Minimises direct and indirect impact on businesses during construction and operation (including impact on CBD car parking)
- Minimises social impacts associated with traffic disruption during construction (including pedestrian and cyclist movements)
- Minimises access impacts to river users during construction and operation - access to and from the river.

Environmental perspective:

- Minimises impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, natural processes, etc. excluding SEPP14 wetland boundaries)
- Minimises encroachment and impacts on SEPP14 area
- Minimises impact on Aboriginal heritage
- Minimises impact on Non-Aboriginal heritage
- Provides for a structure form that best fits with its surrounding landscape character and visual amenity
- Minimises the impact of noise.

- Reviewed information on the three strategic design options (East Option, Central Option and West Option), together with their key features so there was a common understanding of their differences, opportunities and constraints for later evaluation (see **Section 3, Appendix 2**).
- Evaluated the three options against the assessment criteria in three categories (functional, socio-economic and environmental perspectives) and compared the outcomes against their relative cost estimates (see **Section 3.2 – Section 3.4**).
- The workshop group unanimously recommended that **West Option** (as shown in ***Figure 1***) should move forward as the preferred option to progress the project planning as:
  - It best achieves the assessment criteria for each perspective at a cost that is not “significantly” more than the cheapest option (Central Option)
  - It provides the best connectivity and functionality
  - It provides better opportunities for parking to support CBD growth and foreshore access
  - It provides the greatest flexibility in terms of options for construction
  - It has superior geometry (which impacts on aesthetics and safety)
  - It allows a better driver experience and the better aesthetic solution
  - It will lead to better pedestrian accessibility
  - It provides better opportunities for parking and boating facilities on northern side of the river.

  The recommendation was based on the qualitative assessment against criteria which reflected what the project must achieve and the relative strategic cost estimate compared to the other options. The recommendation was qualified and requires the satisfactory resolution of the following ‘subject to’ statements:
  - Investigating further the potential for Aboriginal heritage artefacts to be found on the north west bank of the river and suitable mitigation being undertaken
  - Resolving the urban design aspects of the super-T backspan
  - Minimising environmental impacts
  - Considering temporary construction access tracks on the south eastern side of the bridge work in order to decrease SEPP 14 wetland impacts
  - Resolving satisfactorily with Council the pedestrian/cyclist connections to the CBD
  - Determining an appropriate demolition staging of the existing bridge after the new bridge is

operational

- Resolving and managing the relocation or protection of the impacted utilities
- Having the appropriate navigation clearance for water craft determined
- Considering the relocation of the boat ramps to utilise the space on the northern side of the river
- Managing the access and parking access to the boat ramps on the northern side of the river.

It should be noted that the recommendation is based on the information available at the time of the assessment.

- At the completion of the workshop, the workshop group also concluded:
  - The clearance height needs further investigations including (cost, benefit, opportunity and constraint analysis) and discussions with relevant stakeholders
  - The constructability aspects of the two anticipated bridge construction methods being proposed need to be investigated further
  - It needs to be confirmed that the demolition of the existing bridge (after the new bridge is operational) will occur to one metre below river bed level as per current standards to avoid being a future water hazard.

1.5 Next steps

The next steps in the planning process for the project were discussed with the workshop group. These included:

- Further investigations are needed to confirm the assumptions being made (ie. geotechnical investigations, traffic analysis, utility locations, etc.) so that the design can be refined
- On completion of the appropriate technical studies and investigations a preferred option will be announced and community feedback sought later this year.

2. Project information and analysis

The information presented in this section is a summary of the information shared by the workshop participants on various aspects of the Batemans Bay Bridge project. Project material was presented and other information was shared that allowed the participants to reflect on the project purpose and objectives, givens and constraints that the project was being planned within and together with other items considered important in order to compare the strategic bridge location options.

The draft assessment criteria (which had been distributed prior to the workshop in a VM background paper) were reviewed and modified to ensure they reflected the project objectives and other items of importance that could be used to differentiate the options. Once this had been agreed to, the group weighted the assessment criteria using a paired comparison approach. The weighted assessment criteria would be later used to evaluate the options and recommend a preferred option to progress the project.

2.1 Project background and overview

A brief summary of information presented included:

- Project background:
  - The Batemans Bay Bridge with a lift span was constructed over the Clyde River in 1956 to replace the ferry service
  - The bridge is a 10 span, 287 metres long bridge with six truss spans
  - The current bridge has a clearance of 3.6 metres above mean high water springs (MWHS). The lift span can be raised to a maximum of 23 metres.
- Project need:
  - The bridge has limited freight access to the south along the Princes Highway and to the town of Batemans Bay due to high mass limit (HML) semi-trailers and B-double vehicles up to 26 metres crossing the bridge
  - Due to the truss height, there is a 5.1 metre constraint to over height vehicles
  - Bridge elements are in poor condition which require high ongoing maintenance costs
  - The need to lift the span for marine craft causes traffic congestion and due to its age has broken down in the past in the “up” position causing extended delays and frustration to road users
  - The connectivity for all road users to essential services is unreliable and there are associated economic and social impacts resulting from extended road closures or reduced capacity
  - Journey reliability is poor and there are long traffic delays between Berrima Parade and Beach Road particularly in holiday peaks with little accommodation for future traffic growth without corridor and intersection improvements. This is frustrating for all road users not only through traffic but also the local residents of Batemans Bay
  - There is less than desirable road user safety due to the width of the bridge and existing traffic barriers
  - There is constrained access on the Clyde River for water craft due to the height of the bridge and reliance on lift span operation.
- Objectives of the project are to:
  - Remove barriers to highly productive use of the road freight network
  - Address poor bridge condition and reduce ongoing maintenance costs
  - Improve network connectivity
  - Improve journey reliability
- Roads and Maritime investigated a number of options to address the issues including:
  - Business as usual
  - Alternative infrastructure options
  - Bridge renewal
  - Bridge replacement (including horizontal alignment, vertical clearance and bridge types)
- As a result of investigations, strategic options were developed and a shortlist prepared. Considerations included:
  - A new crossing of the Clyde River at Batemans Bay with the new bridge on either the eastern or western side of the existing bridge
  -

- The bridge would be wide enough to cater four lanes
- Construction to be either an incrementally launched approach or balanced cantilever bridge.

