

Transport
for NSW

Princes Highway upgrade program Moruya bypass - Strategic Investigation and Design Workshops Report

April 2022



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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which we work and live.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the land, waters and seas and their rich contribution to society.

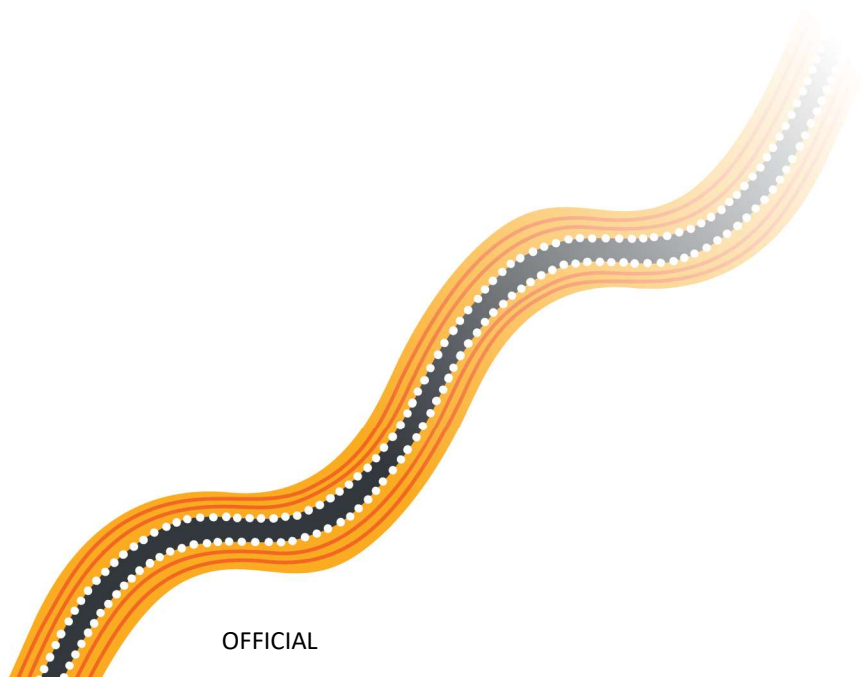


Table of Contents

- 1. Executive summary 5**
 - 1.1 How was the preferred strategic corridor selected?5
- 2. Introduction 10**
 - 2.1 Project investigation area 10
- 3. Project workshops 13**
 - 3.1 Project investigation area 13
 - 3.2 Preliminary investigations – project goals and objectives workshops 15
 - 3.3 Preliminary corridor shortlisting workshop 22
 - 3.4 Value Management Workshop 31
 - 3.5 Technical Workshop (Post-VM Workshop) 61
 - 3.6 Corridor Review Workshop 65
 - 3.7 Preferred Corridor Selection Workshop 75
 - 3.8 Preferred Strategic Corridor Decision 82

Document control

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Versions

Version	Amendment notes	Date
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1. Executive summary

In March 2019, the Australian and NSW Governments committed \$1.9 billion towards upgrading the Princes Highway between Nowra and the Victorian border. Planning for the Moruya bypass has been identified as a short term priority within the Princes Highway strategic roadmap. The roadmap is a 20 year plan to deliver a safe, reliable, efficient and connected transport network.

In May 2021, the Orange option was announced as the preferred strategic option for the Moruya bypass, following community and stakeholder engagement, planning and development processes. These processes included a series of workshops to enable a long list of 11 options to be progressed to a preferred strategic corridor option.

This report provides an overview of the workshops that were conducted to select a preferred strategic corridor for the Moruya bypass. It should be read in conjunction with the Moruya bypass [Strategic Corridor Options Report](#) (SCOR), May 2021.

Figure E-1 Strategic Design Timeline

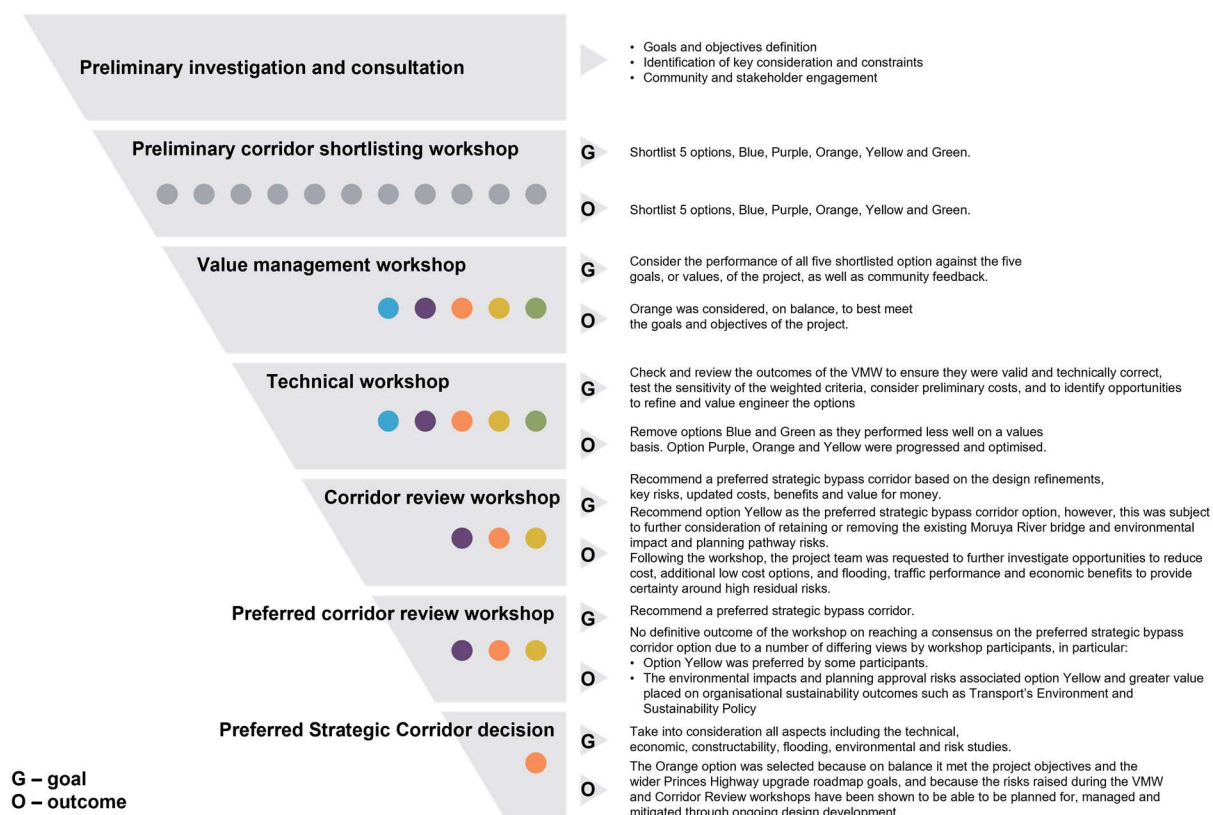


1.1 How was the preferred strategic corridor selected?

The preferred strategic corridor was selected using the following process and workshops (refer also Figure E-2).

It is noted that no one part of the process is the primary decision-making tool. All stages of the process are considered in determining which option, on balance, provides the best outcome in terms of value and value for money in line with value management standards.

Figure E-2 Strategic options process



Preliminary investigations and consultation

The preliminary investigations and consultation phase included:

- Community and stakeholder engagement
- Goals and objectives definition workshop by Transport
- Identification of key considerations and constraints

Community and stakeholder engagement commenced in March 2020 with community feedback providing Transport with suggested bypass routes (refer to Moruya bypass Community Consultation Report August 2020). Engagement was also held with key stakeholder groups including Health Infrastructure, Eurobodalla Shire Council, local business chamber and other government agencies in order to get a better understanding of current and future transport use and future planning and land use in the development of the options (refer Section 4 of the SCOR). Community and stakeholder engagement was used to inform the option longlist development and the preferred strategic corridor (refer Section 4 of the SCOR).

Project objectives workshops were held on 6 August and 20 August 2020 to identify project specific goals and objectives for the Moruya bypass based on the Princes Highway upgrade program roadmap and the specific project service need (refer Section 2.3 of this report). The objectives were used to develop criteria to assess the options during the course of the project.

The key project constraints and design requirements (refer Section 3 of the SCOR) were considered at every stage of the development of the Moruya bypass, and were key inputs to the workshops.

Preliminary corridor shortlisting workshop

A **Preliminary Corridor Shortlisting workshop** was held on Monday 17 August 2020. The purpose of this workshop was to assess and shortlist 11 preliminary corridor options that had been developed for the Moruya bypass. The outcome of this was the shortlisting of five strategic corridor options – Blue, Purple, Orange, Yellow and Green (refer Section 2.4 of this report and Sections 5.3 and 5.4 of the SCOR).

Value Management workshop

A **Value Management Workshop** (VMW) was held on 21 September 2020 with a range of subject matter experts (refer Section 2.5 of this report). The purpose of this workshop was to consider the five shortlisted options (Blue, Purple, Orange, Yellow and Green) and, using the values and perspectives of the group, assess their relative performance against agreed project criteria. The outcome of this was that three options were taken forward for further consideration: Purple, Orange and Yellow.

Technical (post-Value Management) workshop

A **technical workshop** was held following the VMW on 1 October 2020 (refer Section 2.6 of this report). The purpose of this workshop was to review the results of the VMW and determine the requirements for further actions, design and investigations, in particular to assess the issues of crossing a major floodplain. The outcome of the workshop was that Options Purple, Orange and Yellow were ratified to be taken forward for further consideration.

Corridor review workshop

A **corridor review workshop was held** on 20 October 2020 (refer Section 2.7 of this report). The purpose of the corridor review workshop was to recommend a preferred strategic corridor based on design refinements, key risks, updated costs, benefits and value for money.

The outcome of this workshop was that the Yellow option was recommended as the preferred strategic option, subject to further consideration of technical issues such as retaining or removing the existing Moruya River bridge, and environmental impact and planning pathway risks.

Additional field work was also undertaken in late 2020 and early 2021. Temporary cameras were installed at various locations in and around Moruya to collect traffic data over the peak 2020/2021 holiday period. Geotechnical investigations, biodiversity and Aboriginal heritage studies were carried out in early 2021 to get a better understanding of the environmental, Aboriginal heritage and geotechnical conditions of the area.

Preferred corridor selection workshop

A **preferred corridor selection workshop** was held on 5 February 2021, after substantial additional technical work (refer Section 2.8 of this report). The purpose of this workshop was to consider the bypass corridor and select a preferred option. The outcome was that while Option Yellow remained the preferred corridor by some participants, a consensus was not able to be reached, particularly due to the

environmental risks and cost considerations. Further work was to be undertaken to better inform the selection of a preferred corridor.

Preferred Strategic Corridor decision

The process to identify a preferred strategic corridor considered a number of issues including technical, economic, constructability, flooding, environment and risk studies, as well as the outcomes of the workshops. The Orange option was selected because on balance it met the project objectives and the wider Princes Highway upgrade roadmap goals, and because the risks raised during the project development were shown to be able to be planned for, managed and mitigated.

- **Safety:** the preferred strategic corridor would improve safety along the Princes Highway through provision of an upgraded corridor, which includes safety barrier and separates opposing traffic and within the Moruya township by reducing vehicle and freight movements within high pedestrian zones
- **Resilience:** the preferred strategic corridor would improve the flood immunity of the highway and has a low bushfire risk
- **Liveability:** The preferred strategic corridor minimises potential noise impacts and enables future growth of the town, while still providing connections to key destinations. The removal of trucks and through traffic from the Moruya township would improve amenity and liveability, opening up future planning and further possibilities for Moruya as a place and destination. It does not impact Moruya's riverfront parks and supports existing and planned active transport networks
- **Sustainability:** The preferred strategic corridor minimises impacts to bushland areas in the east
- **Connectivity and accessibility:** The preferred strategic corridor on balance improves congestion and journey reliability in town, and reduces travel time on the Princes Highway while maintaining good connections to Moruya and the planned Eurobodalla Regional Hospital.

Preferred strategic corridor

The preferred strategic bypass corridor (Orange corridor) is around 8 kilometres in length, starting near Shelley Road, running parallel and to the east of the existing highway to the Larrys Mountain Road intersection.

From Larrys Mountain Road, the corridor veers further east with a new bridge crossing of the floodplain and Moruya River about 2 kilometres east of the existing bridge. South of the Moruya River, the preferred strategic corridor crosses over South Head Road and continues south to re-join the existing highway.

The preferred strategic corridor would provide connections to the local traffic network at the northern end of the corridor near the North Moruya Industrial Estate and southern end near Mountain View Road.

It would also improve travel time and accessibility to the proposed Eurobodalla Regional Hospital Redevelopment, maintaining connectivity during flood events when compared with the existing Princes Highway. The southern extent of the corridor is shown as a wider corridor as the connection to the Princes Highway is

still to be determined. Transport is continuing to partner with NSW Health Infrastructure as plans for the new Eurobodalla Regional Hospital progress.

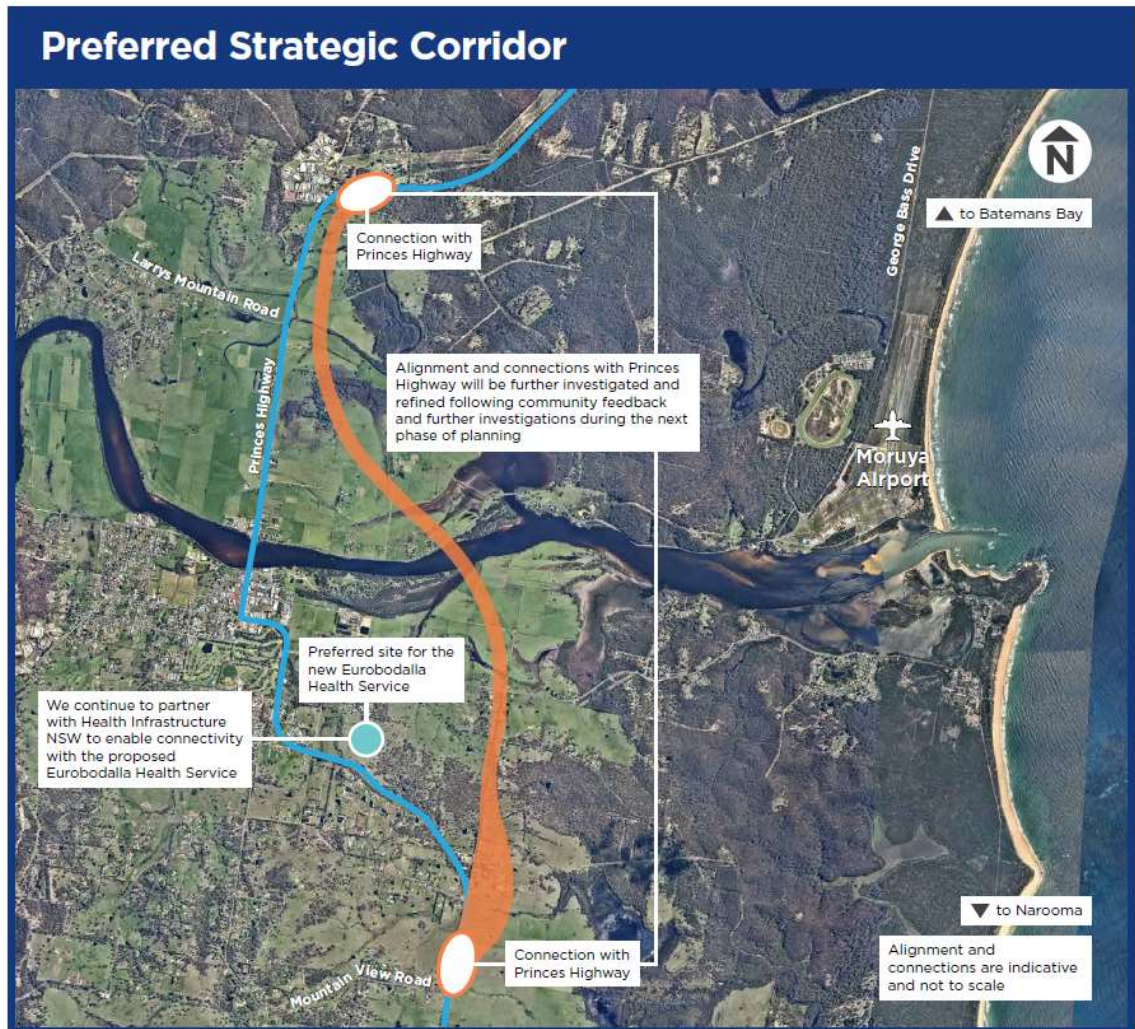


Figure E-3 Preferred Strategic Corridor

2. Introduction

2.1 Project investigation area

The location of the Moruya bypass project is shown in its regional context Figure 2-1 and the project investigation area is shown in Figure 2-2.

The project investigation area covers about 13 kilometres of the Princes Highway north and south of Moruya, inclusive of passing through the town centre. It is located within the Eurobodalla Shire Council local government area (LGA), about 300 kilometres south of Sydney and about 175 kilometres south-west of Canberra.

Moruya township is largely located south of the Moruya River with a smaller residential and commercial area located immediately north of the river and North Moruya Industrial Estate located off the Princes Highway about 3 kilometres north of the town centre. The land north of Moruya River consists of primarily agricultural land on the floodplain to the west of Malabar Creek Lagoon and large areas of native vegetation to the east. The land south of Moruya River consists of the main commercial and residential areas of Moruya and a smaller area of agricultural land to the south-east of Racecourse Creek.

The Moruya River and its tributaries Dooga Creek, Malabar Creek and Racecourse Creek are the main waterways within the investigation area. The Moruya River at Moruya is a wide, tidal river that is popular for recreational and commercial activities as well as the tourism and aquaculture industries. The Moruya River and Malabar Creek are key community resources and host a range of recreational activities such as boating and swimming. The proximity of Moruya Airport allows float planes to use the river for scenic flights, training operations and aerial firefighting.