2.2 The problem

The workshop group reflected on what the problem was that was causing a solution to be considered as outlined in the background paper distributed to participants prior to the workshop. After discussion, the workshop group concluded that the problem was to varying degrees:

- There is limited freight access due to a constraint to HML semi-trailers and B-double vehicles up to 26 metres at Batemans Bay
- There is a 5.1 metre constraint to over height vehicles
- Bridge elements which are currently in poor condition and require high ongoing maintenance costs
- There is unreliable connectivity for all road users to essential services and associated economic and social impacts resulting from an extended road closure or reduced capacity particularly for local traffic either side of the bridge
- There is poor journey reliability and there is long traffic delays between Berrima Parade and Beach Road with little accommodation for future traffic growth without corridor and intersection improvements
- There is less than desirable road user safety associated with the width of the bridge and existing traffic barriers
- There is constrained access on the Clyde River for water craft due to the height of the bridge and the reliance on the lift span operation
- Congestion occurs crossing the bridge particularly at peak times around the week-ends and holiday periods. The main issue has been identified as the bridge crossing and not necessarily the intersections
- Use of the lift span exacerbates congestion and limits connectivity.

2.3 Purpose and objectives of the project

The workshop group reflected on the purpose and objectives of the project as outlined in the background paper. These were discussed, clarified and added to. After discussion, the workshop group concluded:

The purpose of the project is to:

- Replace the current bridge across the Clyde River at Batemans Bay.

The project objectives (ie. what must the project achieve to be successful?) are to:

- Remove barriers to highly productive use of the road freight network
- Address poor bridge condition and reduce ongoing maintenance costs by providing a new bridge and demolishing the existing bridge and its piers
- Improve network connectivity
- Improve journey reliability.

The secondary project objectives are to:

- Provide the best benefit to our customers (all road users, pedestrians, cyclists and maritime users)
- Deliver the project within an acceptable timeframe
- Deliver the project within budget
- Prioritise the safety of our workers and our customers
- Minimise environmental impact
- Deliver a project which fits sensitively with the built, natural and community environment (including providing good urban design)
- Improve river navigation on the Clyde River.

2.4 Givens we are working within

The givens 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 outlined below were shared and agreed to by the workshop group. Comments of note by the group are shown in *italics*.

Givens

- All options are to provide for up to four lanes (two lanes in each direction) and a shared user path (for pedestrian and cyclist). *The need for a future four lane solution will need to be justified as planning proceeds*
- All options are to achieve a design speed of 70 km/h for a posted speed of 60 km/h in line with best practice. *It was felt by the group that this needs to be justified as the greater design speed above posted speed may cause poor driver behaviour and also may increase the footprint of the project above what is actually required*
- All options are to provide improved safety for pedestrians, cyclists, motorists and river users
- All options are to improve through traffic efficiency and remove HML constraints (reduce congestion and travel time including at peak times)
- The northern project limit of works is just south of the roundabout with the Kings Highway
- The southern project limit of works is just north of the intersection with North Street
-
- The existing bridge and approaches need to remain operational for both southbound and northbound traffic while the new bridge is being constructed
- The new bridge must be able to be constructed without closing the Princes Highway as there are no suitable alternative routes available without significant detour *(ie. no long term closures. However, possible short term night time closures may be acceptable)*
- The existing bridge and its abutments are to be removed after the new bridge has opened and is fully operational
- The bridge is to be a concrete structure with an asphalt road surface
- The replacement bridge must tie into the current alignment of the Princes Highway
- *There is an aim to minimise environmental impacts (i.e. to the marine park, SEPP14 wetlands, water quality, oyster farms, etc.)*
- *There is an aim to minimise any water hazards (ie. piers in the waterway, etc.).*

2.5 What else is important that the project needs to consider?

The workshop group (in five focus groups) shared from their various perspectives what else was important that the project needed to consider. There was some commonality between points raised by the focus groups which indicated the level of importance of some of the items raised. The points raised are recorded below.

It is important that the project considers:

Focus group 1

- Ensuring that noise impacts are considered (ie. compression brakes, joint types, etc.)
- Safety is a priority (ie. larger vehicles using the road)
- Aesthetics of the new bridge (ie. construction type – balanced cantilever, incrementally launched, etc.)
- Batemans Bay being a “Tourist Town” needs to be considered in the design
- The new bridge piers must allow for the operation of existing lift span until the existing bridge is demolished
- The difference in strength requirements of the new bridge (ie. 2 lanes as against 4 lanes) and not just greater width of the new bridge.

Focus group 2

- Consider a minimum height of 12.6m above the water and consider potentially greater clearance for higher clearance boats
- Consider providing access to Clyde Street (both sides of the bridge)
- Consider providing two lanes first, demolish the old bridge and then provide a second bridge (duplicated bridges)
- Consider pedestrian access to Wharf Road and Punt Road from the new bridge(possibly a lift to connect)
- Geomorphology changes as a result of changes in flows caused by different pier locations
- Ensuring appropriate and safe access for cyclists and pedestrian
- Aesthetics of the old bridge.

Focus group 3

- Consider personal safety and passive surveillance around the new bridge
- Ensuring the path width is appropriately sized
- Remembering that the project is about movement and place
- Consider enforcement requirements (ie. pull over bays, static/safe areas, etc.)
- Consider the use of CCTV on the bridge (network requirement, TMC/NSW Police requirement)
- Health and emergency services access generally for through/ local/ regional traffic now and for the future
- Place based considerations including severance issues (ie. current fears when the bridge out) and issues with speed, transition and introduction to the town
- Consider and quantify the urban design intent
- What is the sentimental value of the existing bridge?
- Ensuring the community is engaged in the project
- Functional/ town aspects – consideration of different and future movement patterns into and through town (eg. one way street systems, etc.)
- Active transport considerations including height as against ease of access/gradients and the connections at each end of the bridge.

Focus group 4

- Consider the impacts to businesses including oyster farms (ie. water quality impacts) and the impacts on water quality of the different construction methods
- All users need to be considered (no interference to Mackay Park)
- Consider access under the bridge (ie. foreshore connectivity/ access to river during construction)
- Retention of the heritage boat ramp
- Maintaining access to the boat ramps and the river
- Impacts to the bus services and to connectivity and parking particularly in the CBD of Batemans Bay
- Consider any future sea level rise and the impact on road levels of the Princes Highway
- Consider B-double access to the CBD (ie. de-coupling/deliveries, etc.)
- Impacts to services and utilities
- Connectivity and the levels/height differences to local roads
- Urban design of the structure and surrounds are sensitively managed
- Consider future traffic needs and autonomous cars
- Consider lighting the bridge and making it a piece of art through lighting.

Focus group 5

- Consider sensitive management of Aboriginal cultural heritage (PACHCI process) – connectivity with surrounding Aboriginal cultural projects (National Parks)
- Existing maritime facilities impacted by the project need to be replaced.

2.6 Assessment criteria

Using the project objectives as well as the givens and constraints and statements as what else was important that needed to be considered, draft assessment criteria were developed to evaluate the functional, socio-economic and environmental performance of the strategic 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 workshop group reviewed the draft assessment criteria (in the VM background paper) that could be used to qualitatively evaluate the various options.

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

2.6.1 Draft assessment criteria

Initially the draft assessment criteria proposed were:

Functional perspective:

F1 – Construction staging to provide effective passage under existing and forecast traffic conditions (*to ensure free flow traffic*)

F2 – Provides for flexibility in construction method – Launch or Balanced Cantilever

F3 – Provides for safe demolition of existing structure while replacement bridge is operational

F4 – Minimises impact on major public utilities.

Socio-economic perspective:

S1 – Minimises direct impacts to properties (including lots, houses, businesses and community facilities)

S2 – Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)

S3 – Minimises direct and indirect impact on businesses during construction and operation

S4 – Minimises social impacts associated with traffic disruption during construction

S5 – Minimises access impacts to river users during construction and operation - access to and from the river.

Environmental perspective:

E1 – Minimises impact on biodiversity (i.e. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, etc.)

E2 – Minimises encroachment and impacts on SEPP14 area

E3 – Minimises impact on Aboriginal heritage

E4 – Minimises impact on Non-Aboriginal heritage

E5 – Provides for a structure form that best fits with its surrounding landscape character and visual amenity

E6 – Provides for a positive road user experience

E7 – Minimises the impact of noise.

2.6.2 Agreed assessment criteria

For each of the draft assessment criteria identified, the workshop group clarified what it meant, ensured it reflected the appropriate intent and that it would assist in differentiating between the various options. The workshop 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 – Construction staging to provide effective passage under existing and forecast traffic conditions (*to ensure free flow traffic*)

F2 – Provides for flexibility in construction method – Launch or Balanced Cantilever

F3 – Ease of safe demolition of existing structure while the replacement bridge is operational

F4 – Minimises impact on major public utilities (flexibility in pier locations to optimise)

F5 – Inherently safer for road users (road user experience).

Socio-economic perspective:

S1 – Minimises direct impacts to properties (including lots, houses, businesses and community facilities)

S2 – Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)

S3 – Minimises direct and indirect impact on businesses during construction and operation (including impact on CBD car parking)

S4 – Minimises social impacts associated with traffic disruption during construction (including pedestrian and cyclist movements)

S5 – Minimises access impacts to river users during construction and operation - access to and from the river.

Environmental perspective:

E1 – Minimises impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, natural processes, etc. excluding SEPP14 wetland boundaries)

E2 – Minimises encroachment and impacts on SEPP14 area

E3 – Minimises impact on Aboriginal heritage

E4 – Minimises impact on Non-Aboriginal heritage

E5 – Provides for a structure form that best fits with its surrounding landscape character and visual amenity

E7 – Minimises the impact of noise.

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

In the Technical/Functional perspective category:

- The workshop group agreed with the draft criteria nominated in this category
- The group clarified criteria F3 to “Ease of safe demolition of existing structure while the replacement bridge is operational)”
- The group clarified criteria F4 to include “Minimises impact on major public utilities (flexibility in pier locations to optimise)”
- The group added another criteria which included criteria E6 being criteria F5 “Inherently safer for road users (road user experience)”.

In the Socio-economic perspective category:

- The workshop group clarified the criteria S3 being “Minimises direct and indirect impact on businesses during construction and operation” to include the impact on CBD car parking
- The workshop group clarified the criteria S4 being “Minimises social impacts associated with traffic disruption during construction” to include pedestrian and cyclist movements.

In the Environmental perspective category:

- The workshop group clarified that the criteria E1 being “Minimises impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas” to include natural processes but also to exclude SEPP14 wetland boundaries which was included in criteria E2
- Criteria E6 being “Provides for a positive road user experience” was seen as a functional criteria. It was broadened slightly and became F5 being “Inherently safer for road users (road user experience).

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 strategic options for the project.

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 the “money” aspect. 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.

2.7 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 assists in determining the relative importance of different criteria or values by comparing them against each other, in pairs.

The process used was to compare two criteria (in pairs) to determine which of the two was more important when it came to assessing the options. If the group thought there was no difference between the importance of one criteria over the other, the group scored them as equal.

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

2.7.1 Functional perspective

No	Assessment	Raw Score	Relative Weightings
F1	Construction staging to provide effective passage under existing and forecast traffic conditions (to ensure free flow traffic)	3	30%
F2	Provides for flexibility in construction method – Launch or Balanced Cantilever	1	10%
F3	Ease of safe demolition of existing structure while the replacement bridge is operational	2	20%
F4	Minimises impact on major public utilities (flexibility in pier locations to optimise)	0	0%
F5	Inherently safer for road users (road user experience)	4	40%
	Total	**10**	**100%**

Scoring Matrix

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

	F2	**F3**	**F4**	**F5**
F1	F1	F1	F1	F5
	F2	F3	F2	F5
		F3	F3	F5
			F4	F5
				F5

Summary

The weighting of the assessment criteria from a functional perspective using the paired comparison approach indicated that the "Inherently safer for road users", was the most important criteria followed by "Construction staging to provide effective passage under existing and forecast traffic conditions" and then "Ease of safe demolition of existing structure while the replacement bridge is operational" followed by "Provides for flexibility in construction method" in terms of importance.

It should be noted that "Minimises impact on major public utilities" although important was not considered as important as the other criteria when compared in pairs, and scored zero.

2.7.2 Socio-economic perspective

No	Assessment	Raw Score	Relative Weightings
S1	Minimises direct impacts to properties (including lots, houses, businesses and community facilities)	1	10%
S2	Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)	3.5	35%
S3	Minimises direct and indirect impact on businesses during construction and operation (including impact on CBD car parking)	3.5	35%
S4	Minimises social impacts associated with traffic disruption during construction (including pedestrian and cyclist movements)	0	0%
S5	Minimises access impacts to river users during construction and operation - access to and from the river	2	20%
	Total	**10**	**100%**

Scoring Matrix

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

	S2	**S3**	**S4**	**S5**
S1	S2	S3	S1	S5
	S2	S2/S3	S2	S2
		S3	S3	S3
			S4	S5
				S5

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 and local connectivity (including regional development and local planning foreshore planning, etc.)” and “Minimises direct and indirect impact on businesses during construction and operation (including impact on CBD car parking)” were the most important criteria followed by “Minimises access impacts to river users during construction and operation - access to and from the river” and then “Minimises direct impacts to properties (including lots, houses, businesses and community facilities)” in terms of importance.