Figure 2-1 Moruya Bypass regional context

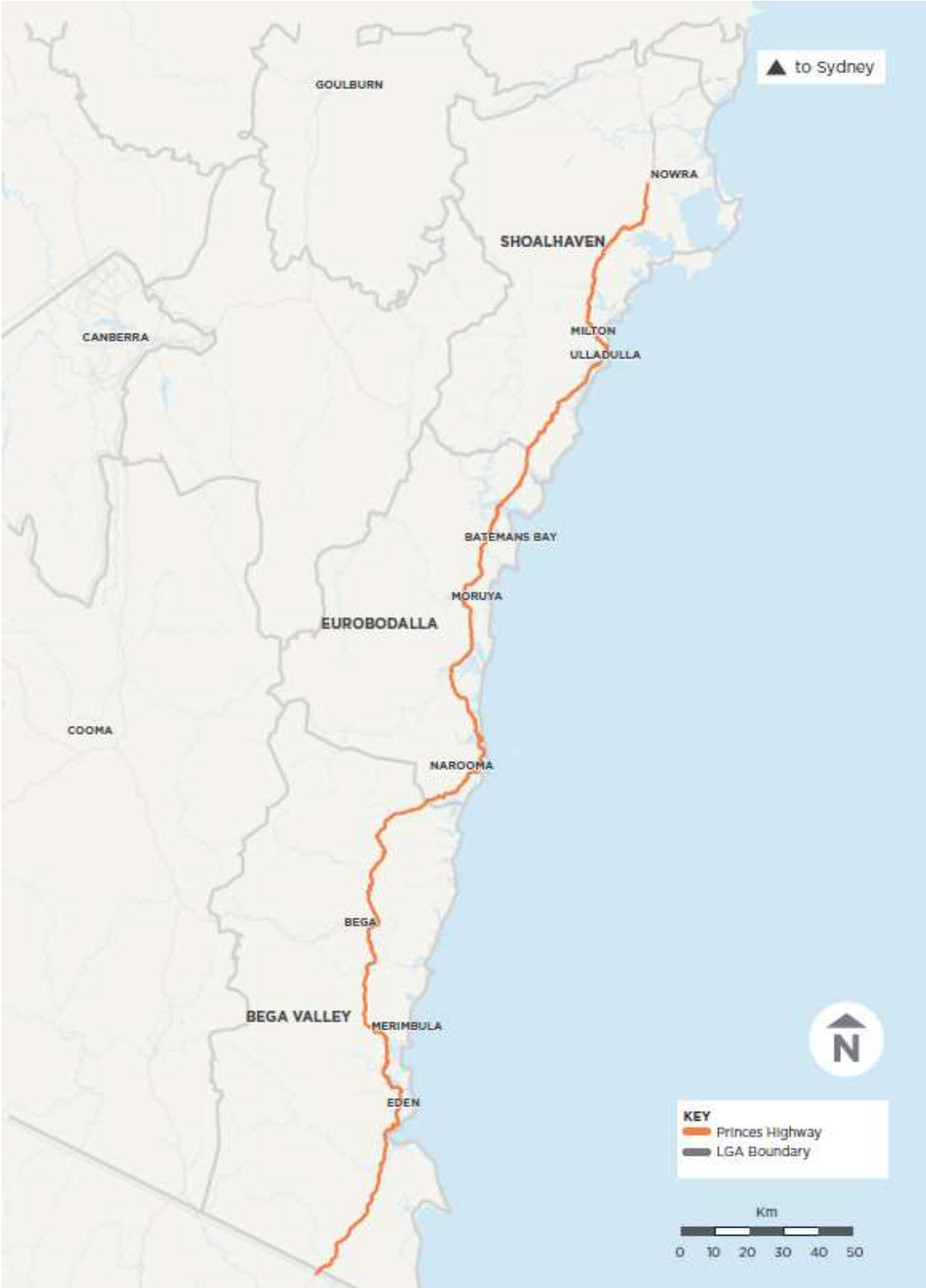
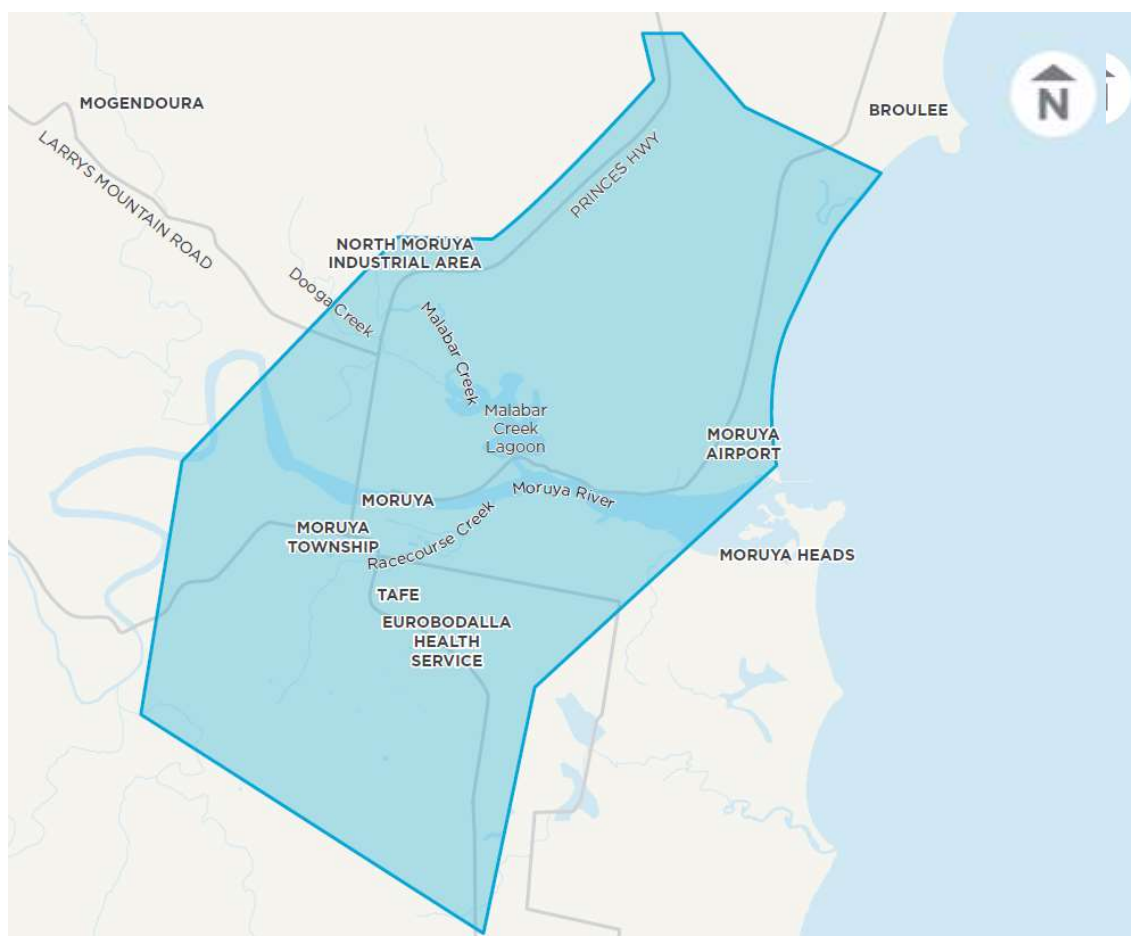


Figure 2-2 Moruya Bypass investigation area



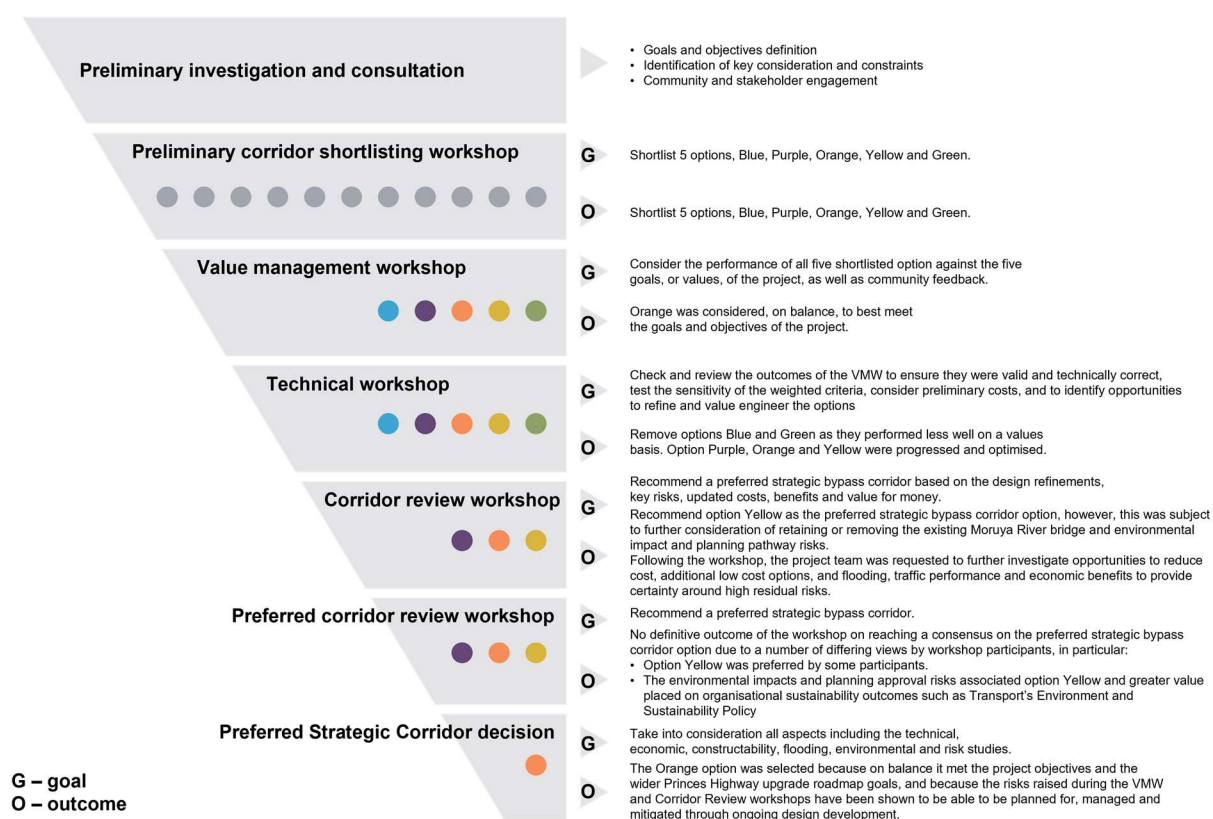
3. Project workshops

3.1 Project investigation area

The selection of a recommended strategic corridor involved the following process and workshops (refer also Figure 3-1).

It is noted that no one workshop or part of the process was the primary decision-making tool. All stages of the process are considered in determining which option, on balance, provides the best outcome in terms of value and value for money.

Figure 3-1 Strategic options process



Preliminary investigations and consultation

The preliminary investigations and consultation phase included:

- Community and stakeholder engagement
- Goals and objectives definition workshops
- Identification of key considerations and constraints

Community and stakeholder engagement commenced in March 2020 with community feedback providing Transport with suggested bypass routes (refer to Moruya bypass Community Consultation Report August 2020). Engagement was also held with key stakeholder groups including Health Infrastructure, Eurobodalla Shire Council, local business chamber and other government agencies in order to get a better understanding of current and future transport use and future planning and land use in the development of the options (refer Section 4 of the SCOR).

Community and stakeholder engagement was used to inform the option longlist development and the preferred strategic corridor (refer Sections 4 of the SCOR).

Project objectives workshops were held on 6 August and 20 August 2020 to identify project specific goals and objectives for the Moruya bypass based on the Princes Highway upgrade program roadmap and the specific project service need (refer Section 2.3 of this report). The objectives were used to develop criteria to assess the options during the course of the project (refer to Section 3.3 below and Section 2.3 of the SCOR).

The key project constraints and design requirements (refer Section 3 of the SCOR) were considered at every stage of the development of the Moruya bypass, and were key inputs to the workshops.

Preliminary corridor shortlisting workshop

A Preliminary Corridor Shortlisting workshop was held on Monday 17 August 2020. The purpose of this workshop was to assess and shortlist 11 preliminary corridor options that had been developed for the Moruya bypass. The outcome of this was the shortlisting of five strategic corridor options – Blue, Purple, Orange, Yellow and Green (refer Section 3.4 below and Sections 5.3 and 5.4 of the SCOR).

Value Management workshop

A VMW was held on 21 September 2020 with a range of subject matter experts (refer section 3.5 below). The purpose of this workshop was to consider the five shortlisted options (Blue, Purple, Orange, Yellow and Green) and, using the values and perspectives of the group, assess their relative performance against agreed project criteria. The outcome of this was that three options were taken forward for further consideration: Purple, Orange and Yellow.

Technical (post-Value Management) workshop

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Corridor review workshop

A corridor review workshop was held on 20 October 2020. The purpose of the corridor review workshop was to recommend a preferred strategic corridor based on design refinements, key risks, updated costs, benefits and value for money.

The outcome of this workshop was that the Yellow option was recommended as the preferred strategic option, subject to further consideration of technical issues such as retaining or removing the existing Moruya River bridge, and environmental impact and planning pathway risks.

Additional field work was also undertaken in late 2020 and early 2021. Temporary cameras were installed at various locations in and around Moruya to collect traffic data over the peak 2020/2021 holiday period. Geotechnical investigations and vegetation, local habitat and Aboriginal heritage studies were carried out in early

2021 to get a better understanding of the environmental, Aboriginal heritage and geotechnical conditions of the area.

Preferred corridor selection workshop

A preferred corridor selection workshop was held on 5 February 2020 after substantial additional technical work. The purpose of this workshop was to consider the bypass corridor and lower-cost options and select a preferred option. The outcome was that while Option Yellow remained the preferred corridor by some participants, consensus was not able to be reached, particularly due to the environmental risks and cost considerations. Internal advice was sought following this workshop.

Preferred Strategic Corridor decision

The process to identify a preferred strategic corridor considered a number of issues including technical, economic, constructability, flooding, environment and risk studies, as well as the outcomes of the workshops. The Orange option was selected because on balance it met the project objectives and the wide Princes Highway upgrade roadmap goals, and because the risks raised during the project development were shown to be able to be planned for, managed and mitigated.

- **Safety:** the preferred strategic corridor would improve safety along the Princes Highway through provision of an upgraded corridor, which includes safety barrier and separates opposing traffic and within the Moruya township by reducing vehicle and freight movements within high pedestrian zones
- **Resilience:** the preferred strategic corridor would improve the flood immunity of the highway and has a low bushfire risk
- **Liveability:** The preferred strategic corridor minimises potential noise impacts and enables future growth of the town, while still providing connections to key destinations. The removal of trucks and through traffic from the Moruya township would improve amenity and liveability, opening up future planning and further possibilities for Moruya as a place and destination. It does not impact Moruya's riverfront parks and supports existing and planned active transport networks
- **Sustainability:** The preferred strategic corridor minimises impacts to bushland areas in the east
- **Connectivity and accessibility:** The preferred strategic corridor on balance improves congestion and journey reliability in town, and reduces travel time on the Princes Highway while maintaining good connections to Moruya and the planned Eurobodalla Regional Hospital.

3.2 Preliminary investigations – project goals and objectives workshops

3.2.1 Project goals and objectives workshops – overview

As part of the preliminary investigations and consultation phase, project objectives workshops were held on 6 August 2020 and 20 August 2020. The overall purpose of the objectives workshops were to develop project specific vision, objectives and

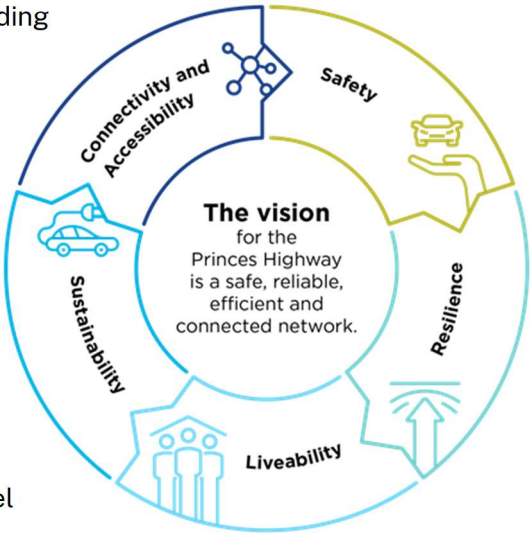
indicators for the Moruya bypass project, based on the Princes Highway Program roadmap goals (see below).

The workshops brought together a range of Transport subject matter experts, team members and technical specialists that were core to the project (refer Appendix A for attendance list).

Overall, the project objectives were developed by considering the program goals, as well as community feedback received to date. They were then further refined and tailored to the specific requirements of Moruya bypass by the project team.

The Princes Highway upgrade program roadmap is built on five goals:

- **Safety** – Safer for all customers and communities; including during construction and once completed
- **Resilience** – Adaptable to a changing social, environmental and economic context including the ability to quickly recover from major disruption events
- **Liveability** – Gives the town back to the community by contributing to the provision of attractive, healthy places to live, work and play
- **Sustainability** – Socially, environmentally and economically sustainable and unlocks a wide variety of benefits for communities and other customers
- **Connectivity and accessibility** – Provides good physical and digital connectivity and accessibility, including travel time savings and more reliable journeys.



3.2.2 Project objectives workshop – outcomes

Objectives workshop 1 – 6 August 2020

The purpose of the workshop was to:

- Identify Princes Highway upgrade program objectives which apply to the Moruya bypass project
- Discuss and agree the measures for each objective
- Discuss and agree how objectives can be used to assess potential design options (input from SMEs)

During the workshop, the participants were provided with a presentation on the Princes Highway upgrade program roadmap goals and objectives, as well as the community feedback received to date (refer Section 4 of the SCOR).

The participants undertook an exercise to identify what the Moruya bypass needed to achieve in order to meet the program goals of the Princes Highway upgrade program roadmap. A summary of the discussion is provided below:

Table 3-1 Workshop objectives development

Goal	Objectives workshop discussion points
PHUP roadmap Safety goal	Safer for all customers and communities; including during construction and once completed

Moruya safety objectives discussion	<p>The project needs to achieve the following in terms of safety:</p> <ul style="list-style-type: none"> • Be safe for all phases of the project, including construction and operation • Improve safety for fauna, including koalas • Improved safety for local, short distance, regional and long distance trips • Provide safety treatments for the changed movement function in the town, based on a movement and place model • That the project does not result in an increase of crashes occurring on another part of the road network • Provide of safety rest areas for all customers including tourists and freight • Safe and efficient points of access with the Princes Highway • Reduction in heavy vehicle crashes • Address safety on the old Princes Highway as well as the new bypass • Make sure we don't induce rat-runs through the local areas
PHUP roadmap Resilience goal	Adaptable to a changing social, environmental and economic context including the ability to quickly recover from major disruption events
Moruya resilience objectives discussion	<p>The project needs to achieve the following in terms of resilience:</p> <ul style="list-style-type: none"> • Adapt corridor over time to respond to climate change impacts including rising sea levels and more frequent extreme weather events. • Adapting to a changing social, environmental and economic context • Enable quick recovery from an emergency situations and disaster events, including traffic emergencies, bushfires and flooding. • Respond to changing land use and technologies. • Ensure information can be shared rapidly with customers during emergencies. • Improve telecommunications network coverage in the broader area. • Future-proof the transport network against climate change impacts including flooding and sea level rise.
PHUP roadmap Liveability goal	Gives the town back to the community by contributing to the provision of attractive, healthy places to live, work and play
Liveability	<p>The project needs to achieve the following in terms of liveability:</p> <ul style="list-style-type: none"> • Support more and improved opportunities for walking and cycling along the corridor to encourage physical activity within the local community.