It should be noted that “Minimises social impacts associated with traffic disruption during construction (including pedestrian and cyclist movements)” although important was not considered as important as the other criteria when compared in pairs, and scored zero.

2.7.3 Environmental perspective

No	Assessment	Raw Score	Relative Weightings
E1	Minimises impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, natural processes, etc excluding SEPP14 wetland boundaries)	3.5	23%
E2	Minimises encroachment and impacts on SEPP14 area	3.5	23%
E3	Minimises impact on Aboriginal heritage	5	33%
E4	Minimises impact on Non-Aboriginal heritage	1	7%
E5	Provides for a structure form that best fits with its surrounding landscape character and visual amenity	2	13%
E7	Minimises the impact of noise	0	0%
	Total	**15**	**99%***

(*) – indicates rounding error

Scoring Matrix

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

	E2	**E3**	**E4**	**E5**	**E7**
E1	E1/E2	E3	E1	E1	E1
E2		E3	E2	E2	E2
E3			E3	E3	E3
E4				E5	E4
E5					E5
E7					

Summary

The weighting of the assessment criteria from an environmental perspective using the paired comparison approach indicated that “Minimises impact on Aboriginal heritage” was considered the most important criteria followed by “Minimise impact on biodiversity” and “Minimises encroachment and impacts on SEPP14 area” and then “Provides for a structure form that best fits with its surrounding landscape character and visual amenity” and then “Minimises impact on Non-Aboriginal heritage” in terms of importance.

It should be noted that “Minimises the impact of noise” although important was not considered as important as the other criteria when compared in pairs, and scored zero.

2.7.4 Assessment summary

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

Assessment Criteria					
Functional		**Socio-economic**		**Environmental**	
Criteria	**Wt**	**Criteria**	**Wt**	**Criteria**	**Wt**
Construction staging to provide effective passage under existing and forecast traffic conditions	30%	Minimises direct impacts to properties (including lots, houses, businesses and community facilities)	10%	Minimises impact on biodiversity (ie. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, natural processes, etc. excluding SEPP14 wetland boundaries)	23%
Provides for flexibility in construction method	10%	Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)	35%	Minimises encroachment and impacts on SEPP14 area	23%
Ease of safe demolition of existing structure while the replacement bridge is operational	20%	Minimises direct and indirect impact on businesses during construction and operation	35%	Minimises impact on Aboriginal heritage	33%
Minimises impact on major public utilities	0%	Minimises social impacts associated with traffic disruption during construction	0%	Minimises impact on Non-Aboriginal heritage	7%
Inherently safer for road users (road user experience)	40%	Minimises access impacts to river users during construction and operation - access to and from the river	20%	Provides for a structure form that best fits with its surrounding landscape character and visual amenity	13%
				Minimises the impact of noise	0%

These weighted assessment criteria would later be used to evaluate the 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 workshop group could now broadly review the three options for the project.

3. Options review

In this section of the report, the workshop group evaluated the strategic options using assessment criteria derived from the project objectives and other items of importance and ranking them in terms of how well they performed functionally, socio-economically and environmentally. The strategic cost estimates were then considered against the options so the workshop group could determine which option provided the best value for money outcome and recommend an option for further project development.

3.1 Strategic option description and study area investigations

Before commencing the evaluation process, an overview of the investigations undertaken by the Aurecon project team within the study area as well as a description of the options was presented to the group which elaborated on items summarised in the VM background paper.

The strategic options (as shown in **Figure 1**) were:

- **East option –** This option passes to the east of and is the closest to the existing bridge structure across the Clyde River
- **Central option –** This option starts on the existing Princes Highway at the south and then crosses over the existing bridge before travelling to the west of the existing bridge
- **West option –** This option passes to the west of the existing bridge structure across the Clyde River.

In order to compare the relative options on a like for like basis, the alignments were developed using the following design elements:

- Cross section – All options have the provision to cater for four lanes and a shared use path. The design speed for all options is 70 kilometres per hour. The structural depth of the bridge on each option would be 3.5 metres
- The geometry of all options allows for a launched bridge construction method with the flexibility for other options. The bridge spans will be between 50 metres and 55 metres depending on the bridge height and final outcome of urban design input
- A shared use path/cycleway will be provided on the ocean side of the new bridge
- Alignment extents – The northern project limit of works is just south of the roundabout with the Kings Highway and the southern project limit of works is just north of the intersection with North Street
- Minimum navigational clearance – A nominal navigational clearance above Mean High Water Spring (MHWS) was included for all three options to be considered in the evaluation process.

The presentation material including comparison material for the options which were developed by the project team to assist in differentiating between the options can be found in ***Appendix 2***.

3.2 Assessment of options

Having reviewed the options and gained a common understanding of investigations undertaken, the workshop group was now in a position to evaluate them against the weighted assessment criteria previously developed.

The workshop group divided into three focus groups, being a functional, a socio-economic and an environment focus group based on expertise or represented perspectives.

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

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. No difference between the options would see the other option scored as a 4.

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

Once the evaluation was completed, the results were scored using the appropriate weighting determined earlier for each criteria. This enabled a relative overall ranking for each option for the three categories to occur (from 1 to 3 with 1 being the best).

It should be noted that 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.

3.2.1 Assessment of options using the functional perspective

Assessment Criteria	Construction staging to provide effective passage under existing & forecast traffic conditions	Provides for flexibility in construction method	Ease of demolition of existing structure while the replacement bridge is operational	Minimises impact on major public utilities	Inherently safer for road users (road user experience)	Total Score & Rank
Weighting	30%	10%	20%	0	40%	
West Option	**4**	**4**	**4**	4	**4**	**1**
	3	3	3	**3**	3	
	2	2	2	2	2	
	1	1	1	1	1	
Sub-total	**120**	**40**	**80**	**0**	**160**	**400**
Central Option	4	4	4	**4**	4	**2**
	3	3	**3**	3	**3**	
	2	**2**	2	2	2	
	1	1	1	1	1	
Sub-total	**60**	**20**	**60**	**0**	**120**	**260**
East Option	4	**4**	4	**4**	4	**3**
	3	3	3	3	3	
	2	2	2	2	2	
	1	1	**1**	1	**1**	
Sub-total	**90**	**40**	**20**	**0**	**40**	**190**

Key observations

- With regards to “Construction staging to provide effective passage under existing and forecast traffic conditions”, the focus group believed that the West Option would allow the use of a side track and therefore would be easier to build and allow better traffic flow. Whereas, the Central Option would require a pier and abutment to be built within the existing Princes Highway alignment and would require more substantial temporary roadworks in order to maintain traffic flow on the Princes Highway during construction.. It was considered the worst option as it required working closer to live traffic. The East Option was considered only nominally worse than the West Option and scored a “3”
- With regards to “Provides for flexibility in construction method”, the West and East Options were considered the best and the Central Option was rated a “2” as a balanced cantilever construction approach could not be used in this option
- With regards to “Ease of safe demolition of existing structure while the replacement bridge is operational”, the West Option rated the best because of the greater distance to the exiting bridge. The Central Option performed the next best and slightly poorer than the West Option as it has reduced headroom for demolition of the beam slab. The East Option was viewed as the worst against this criteria as it has the least room in the park for demolition activities and storage as well as the least headroom under the new bridge to manoeuvre a crane
- With regards to “Minimises impact on major public utilities”, the East Option was considered the best to minimise the impact on major public utilities, since the East Option only impacts the water and sewer lines which can be more easily managed than relocation of optic fibre. The West Option would have a bigger impact on the optic fibre and Telecom cable. It should be noted the focus group elected to rate the options against this criteria although it had a zero weighting in the paired comparison weighting process since utilities can be relocated although at a cost to the project.
- With regards to “Inherently safer for road users”, the focus group rated the West Option the best since it has potential for better pedestrian and cyclist options. The Central Option was rated the next best with the East Option rated as the worst against this criteria.

3.2.2 Assessment of options using the socio-economic perspective

Assessment Criteria	Minimises direct impacts to properties	Best fits with existing & future planning & local connectivity	Minimises direct & indirect impacts on businesses during construction & operation	Minimises social impacts associated with traffic disruption during construction	Minimises access impacts to river users during construction & operation	Total Score & Rank
Weighting	10%	35%	35%	0	20%	
West Option	4	**4**	4	4	**4**	**1**
	3	3	**3**	**3**	3	
	2	2	2	2	2	
	1	1	1	1	1	
Sub-total	**30**	**140**	**105**	**0**	**80**	**355**
Central Option	**4**	4	**4**	**4**	4	**1**
	3	**3**	3	3	**3**	
	2	2	2	2	2	
	1	1	1	1	1	
Sub-total	**40**	**105**	**140**	**0**	**60**	**345**
East Option	4	4	4	**4**	4	**3**
	3	3	3	3	3	
	2	2	**2**	2	**2**	
	1	**1**	1	1	1	
Sub-total	**10**	**35**	**70**	**0**	**40**	**155**

Key observations

- With regards to “Minimises direct impacts to properties”, the Central Option was viewed to have the least impact, followed by the West Option which was viewed as marginally worse. The East Option was viewed as having the greatest impact and was rated as a “1”
- With regards to “Best fits with existing and future planning and local connectivity’, the West Option allowed for the best for future planning and local connectivity followed by the Central Option which was rated marginally worse. The East Option has the greatest impact on premium real estate (particularly on the eastern side) and was rated as a “1”
- With regards to “Minimises direct and indirect impact on businesses during construction and operation”, the Central Option was viewed as having the least impact on businesses followed by the West Option which was viewed as marginally worse with more impacts during construction. The East Option was considered the worst and was rated as a “2”
- With regards to “Minimises social impacts associated with traffic disruption during construction”, the Central and West Options were viewed as the best options and the West Option which had an impact on traffic adjacent to the Woolworths shopping area was rated as a “3”. It should be noted the focus group elected to rate the options against this criteria although it had a zero weighting in the paired comparison weighting process
- With regards to “Minimises access impacts to river users during construction and operation” the West Option was rated as the best, followed by the Central Option. The East Option was viewed as having issues on the southern side of the river and was rated as a “2”.

3.2.3 Assessment of options using the environmental perspective

Assessment Criteria	Minimises impact on biodiversity (ex. SEPP 14 wetland boundaries)	Minimises encroachment & impacts on SEPP 14 area	Minimises impact on Aboriginal heritage	Minimises impact on non-Aboriginal heritage	Provides for a structure form that best fits with its surrounding landscape character & visual amenity	Minimises the impact of noise	Total Score & Rank
Weighting	23%	23%	33%	7%	13%	0	
West Option	4	**4**	4	4	**4**	**4**	**1**
	3	3	**3**	**3**	3	3	
	2	2	2	2	2	2	
	1	1	1	1	1	1	
Sub-total	**69**	**92**	**99**	**21**	**52**	**0**	**333**
Central Option	4	**4**	**4**	4	4	**4**	**1**
	3	3	3	**3**	**3**	3	
	2	2	2	2	2	2	
	1	1	1	1	1	1	
Sub-total	**69**	**92**	**132**	**21**	**39**	**0**	**353**
East Option	**4**	**4**	4	**4**	4	**4**	**3**
	3	3	3	3	3	3	
	2	2	**2**	2	2	2	
	1	1	1	1	**1**	1	
Sub-total	**92**	**92**	**66**	**28**	**13**	**0**	**291**

Key observations

- With regards to “Minimises impact on biodiversity”, the focus believed that the East Option performed the best with only a minor difference to the Central and West Options
- With regards to “Minimises encroachment and impacts on SEPP14 area”, the focus group rated all three option the same as they were relatively similar and difficult to differentiate
- With regards to “Minimises impact on Aboriginal heritage”, the focus group commented that cultural sensitivity is the main difference. The Central Option performs the best as it has a lesser impact on archaeological site on northern bank. Further investigations and consultation is required for the East Option which is considered the worst relatively. The West Option was considered as being rated between the Central Option and the East Option. It too requires more investigation
- With regards to “Minimises impact on Non-Aboriginal heritage”, the East Option was considered the best as it is clear of any potential impacts. The West and Central Options were rated the same and slightly worse than the East Option because they appear to have the potential to impact the punt ramp (there is an opportunity for interpretive alignment work and potentially subject to protection measures)
- With regards to “Provides for a structure form that best fits with its surrounding landscape character and visual amenity”, the West Option was viewed as the best as it has a curve which appears more graceful. Both the West and Central Options fit into the landscape better on the northern side. So the Central Option scored the next best. The East Option was rated the worst as it has a clunky landing on the northern bank with a straight and then a curve on the southern side which is not preferred

- With regards to “Minimises the impact of noise, the focus group believed that all options would have roughly the same impact. It should be noted the focus group elected to rate the options against this criteria although it had a zero weighting in the paired comparison weighting process.