	<ul style="list-style-type: none"> • Investigate opportunities for better accessibility and connectivity of alternative modes of transport. • Give the town back to the community of people who live there. • Facilitate cross-highway movements. • Reduce heavy traffic, congestion and improve traffic efficiency. • Minimise impacts to identified social infrastructure and green space wherever possible. <p>Specific stakeholder comments outside Transport's direct responsibility</p> <ul style="list-style-type: none"> • Encourage a mix of land uses that support a diverse range of activities and people along the corridor. Support access to affordable services and a range of housing options. • Contribute to and reinforce the character of villages and towns to provide vibrant and prosperous centres along the corridor. • Protect and enhance the corridor's abundant natural and open spaces. • Support the supply of residential land, while considering the other needs for elevated land. • Minimise impacts to Riverside Park and Malabar Creek.
PHUP roadmap Sustainability goal	Socially, environmentally and economically sustainable and unlocks a wide variety of benefits for communities and other customers
	<p>The project needs to achieve the following in terms of sustainability:</p> <ul style="list-style-type: none"> • Provide a corridor that is socially, environmentally and economically sustainable and unlocks a wide range benefits for communities and other customers. • Support economic prosperity of the region. • Support the freight task. • Facilitate current and future uptake in Electric Vehicles and connected and automated vehicles. • Support growth in employment of at risk communities including Indigenous, youth, long term unemployed and refugee communities. • Protect and enhance the natural environment. • Connect communities by providing alternative and sustainable modes of transport. • Minimise the total carbon footprint of the highway, from construction, to daily use, to decommissioning. <p>Specific stakeholder comments outside Transport's direct responsibility</p> <ul style="list-style-type: none"> • Attract private investment in villages and towns along the corridor by providing reliable and safe access to desirable places.

	<ul style="list-style-type: none"> Support the expansion and diversification of tourism into the region in a sustainable way. Support the supply of land for industrial use.
PHUP Connectivity and accessibility goal	Provides good physical and digital connectivity and accessibility, including travel time savings and more reliable journeys
Connectivity and accessibility	<p>The project needs to achieve the following in terms of connectivity and accessibility:</p> <ul style="list-style-type: none"> Support a range of transport options, including public and active transport, to provide options to cater for the needs of all potential customers. Provide improved access to employment, services, retail and recreation for all customers. Ensure adequate access / connectivity between the new and old highway routes. Facilitates accessibility to the Eurobodalla Regional Hospital for local and regional users. Facilitate access to the future emergency services precinct. Improve access and connectivity to the airport and the North Moruya industrial area. Provide a safer travel environment for freight vehicles, improve driver safety and wellbeing, and enable efficient and effective freight movement along the corridor. Integrate first and last mile transport needs for freight and public transport. <p>Specific stakeholder comments outside Transport's direct responsibility</p> <ul style="list-style-type: none"> Facilitate growth in hospital precinct.

At the conclusion of the workshop, the participants had mapped out from many perspectives what the Moruya bypass needed to achieve to successfully deliver the goals of the Princes Highway upgrade program roadmap.

Following the workshop, the discussion points were collated, refined and assigned as one of three categories for the Moruya bypass project: **vision**, **objectives**, or **indicators**. A draft set of objectives was prepared and reviewed internally within Transport and feedback provided. This information formed the basis of discussion for objectives workshop 2.

Objectives workshop 2 – 20 August 2020

The purpose of this workshop was to:

- Review objectives and discuss feedback
- Refine key results areas and key performance indicators for each objective
- Identify which of the KRAs/ KPIs are differentiators in the VM process

During the workshop, the participants were provided with a draft of the refined Moruya bypass vision, objective and indicators. The participants discussed and

amended these elements to provide a final draft version of the vision, objectives and indicators.

The group also discussed which of the indicators would be used as criteria for the VMW in the context of whether or not they comprise differentiators for decision-making (if a criterion is deemed to not be a differentiator between options, it would not be included in the VMW, as it would not assist with decision making).

Following the workshop, a final draft was prepared. The goals, objectives and indicators were then submitted for endorsement by Transport before being used to assess corridor options.

The Moruya bypass project goals and objectives are summarised in Table 3-2. VMW criteria are further discussion in Section 3.4 of this report.

Table 3-2 Moruya bypass goals and objectives

Goal	Objectives
Goal 1 – Safety A safer transport network for all customers and communities; and for all phases of the project lifecycle.	<ul style="list-style-type: none"> Objective 1.1 – Work towards zero fatal and serious injury crashes across the transport network and for all modes; both for the highway and within the township.
	<ul style="list-style-type: none"> Objective 1.2 – Deliver safety in design, keeping our people, industry partners and customers safe during construction, operation and maintenance of the transport network.
Goal 2 – Resilience A transport network that is adaptable to a changing social, environmental and economic context including the ability to quickly recover from major disruption events.	<ul style="list-style-type: none"> Objective 2.1 – Improve the transport network's ability to respond to emergencies including bushfires and flood.
	<ul style="list-style-type: none"> Objective 2.2 – Future-proof the transport network against climate change impacts including flooding and sea level rise.
	<ul style="list-style-type: none"> Objective 2.3 – The transport network is able to respond to future evolving technologies and requirements.
Goal 3 – Liveability A transport network that gives the town back to the community by contributing to the provision of attractive, healthy places to live, work and play.	<ul style="list-style-type: none"> Objective 3.1 – Provision of a transport network that contributes to and reinforces Moruya town centre as a place.
	<ul style="list-style-type: none"> Objective 3.2 – Protect and maintain natural and open spaces.
	<ul style="list-style-type: none"> Objective 3.3 – Support mode shift and health and wellbeing outcomes for Moruya.

	<ul style="list-style-type: none"> Objective 3.4 – Support access to affordable transport services and a range of housing options.
Goal 4 – Sustainability A transport network that is socially, environmentally and economically sustainable and unlocks a wide range of benefits for communities and other customers.	<ul style="list-style-type: none"> Objective 4.1 – Support existing environmental values and the continued ecological function of the surrounding environment.
	<ul style="list-style-type: none"> Objective 4.2 – Support a circular economy approach to resource and waste management.
	<ul style="list-style-type: none"> Objective 4.3 – Support economic prosperity in the region.
	<ul style="list-style-type: none"> Objective 4.4 – Support growth in employment opportunities.
	<ul style="list-style-type: none"> Objective 4.5 – Support the expansion and diversification of tourism into the region in a sustainable way.
Goal 5 – Connectivity and Accessibility A transport network that provides good physical and digital connectivity and accessibility.	<ul style="list-style-type: none"> Objective 5.1 – Improve access to a range of transport modes and connectivity to employment, services, retail and recreation for all customers.
	<ul style="list-style-type: none"> Objective 5.2 – A solution that facilitates accessibility to the Eurobodalla Regional Hospital (new hospital).
	<ul style="list-style-type: none"> Objective 5.3 – Provide digital and communications infrastructure to support access and connectivity.

3.2.3 Post-workshop actions

Following the development of the Moruya bypass goals and objectives, a set of strategic bypass options and alternatives were developed.

As part of the development of any infrastructure proposal, a range of high level strategic alternatives are required to be considered in order to explore strategic solutions that best meet the project objectives and service needs.

For this proposal, a range of strategic alternatives were considered by Transport that reflected a spectrum from low and medium cost solutions through to the provision of major highway infrastructure for a bypass of Moruya. These included:

- Business as usual – the ‘do nothing’ option
- Minor infrastructure improvements – ‘do minimum’ options, in this case involving upgrades to existing infrastructure and town network improvements

- Major upgrades – development of full bypass options, including short and long bypasses of Moruya.

Business as usual or do nothing alternative

The business as usual option involves retaining the Princes Highway as it currently exists. This alternative was not considered for further assessment as it fails to address any of the project objectives or service needs.

Minor infrastructure improvements

The minor or 'do minimum' infrastructure improvement alternatives considered by the project team included upgrades of existing intersections to provide traffic flow and safety improvements, particularly in the town centre of Moruya where traffic congestion and delays impact on both highway efficiency and the amenity of the town. These minor infrastructure improvements were considered to have limited benefit in improving broader network connectivity, resilience of the road, sustainability of the region, or in achieving desirable amenity and 'place' outcomes for Moruya as a standalone solution.

However, they were considered viable and important in terms of providing safety and travel time improvements. As such the development of minor infrastructure improvements within the town centre of Moruya did go forward for consideration in parallel with the major infrastructure improvements.

Major infrastructure improvements

The major infrastructure improvements included long and short bypass options. The considerations for these strategic alternatives included major upgrades of the Princes Highway, both along its current alignment and on new bypass alignments.

A bypass would provide a substantial improvement to safety and efficiency, while also allowing for increased resilience, sustainability and improved place outcomes due to the ability to bypass Moruya and provide an alternative route to the existing alignment.

Major infrastructure improvements were recognised as potentially delivering substantial benefits across all of the project goals – safety, resilience, sustainability, liveability and connectivity and accessibility. However, it was also acknowledged that this type of strategic alternative was significantly more expensive and had a number of risks to be managed.

For this reason, as the project progressed, a range of corridor options were developed in parallel with minor infrastructure improvements.

3.3 Preliminary corridor shortlisting workshop

3.3.1 Project objectives workshop – overview

Between July 2020 and September 2020, Transport prepared a technical assessment of the constraints and conditions associated with the investigation area (refer Section 3 of the SCOR) and developed a long list of corridor options for the Moruya bypass.

The long list took into consideration goals set out in the Princes Highway upgrade program Roadmap (refer Section 2.3 above) and the community and stakeholder feedback and engagement undertaken in April-May 2020 (refer Section 4 of the SCOR).

A total of 11 preliminary corridor options were identified across four broad categories including:

- Three western corridors to the west of Moruya (Options A, B and C)
- One lower cost internal corridor option utilising the existing Moruya River bridge (Option D)
- Three ‘central’ corridors to the east of Moruya and to the west of Malabar Creek (Options E, F and G)
- Four eastern corridors to the east of Malabar Creek (Options H, H-I, I and J).

The 11 preliminary corridor options are shown in Figure 3-2 and a description provided in Table 3-3.

Figure 3-2 Long list of corridor options

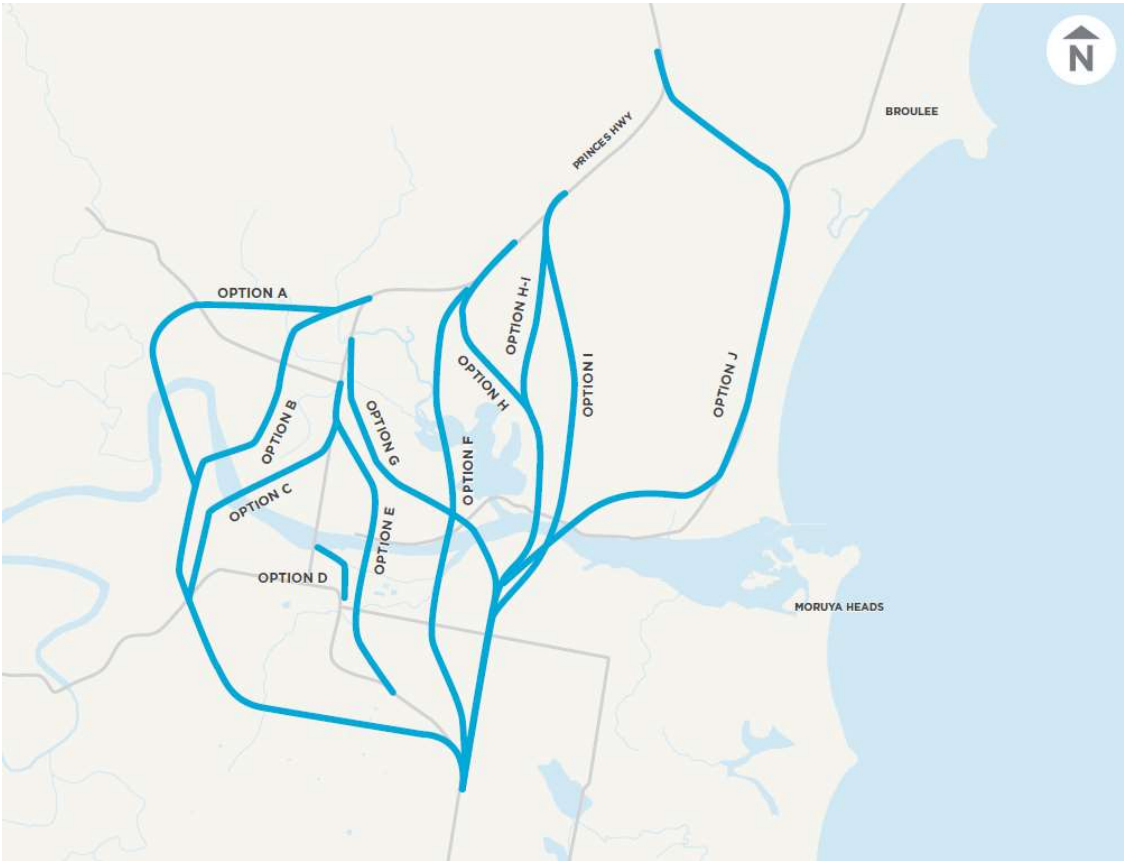


Table 3-3 Description of long list of corridor options

Location	Corridor option	Description (north to south)
West	Option A 12 km	This is the western-most corridor option. The corridor starts near Shelley Road and travels to the west of the residential development at Glenduart Grove, off Larrys Mountain Road. The corridor crosses the Moruya River at Behringers Point, then travels south and east to connect to the existing Princes Highway just north of Mountain View Road.
	Option B 10 km	This corridor also starts near Shelley Road but travels to the east of the residential development at Glenduart Grove, off Larrys Mountain Road. The corridor crosses the Moruya River at Behringers Point (further east than the Option A corridor), then travels south and east to connect to the existing Princes Highway just north of Mountain View Road.
	Option C 8 km	This corridor starts south of Larrys Mountain Road, crosses the Moruya River at a point near the existing Moruya District Hospital, and travels south and east to connect to the existing Princes Highway just north of Mountain View Road.
Through-town	Option D 1 km	This corridor would constitute an inner, or town centre bypass, which utilises the existing bridge over Moruya River. The corridor starts just south of the existing bridge, travels east along Shore Street and Church Street, then south along John Street to connect to the existing Princes Highway just north of Murray Street.
Central	Option E 4 km	This corridor starts just south of Larrys Mountain Road and heads to the east, before travelling south along Main Street. It crosses the Moruya River at Riverside Park and crosses South Head Road before passing to the east of Moruya TAFE to connect to the existing Princes Highway south of Bergalia Street.
	Option F 7 km	This corridor starts north of Percy Davis Drive, travels south and crosses Malabar Lagoon, Moruya River and Racecourse Creek, then continues broadly south to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.
	Option G 8 km	This corridor starts just north of Larrys Mountain Road and travels south-east, crossing Moruya River to the west of the mouth of Malabar Creek. The alignment then heads in a south direction to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.
East	Option H 7 km	This corridor starts north of Percy Davis Drive, travels south east utilising some of Malabar Drive, crosses Moruya River to the east of the mouth of Malabar Creek and the west of the granite quarry, then travels south to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.

	Option H-I 8 km	H-I is a hybrid of options H and I. The corridor starts near the Waldron Swamp rest area, travels south to cross the Moruya River to the east of the mouth of Malabar Creek and the west of the granite quarry. The corridor then travels south to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.
	Option I 8 km	This corridor starts near the Waldron Swamp rest area, travels south in the vicinity of Phyllis Davis Drive, and crosses the Moruya River to the east of the granite quarry. The corridor then travels south to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.
	Option J 12 km	This corridor starts near Broulee Road, travels south east using the existing George Bass Drive past Moruya Airport, then veers west and to cross the Moruya River. It then heads south to cross South Head Road and connect to the existing Princes Highway at Mountain View Road.

3.3.2 Corridor shortlisting workshop – outcomes

A preliminary corridor shortlisting workshop involving Transport project team representatives was held on Monday 17 August 2020 to review and assess the long list of 11 preliminary corridor options and to establish a shortlist of corridor options for further development and investigation.

An options assessment register was used to identify the key functional, social and environmental features and constraints, and highlight any considerations that may rule out corridor options.

The workshop commenced with a background presentation to the participants which outlined the project goals and objectives, and the project givens and constraints.

The workshop participants reviewed the long list of 11 corridor options and focussed on constraints, impacts or performance measures that would eliminate a corridor option (known as ‘showstoppers’). As agreed by the group, the key considerations included the following:

- Community and stakeholder acceptance based on feedback received during the consultation phase (refer Section 4 of the SCOR)
- Traffic modelling metrics, including vehicle hours travelled (VHT), vehicle kilometres travelled (VKT) and bypass utilisation (refer Section 3.2 of the SCOR)
- Potential flooding impacts and length of floodplain crossing (refer Section 3.6 of the SCOR)
- Corridor length
- Potential to minimise environmental and heritage impacts, including impact to Aboriginal cultural heritage and conservation areas.

The outcomes of the corridor shortlisting workshop are presented in **Table 3-4**. This provides an overview summary of the workshop commentary for each option, the nomination of hybrid options and a rationale for shortlisting or elimination as agreed at the workshop.