3.3 Relative strategic cost estimates

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

The strategic cost estimates were presented as a range being the relative strategic costs for a bridge with a 12 metre high clearance and then the amount of extra cost for the bridge to have a clearance of 16.4 metres. It was noted that should the bridge clearance be raised to 16.4 metres then other impacts such as increased footprint, approach grades and environmental encroachments would be greater and would need to be reassessed.

Absolute estimates for each option are likely to change as the project progresses. However the relative order of magnitude between the options are shown below. Further work on costs would need to be carried out as more information becomes available and the project progresses.

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

Options	Relative strategic cost estimates (bridge with a 12m clearance)	Relative extra cost to have a 16.4m clearance bridge
West Option	$X + $5M	+ $10M
Central Option	$X	+ $15M
East Option	$X + $5M	+ $25M

3.4 Value matrix

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

Value Matrix

Options	Functional	Socio-economic	Environmental	Relative strategic costs estimates for 12m clearance (extra to 17m clearance)
West Option	1 (400)	1 (355)	1 (333)	$X+$5M (extra $10M)
Central Option	2 (260)	1 (345)	1 (353)	$X (extra $15M)
East Option	3 (190)	3 (155)	3 (300)	$X+$5M (extra $25M)

3.5 Recommending a preferred direction

As a result of the evaluation, the workshop group (in five focus groups) was asked which option should be recommended as the preferred option to be progressed as the project proceeds. The focus groups were also asked to record their reasons why. However, the preference would be subject to certain identified issues being addressed. The focus groups’ conclusions as presented to the whole group are recorded below.

3.5.1 Focus group 1

- Focus group 1 recommended the ***West Option*** as the preferred option to be progressed because:
  - It best achieves the assessment criteria for each perspective at a cost that is not “significantly” more than the cheapest (Central) option

Subject to:

- Having the appropriate navigation clearance for water craft determined
- Addressing any impacts on the boat ramps
- Investigating further the Aboriginal heritage findings on the north west bank of the river and suitable mitigation being undertaken
- Resolving the urban design aspects of the bridge super-T backspan
- Resolving satisfactorily with Council the pedestrian/cyclist connections to the CBD

3.5.2 Focus group 2

- Focus group 2 recommended the ***West Option*** as the preferred option to be progressed because:
  - It provides the greatest flexibility in terms of options for construction
  - It has superior geometry (which impacts on aesthetics and safety)
  - It allows a better driver experience
  - It will lead to better pedestrian accessibility

  Subject to:
  - Determining an appropriate demolition staging of the existing bridge after the new bridge is operational
  - Resolving and managing the relocation or protection of the impacted utilities

3.5.3 Focus group 3

- Focus group 3 recommended the ***West Option*** as the preferred option to be progressed because:
  - It provides the best for future planning and local connectivity and functionality
  - It provides better opportunities for parking to support CBD growth and foreshore access

  Subject to:
  - Minimising environmental impacts
  - Investigating further to minimise impacts on the archeological site on north bank (ie. minimising cut/fill in this area or consider other protection measures)

3.5.4 Focus group 4

- Focus group 4 recommended the ***West Option*** as the preferred option to be progressed because:
  - It ranked the highest of the three options in terms of the assessment criteria
  - It has a minimal cost differential with the Central Option (cheapest option)

  Subject to:
  - Investigating further the Aboriginal heritage findings on the north west bank of the river and suitable mitigation being undertaken
  - Resolving the urban design aspects of the bridge super-T backspan
  - Considering temporary construction access tracks on the south eastern side of the bridge work in order to decrease SEPP 14 wetland impacts

3.5.5 Focus group 5

- Focus group 5 recommended the ***West Option*** as the preferred option to be progressed because:
  - It provides better opportunity for boating related businesses because of the cheaper height option
  - It provides the opportunity for the foreshore to be opened up
  - It is a better aesthetic solution
  - It provides better opportunities for parking and boating facilities on northern side of the river

  Subject to:
  - Relocating of the boat ramps to utilise the space on the northern side of the river
  - Managing the access and parking access to the boat ramps on the northern side of the river

3.6 Navigational clearance height discussion

Having recommended a preferred option, the workshop group discussed the navigational clearance height of the new bridge. Key points raised included:

- The actual clearance height still needs to be resolved following further investigations (costs and benefit analysis) and consultation with the community and key stakeholders.
- Providing a greater clearance is unlikely to provide a much greater benefit for the greater costs involved
- It was put to the group that most coastal cruising is likely to stay east of the bridge and the future for boating appears to be in favour of more motor cruising which will be in water craft of a lower height than yachts. Boat sizes are increasing but not much greater in height
- A higher clearance would open up greater stretches of the Clyde River for use to most boats moored in the marina (east of the bridge) and provide opportunities for a marina upstream of the bridge. Also with the entrance to the Clyde River being dredged more regularly and the potential for a greater bridge clearance, it could attract more boats heading up the coast and provide a greater economic benefit to Batemans Bay
- Conversely, a higher navigational clearance would require a bridge that would have a major change to the landscape in terms of greater visual impact and steeper grades for the road over the bridge to achieve the increased height. It would require a greater footprint which in turn would impact on the SEPP14 wetlands and the difference in levels to obtain the grade would require major retaining walls very close to the CBD
- Also the oyster farming community would not support greater number of boats upstream due to the potential pollution risk to their industry
- When built in 1956, the existing lift span bridge was designed to cater for watercraft to support timber-related and fishing industries which were required to navigate upstream of the bridge. These have been mostly replaced by recreational water traffic and over the years there are fewer commercial craft using the waterway west of the bridge that require the greater clearance
- It was put that most boats are likely to stop east of the bridge and the extra funds for bridge clearance could be more effectively used for greater water access to attract boats as a destination to the CBD

4. Workshop conclusions and the next steps

4.1 Recommendations from the workshop group

The workshop group unanimously recommended that the **West Option** (as shown in ***Figure 1***) should move forward as the preferred option to progress the project planning as:

- It best achieves the assessment criteria for each perspective at a cost that is not "significantly" more than the cheapest option (Central Option)
- It provides the best connectivity and functionality
- It provides better opportunities for parking to support CBD growth and foreshore access
- It provides the greatest flexibility in terms of options for construction
- It has superior geometry (which impacts on aesthetics and safety)
- It allows a better driver experience and the better aesthetic solution
- It will lead to better pedestrian accessibility
- It provides better opportunities for parking and boating facilities on northern side of the river.