Table 3-4 Corridor shortlisting workshop outcomes

Corridor option	Workshop commentary and rationale for shortlisting	Shortlisted – Yes / No
Western options		
Option A	<ul style="list-style-type: none"> • High impact to community and existing roads north of Moruya River • Impact to residential south of the Moruya River • Impact to farmland and dairies • Significant longer travel length and travel time compared to the existing Princes Highway • More local road crossings and intersections with local roads • Poorest performing for traffic viewpoint 	No
Option B	<ul style="list-style-type: none"> • A hybrid of Option B and Option C was shortlisted for further development. (See Option B-C below). 	No
Option C	<ul style="list-style-type: none"> • A hybrid of Option B and Option C was shortlisted for further development. (See Option B-C below). 	No
Option B-C	<ul style="list-style-type: none"> • The workshop participants suggested a further option be developed that is a hybrid of Option B and Option C, which selects the most efficient path considering the technical constraints and considerations including flooding and bridge lengths • Option B-C provided a western option that performed better than A, B and C options in terms of flooding • Notwithstanding, it was noted that this option is close to rural and residential subdivisions • There are a number of local road crossings and in intersections with local roads • Along with option A, poorest performing from a traffic point • It was agreed that B-C, as the best performing corridor option to the west of Moruya township would be shortlisted for comparison at the VMW. 	Yes renamed as Blue
Central Options		
Option D	<ul style="list-style-type: none"> • Makes use of the existing bridge over Moruya River which was constructed in the 1960s • Difficult for large vehicles to make the turn onto the existing Princes Highway, just south of the existing bridge 	Not shortlisted for a bypass, but was further considered as short term 'Do

	<ul style="list-style-type: none"> Does not deal with poor performing intersection on the North side of the airport Traffic and connectivity performance likely to be poor No significant improvements to connectivity Amenity considerations, such as impact to Riverside Park May provide additional flood protection Does not fit the brief of a 'bypass' 	Minimum' option
Option E	<ul style="list-style-type: none"> This corridor option was considered to perform well in terms of travel time Alignment runs through Riverside Park Traverses area of Aboriginal heritage Best performing from preliminary traffic assessment There are some flooding issues, such as in the southern area, which is a backwater in the floodplain There may be a higher cost for the same conveyance through the floodplain A long bridge would be required It was agreed that option E, as an option that performed relatively well in terms of traffic and provided connectivity to the Moruya township, would be shortlisted for comparison at the VMW. 	Yes renamed as Purple
Option F	<ul style="list-style-type: none"> Crosses Malabar Lagoon Impacts to Aboriginal cultural heritage and conservation area Potentially long bridges across the floodplain Other central options performed better than F. 	No
Option G	<ul style="list-style-type: none"> Passes to the east of town, providing for growth and amenity Provides connection to the Shelley Road industrial estate Would require a long bridge across the floodplain The constructability challenges need to be understood from a constructability point of view May affect the seaplane operations Possible to minimise impact to Aboriginal heritage areas Cuts across wetlands It was agreed that a 'central' option away from the Moruya town centre that with a 	Yes renamed as Orange

	long length of bridge across the floodplain would be shortlisted for comparison at the VMW.	
Eastern options		
Option H	<ul style="list-style-type: none"> A hybrid of Option H and Option I was shortlisted for further development. (See Option H-I below) Similar corridor to Option H-I, however with a perceived lesser benefit due to the length of corridor and northern tie-in point. 	No
Option I	<ul style="list-style-type: none"> A hybrid of Option H and Option I was shortlisted for further development. (See Option H-I below) Impact to Crown Land. Passes through more challenging terrain. Longer route than the consolidated Option H-I. Moruya River crossing (to the east of Moruya quarry) to be consolidated with Option H-I. 	No
Option H-I	<ul style="list-style-type: none"> Perceived greater benefit than Option H as it provides the most direct route Offsets earthworks May be able to avoid impacts to Aboriginal heritage It was agreed that Option H-I, with the intent of shifting the Moruya River crossing to the east to avoid impacting the Moruya granite quarry heritage site, would be shortlisted for comparison at the VMW. 	Yes renamed as Yellow
Option J	<ul style="list-style-type: none"> It was agreed that Option J, which was considered to be a better performing corridor in terms of traffic, would be shortlisted for comparison at the VMW. 	Yes renamed as Green

3.3.3 Post-workshop actions

Following the preliminary corridor shortlisting workshop, the five shortlisted corridors were further developed, taking into account the constraints identified and ongoing technical investigations (refer Section 3 of the SCOR).

This further development included minor adjustments to the start and finishing points of the short-listed corridors to allow for future intersections and other potential connections to the existing road network.

Following shortlisting, the naming convention for the five shortlisted corridors was changed from letters to colours. The shortlisted corridor options are shown in Figure 3-3 and described in Table 3-5.

Figure 3-3 Shortlisted bypass corridors



Table 3-5 Description of shortlisted corridor options

Location	Long list corridor name	Shortlist corridor name	Description (north to south)
West	Option B-C	Option Blue	The Blue corridor starts south of Malabar Drive and heads west, passing to the east of the residential area off Larrys Mountain Road. It crosses Moruya River west of the Moruya District Hospital, travels in a large arc around the western and southern sides of Moruya town, before connecting to the existing Princes Highway near Mountain View Road.
Central	Option E	Option Purple	The Purple corridor starts near Shelley Road and runs to the east of the existing highway before heading south-east near Larrys Mountain Road. The corridor crosses Moruya River at Riverside Park, and runs between the town centre and Braemar Estate to connect to the existing Princes Highway east of Moruya TAFE.
Central	Option G	Option Orange	The Orange corridor starts just north of Larrys Mountain Road and travels south-east, crossing Moruya River to the west of the mouth of Malabar Creek. The alignment then heads in a south direction to cross South Head Road and connect to the existing Princes Highway south of Noads Drive.
East	Option H-I	Option Yellow	The Yellow corridor starts immediately south of Waldron Swamp rest area, travels south to cross the Moruya River to the east of the mouth of Malabar Creek and the west of the granite quarry. The corridor then travels south to cross South Head Road and connect to the existing Princes Highway north of Donnellys Road.
East	Option J	Option Green	The Green corridor starts at Broulee Road, travels south east using the existing Broulee Road and then George Bass Drive past Moruya Airport. It veers west to cross the Moruya River. It then heads south to cross South Head Road and connect to the existing Princes Highway north of Donnellys Road.

3.4 Value Management Workshop

3.4.1 Value Management Workshop – background and overview

Background to value management

Value management is an analytical process commonly used on major infrastructure and investment projects to achieve best value and, where appropriate, value for money outcomes. It is a standardised and repeatable process used to consider and balance differing community and stakeholder needs and expectations and the perceived usefulness, benefits and importance of a product, process, service, system or organisation.

The VMW process is based on the framework for Value Management outlined in Australian Standard AS4183: Value Management (2007).

It is not the primary decision-making tool. Instead, it forms one part of the decision-making process. It was used as part of the following considerations when recommending a preferred strategic corridor for the Moruya bypass:

- Community and stakeholder engagement and input
- VMW and recommendations
- Technical workshop recommendations
- Technical investigations
- Constraints, risks and opportunities
- Estimated cost, economic benefits and value for money
- Princes Highway upgrade program, Transport and Ministerial governance and assurance processes and approvals.

Purpose of the VMW

The overall purpose of the VMW was to consider the performance of all five shortlisted corridors (Blue, Purple, Orange, Yellow and Green) against the five goals –or ‘values’– of the project, as well as community and stakeholder feedback. As part of this, participants reviewed, assessed and evaluated the corridor options against agreed criteria derived from the project’s goals and objectives.

Pre-VMW tasks

Following the Corridor Shortlisting Workshop (refer Section 3.3 of this report) and prior to the VMW, the following tasks were undertaken:

General	<ul style="list-style-type: none">• Review of community stakeholder engagement feedback• Review of all background data and studies• Identification of draft assessment criteria following on from the agreed goals and objectives of the project• Inclusion of the shortlisted options and design considerations, including key community, engineering, social and environmental constraints, into an online
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	<p>Geographic Information System (GIS) portal in both 2D and 3D format for information collaboration between Transport and partner organisations</p> <ul style="list-style-type: none"> • Optimisation of the strategic design for shortlisted options • Assessment and documentation of potential utility conflicts for each strategic option • Preparation of presentations and datasheets for each of the criteria as follows.
Safety	<ul style="list-style-type: none"> • Safety studies and audits of shortlisted options including a Road Safety Audit and Safe Systems Assessment • Completion of a Health and Safety in Design (HSiD) Workshop and Constructability Workshop to identify key constraints and issues with the shortlisted options
Resilience	<ul style="list-style-type: none"> • Production of a flood model (TUFLOW) for the study area and Moruya River catchment and documentation of the finding associated with each shortlisted option • Analysis of bushfire and flood conditions and routes • Assessment of impacts to emergency services including the emergency route management impact plan
Liveability	<ul style="list-style-type: none"> • Qualitative assessment of change in amenity for residents including consideration of: <ul style="list-style-type: none"> - Estimated reduction in traffic volumes and heavy vehicles through Moruya - Appraisal of business impacts and opportunities - Appraisal of opportunities for place making, including level of service (LOS) for town centre intersections • Qualitative assessment of improvements for active and public transport including consideration of: <ul style="list-style-type: none"> - Ability to integrate with existing and planned active transport links - Ability to integrate access to active and public transport - Impacts to existing desire lines • Qualitative assessment of impact on landscape character value • Quantitative measure of estimated nuisance noise levels • Qualitative assessment of disruption and impact to the community during construction including consideration of: <ul style="list-style-type: none"> - Interface with residential and commercial properties (as per constructability workshop) - Extent of widening works (as per constructability workshop) - Traffic management considerations (as per constructability workshop) - Indicative construction duration – comparative - Impact on marine moorings • Qualitative assessment of impacts to social infrastructure including consideration of Riverside Park, Moruya Park, SAGE Community Garden, Malabar Lagoon, future state social infrastructure and green space. • Analysis of residual traffic volumes for light and heavy vehicles through the centre of town. • Review of existing active transport infrastructure and future plans. • Indicative construction program.