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

- Investigating further the potential for Aboriginal heritage artefacts to be found on the north west bank of the river and suitable mitigation being undertaken
- Resolving the urban design aspects of the bridge super-T backspan
- Minimising environmental impacts
- Considering temporary construction access tracks on the south eastern side of the bridge work in order to decrease SEPP 14 wetland impacts
- Resolving satisfactorily with Council the pedestrian/cyclist connections to the CBD
- Determining an appropriate demolition staging of the existing bridge after the new bridge is operational
- Resolving and managing the relocation or protection of the impacted utilities
- Having the appropriate navigation clearance for water craft determined
- Considering the relocation of the boat ramps to utilise the space on the northern side of the river
- Managing the access and parking access to the boat ramps on the northern side of the river.

4.2 Other Conclusions

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

- The actual clearance height still needs to be resolved after further investigations including (cost, benefit, opportunity and constraint analysis) and discussions with relevant stakeholders
- The constructability aspects of the two anticipated bridge construction methods being proposed need to be investigated further
- It needs to be confirmed that the demolition of the existing bridge (after the new bridge is operational) will occur to one metre below river bed level as per current standards to avoid being a future water hazard.

4.3 Next steps

The next steps in the planning process for the project were discussed with the workshop group. These included:

- Further investigations are needed to confirm the assumptions being made (ie. geotechnical investigations, traffic analysis, utility locations, etc.) so that the design can be refined
- A recommendation needs to be prepared for approval to proceed further based on the outcomes of the value management workshop and the technical studies undertaken so that an announcement of a preferred option can be made and obtain community feedback later this year.

Appendix 1. List of participants

A1 BATEMANS BAY BRIDGE PROJECT

STRATEGIC OPTION ASSESSMENT WORKSHOP – PARTICIPANTS LIST

Key Stakeholders

Darren Stevenson	Community Representative
Rod Egan	Community Representative
Philip Anderson	Manager Regional Road Planning, Transport for NSW
Jaafar Reslan	Transport for NSW
Jillian Reynolds	Manager, Fisheries, Dept of Primary Industries
Bob Britten	Senior Water Regulation Officer, DPI Water
Warren Sharpe	Director, Infrastructure Services, Eurobodalla Shire Council
Kellee Pisanos	Media and Communications Co-ordinator, Eurobodalla Shire Council
Greg Flood	Local Emergency Services Controller, NSW Police – Far South Coast
Andrew Bain	Member/ Former Commodore, Batemans Bay Sailing Club
Mike Hammond	Principal Manager, South Boating Operations Branch, NSW Maritime
Alisha Davis	Batemans Bay Local Aboriginal Land Council

Roads and Maritime Services

Paul Vecovski	Project Manager
Vivien Murnane	Project Manager
David Ledlin	Environment Manager
Danny Benedetti	Senior Network and Safety Officer
Amanda Scott	Communications and Stakeholder Engagement
Alex Dunstan	Asset Manager
Dony Castro	Bridge Maintenance Planner
Luke Messer	Bridge Engineer, Southern Asset
Fiona MacLauchlan	Leader Regional Planning and Analysis
Ian Archer	Senior Project Manager
Stephen Lum	WHS Partner
Michelle French	Program Delivery Officer
David Norman	External Design Manager
Frank Gaudiosi	Road Designer
Michael Sheridan	Urban Designer
Lee Davison	Aboriginal Cultural Heritage Officer
Matthew Boys	Geotechnical Scientist
Ashis Dey	Project Engineer New Bridge Design

Aurecon Project Team

Jon Williamson	Project Manager
Nial O'Brien	Value Management Lead
Mark Alexander	Structures Design
Alex Saba	Road Design
Ross Prestipino	Facilitator, ACVM

Appendix 2. Comparison material for option evaluation

Functional Perspective					
Criteria		**Constraints & opportunities**	**East**	**Central**	**West**
F1	Construction staging provides effective passage under existing and forecast traffic conditions (to ensure *free flow traffic*)	Constraints	No real differentiator across all three options on the Northern side. Side track located to the west on the southern side Potential short term closures during construction at the southern tie in if constructed by Balanced Cantilever	No real differentiator across all three options on the Northern side. Balanced cantilever not possible Side track on the southern side located to the west provides easy access.	No real differentiator across all three options on the Northern side. Private property lane access will be restricted, temporary road will be signposted at 50km/h Side track on the southern side will be located to the east in close proximity to Woolworths – potential short term access issues during construction
		Opportunities	N/A	N/A	N/A
F2	Provides for flexibility in construction method – Launch or Balanced Cantilever	Constraints	Provides flexibility for both construction methods	Construction over live Princess Hwy traffic, precludes balanced cantilever construction method	Provides flexibility for both construction methods
		Opportunities	Eastern Option allows for construction method to be either Balanced Cantilever or Incrementally Launched	N/A	Eastern Option allows for construction method to be either Balanced Cantilever or Incrementally Launched

	Criteria	Constraints & opportunities	East	Central	West
F3	Provides for safe demolition of existing structure while replacement bridge is operational		No differentiator, but note this option is offset from the existing structure ranges between 6m offset from the north and 14m offset from the southern end.	No differentiator, but note this option is offset from the existing structure ranges between 24m from the north and 0m from the southern end (crosses over).	No differentiator, but note this option is offset from the existing structure ranges between 30m offset from the north and 20m offset from the southern end.
		Opportunities	NA	NA	NA
F4	Minimises impact on major public utilities	Constraints	Clear of Optic Fibre, potential conflict with Sewer and Water crossings.	Clear of Sewer and Water, potential clash with Optic Fibre and Telecom	Clear of Sewer and Water, potential clash with Optic Fibre and Telecom
		Opportunities	N/A	N/A	N/A

Socio-Economic Perspective					
Criteria		**Constraints & opportunities**	**East**	**Central**	**West**
S1	Minimises direct impacts to properties (including lots, houses, businesses and community facilities)	Constraints	Impacts on 13-14 lots 7 impacted houses Impacts to 3 businesses (including 2 businesses with only access impacts, 1 impact on lot but no structures) Impact on foreshore pathways and some parking on southern side (east only) Impacts on foreshore parking area on northern side east (construction only)	Impacts on 9 lots Impacts to 3 businesses (including 2 businesses with only access impacts) Impact on foreshore pathways on southern side Impacts on foreshore parking area on northern side east (construction only) and west	Impacts on 12 lots Impacts to 3 businesses (including 1 business with only access impacts, 1 impact on lot but no structures) Impact on foreshore pathways and some parking on southern side Impacts on foreshore parking area on northern side east (construction only) and west
		Opportunities	N/A	No impacted houses	No impacted houses
S2	Best fits with existing and future planning and local connectivity (including regional development and local planning foreshore planning, etc.)	Constraints	No differentiator	No differentiator	No differentiator
		Opportunities	Would not preclude development of surrounding land (with the exception of direct property impacts) Improvement in foreshore connectivity	Would not preclude development of surrounding land (with the exception of direct property impacts) Improvement in foreshore connectivity	Would not preclude development of surrounding land (with the exception of direct property impacts) Improvement in foreshore connectivity

Criteria		Constraints & opportunities	East	Central	West
S3	Minimises direct and indirect impact on businesses during construction and operation	Constraints	Impacts to 3 businesses (including 2 businesses with only access impacts, 1 impact on lot but no structures)	Impacts to 3 businesses (including 2 businesses with only access impacts)	Impacts to 3 businesses (including 1 business with only access impacts, 1 impact on lot but no structures
		Opportunities	N/A	N/A	N/A
S4	Minimises social impacts associated with traffic disruption during construction	Constraints	N/A	N/A	Side track on the southern side will be located to the east in close proximity to Woolworths – potential short term access issues during construction
		Opportunities	All three maintain princes highway during construction	All three maintain princes highway during construction	All three maintain princes highway during construction
S5	Minimises access impacts to river users during construction and operation - access to and from the river	Constraints		Impacts boat ramp on north west	Impacts boat ramp on north west and close to boat ramp on south west
		Opportunities	No impacts to boat ramps	N/A	N/A

Environmental Perspective					
Criteria		**Constraints & opportunities**	**East**	**Central**	**West**
E1	Minimises impact on biodiversity (i.e. vegetation communities, areas of ecological value, threatened fauna and flora species, fishing grounds and sensitive environmental areas, etc.)	Constraints	Area of vegetation impacted: 0.24-0.38 ha Area of TEC (Threatened ecological community) impacted: 0.16 ha Area of PMV (Protected marine vegetation) impacted: 0.08-0.21 ha	Area of vegetation impacted: 0.52-0.63 ha Area of TEC impacted: 0.43-0.45 ha Area of PMV impacted: 0.09-0.18 ha	Area of vegetation impacted: 0.56-0.74 Area of TEC impacted: 0.44-0.52 ha Area of PMV impacted: 0.12-0.22 ha
		Opportunities	No threatened flora identified	No threatened flora identified	No threatened flora identified
E2	Minimises encroachment and impacts on SEPP14 area	Constraints	Passes through 0.25-0.39 ha of SEPP 14, however, only 0.13-0.27ha is outside of existing road pavement	Passes through 0.25-0.35 ha of SEPP 14, however, only 0.13-0.23ha is outside of existing road pavement	Passes through 0.24-0.34 ha of SEPP 14, however, only 0.12-0.22ha is outside of existing road pavement
		Opportunities	Construct retaining wall to contain impacts at the interface of grass slope and mangrove to reduce impacts	Disturbed SEPP14 area can be rehabilitated Construct retaining wall to contain impacts at the interface of grass slope and mangrove to reduce impacts	N/A
E3	Minimises impact on Aboriginal heritage	Constraints	1 Archaeological area 1 PAD site	1 registered AHIMS site 2 Archaeological areas 1 PAD site	1 registered AHIMS site 2 Archaeological areas 1 PAD site
		Opportunities	No registered AHIMS site	N/A	N/A

Criteria		Constraints & opportunities	East	Central	West
E4	Minimises impact on Non-Aboriginal heritage	Constraints	1 (Batemans Bay Bridge)	3 (Batemans Bay Bridge, Car Ferry Crossing,Unknown)	3 (Batemans Bay Bridge, Car Ferry Crossing,Unknown)
		Opportunities	N/A	N/A	N/A
E5	Provides for a structure form that best fits with its surrounding landscape character and visual amenity	Constraints	Cutting east of Princes Highway needs extending closer towards properties on top of hill. Fill to extend roadway embankment removes established bushland adjacent to existing dwellings	N/A	The constant radius circular curvature can't extend to the south abutment. The span over Clyde street therefore needs to be of an entirely different form requiring the pier adjacent to the water edge to be a large and unsightly structure – unfavourable Urban Design outcome Requires the most extensive cutting and removal of established trees - west of existing Princes Highway
		Opportunities	The same deck section can extend all the way to the south abutment; Consistent deck section. Favourable Urban Design outcome	The same deck section can extend all the way to the south abutment; Consistent deck section. Favourable Urban Design outcome Less cutting and fewer established trees to remove - west of existing Princes Highway	N/A

Criteria		Constraints & opportunities	East	Central	West
E6	Provides for a positive road user experience	Constraints	Tight radii in at the southern interface create an un-desirable driver experience.	Smooth arching alignments with large radii, provide a desired driver comfort criteria.	Smooth arching alignments with large radii, provide a desired driver comfort criteria.
		Opportunities	N/A	N/A	N/A
E7	Minimises the impact of noise	Constraints	Moves closer to residences at North Batemans Bay Would impact around 154 residences, 15 accommodation businesses, 1 school and 1 church – most already impacted by existing bridge structure.	Moves closer to residences/ accommodation on south western side Would impact around 156 residences, 15 accommodation businesses, 1 school and 1 church – most already impacted by existing bridge structure.	Moves closer to residences/ accommodation on south western side Would impact around 152 residences, 15 accommodation businesses, 1 school and 1 church – most already impacted by existing bridge structure.
		Opportunities	N/A	N/A	N/A

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1800 870 119

batemansbaybridge@rms.nsw.gov.au

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