Sustainability	<ul style="list-style-type: none">• Assessment of potential impacts associated with aquatic and terrestrial ecology, Aboriginal and non-Aboriginal heritage• Assessment of current and future land use within the study area• Proximity of bypass to Moruya• Landscape character review
Accessibility and Connectivity	<ul style="list-style-type: none">• Production of traffic models for the study area, assessment of customer types and needs, documentation of the findings associated with each shortlisted option.• Estimated normal AM and PM peak travel time savings.• Estimated normal peak period AM and PM network operation in 2036 (VHT, VKT, vehicle delay).• Numbers and percentage of vehicles using the bypass, both light and heavy vehicles.• Identification of local roads affected intersection performance.

Pre-VMW briefing

The purpose of the briefing was to provide background information for participants on the following:

- What is a VMW
- What is your role at the workshop
- The place of the VMW in the decision-making process for selecting a preferred corridor
- Workshop format
- Introduction to our customers and the study area
- Opportunity for questions

The participants gained the following understanding of the VMW process:

- That VMW is a type of multicriteria analysis (MCA). It is a tool for optimising the balance between differing stakeholder needs and expectations (or values).
- The role of the participant is to bring their knowledge and perspective to the table in order to optimise the outcomes for the project. It was important to note while participants were welcomed to provide perspectives from the community, it was also recognised that the community is diverse with a wide variety of views. A summary of community feedback on the project was provided by Transport during the workshop.
- That the VMW was one step in the process of in making a decision on a preferred strategic corridor. As well as the recommendations of the VMW, other parts of the process would be used to make a decision.
- The problem definition, study area and constraints of the project were also outlined.

3.4.2 VMW – outcomes

The Moruya bypass strategic corridor options VMW was held on Monday 21 September 2020 and brought together a range of Transport project team members, technical specialists, stakeholders, and community and business representatives.

Participants included representatives external to Transport from key stakeholders such as Eurobodalla Shire Council, Health Infrastructure NSW, Southern NSW Local Health District, Department of Planning, Industry and Environment (DPIE) and Department of Primary Industries (DPI). The Moruya Business Chamber – Moruya bypass subcommittee were also represented at the workshop. All external participants, including the Moruya Business Chamber, were required to sign a confidentiality deed prior to participating in the workshop due to the sensitive nature of the information presented.

Transport team members represented a range of relevant disciplines including road safety, design, bridge engineering, environment, community engagement, Aboriginal engagement, planning, geotechnical engineering, construction, maintenance, work health and safety (WHS), property and management and governance.

In addition to this, representatives from Transport's partnering organisations provided additional technical support and advice in the areas of design and environment (Arup), constructability and Health and Safety in Design (HSiD) (Ranbury), flooding and hydrology (Rhelm), cost estimating (North Projects) and landscape character and visual amenity (Tract Consultants).

Workshop participants were mainly from State and Local Government agencies that are bound by their respective professional Code of Conduct and Ethics. This includes responsibility to report unethical, dishonest and/or corrupt behaviour. A copy of Transport Code of Conduct can be found on our website <https://www.transport.nsw.gov.au/about-us/who-we-are/culture-and-values>.

VMW structure

The VMW workshop provided participants a structured process to consider value, perceived usefulness and benefits of the shortlisted options, and the opportunity for discussion when differing views were encountered. At the workshop, participants:

- Learned about the project, the community and service needs, and the roadmap vision and objectives through presentations
- Nominated 'What's important' from their perspectives

- Agreed on the assessment criteria and weightings of within each goal (safety, resilience, liveability, sustainability and accessibility and connectivity)
- Agreed on scoring for each corridor option against the assessment criteria
- Discussed the rankings of each corridor option for each goal
- Discussed the overall ranking of the options from a values perspective
- Further shortlisted the strategic corridor options for consideration
- Developed an action plan for further investigations and actions

Project background and problem definition

The first presentations allowed the participants to understand the project background, problem definition and project objectives; and introduced the five options that were being considered as part of the VMW (refer Section 3.3.3 of this report). Key points in the project background and problem definition were as follows:

- Overall, the project is needed to address safety, remove traffic and heavy vehicles from the town centre, improve the town amenity, provide resilience and support the economic, social and environmental sustainability of the area.
- This section of Princes Highway comprises one lane in each direction for the majority of its length (7.9 km of 8.7 km) with a short section of southbound overtaking lane.
- Daily traffic of approximately 8,000 vehicles was recorded during traffic counts in 2013 and 2019.
- In the AM Peak, approximately 77% of the traffic entering Moruya had a destination within the town. Heavy vehicles represent approximately 11% of all traffic.
- The average crash rate per year on this section of the Princes Highway (0.33 crashes per year per km) is higher than the average for a Class 3 Rural Road in NSW (0.26 crashes per year per km).
- The severity index (1.47) is higher than the NSW average (1.33). Most crashes result in serious injuries (47%), but there was one fatality in the reporting period from 2014 to 2018.
- Crashes on this section of road are predominantly associated with intersections.
- There were two crashes involving pedestrians in this section.
- This section includes two (2) curves with a radius less than 200m, and two (2) curves with a radius between 200m and 400m. These curves are not suitable for a posted speed of 100 km/h.
- This section includes six bridges and major culvert structures, ranging from poor to good condition and from 35 to 85 years in age.

‘What is important’

Following the project presentation, the workshop group discussed ‘what is important to you about the Moruya bypass project’. This was discussed in the context each attendee’s perspective and initiated the conversation regarded the

values of the group as it related to the project. This session provided shared perspectives about the values associated with the project.

The responses are summarised as follows in Table 3-6:

Table 3-6 VMW participants ‘What is important’ to achieve with the Moruya bypass

Project Goals	‘What is important’ discussion
Safety	<p>Network safety:</p> <ul style="list-style-type: none"> • Overall regional road safety on the highway and intersections • Safe connections on an off the bypass • Safety for all modes on whole network including local roads – as a holistic solution • Opportunities to improve safety for Heavy Vehicle drivers • Improved pedestrian and cyclist connectivity and safety in the town centre. • Improve safety for travel between town and coast, town and river • Safety for vulnerable road users within the town of Moruya by reducing their exposure to through traffic then design to reduce speed • Getting the highway out of town. <p>Work health and safety:</p> <ul style="list-style-type: none"> • Application of a safe systems approach for WHS considerations for operators/maintainers. <p>Other considerations:</p> <ul style="list-style-type: none"> • On-river: consider small craft, kayakers and dragon boats all interact in the space near markets.
Resilience	<p>Princes Highway resilience: flooding</p> <ul style="list-style-type: none"> • Flood-safe access 1% or greater/ flood route provision including to the hospital • Flood resilience considering climate change and uncertainty

	<ul style="list-style-type: none"> Improving the capability of the whole network – State and local roads, fire trails, etc to better respond to major events (flood, fire, road crashes, etc) Minimise impacts on river flood behaviour. Both in town and in environmentally sensitive areas. <p>Princes Highway resilience: bushfire</p> <ul style="list-style-type: none"> Emergency access to Larry's Mountain Road area important from a bushfire access perspective Lessons learnt from recent bushfires, management of all emergency services Ability to deal with climate change induced issues – Increased fire risk, flood risk, agriculture changes. <p>Other considerations</p> <ul style="list-style-type: none"> Whole of life considerations i.e. operations and maintenance Simplify whole of life management minimise number and complexity of structures.
	<p>Moruya resilience: floods</p> <ul style="list-style-type: none"> Accessibility in and out of Moruya with flood immunity and ability to facilitate emergency management. Do not cause adverse flood impacts (height/duration) particularly to residential areas. <p>Moruya resilience: economic and community</p> <ul style="list-style-type: none"> Maintain regional economic growth – we want them to continue to thrive and be successful places Minimal impact on businesses and the market Allowing growth while retaining the cultural integrity of the town – very important to the local and tourist populations. Construction supports local economy and employment (e.g. quarrying activities locally) Community sustainability – jobs, Aboriginal heritage and culture, community cohesion.
Liveability	<p>Town liveability and amenity</p> <ul style="list-style-type: none"> To not increase traffic noise in the town centre and minimise impact to residential properties Opportunity to increase pedestrian accessibility within town centre when heavy vehicle traffic is significantly reduced and make Moruya a place Protection of riverfront precinct, maximise amenity for community and visitors Protect Moruya Markets space in Riverside Park – the markets are crucial to Moruya Partnering with ESC to create a legacy for Moruya, successful placemaking for the town centre Priority for pedestrians and cyclists in the town centre, provision of choice for the community re transport and moving through Moruya Ensure safe permeability of old highway through town

	<ul style="list-style-type: none"> • Reduce speed and crossing distance to increase place value • A route that doesn't just shift the problem within Moruya • Protect/ improve amenity of main street. Want to see a true bypass • Not too close to town but not too far away. Don't fragment town with an internal bypass. • Visual connection to the town for the bypass so that the tourism view is activated • Visual impact of large bridges close to town.
	Natural Amenity <ul style="list-style-type: none"> • Moruya has a pristine environment • Fisheries habitat provides natural amenity and community resource • Retention of landscape character and minimisation of visual impacts • Views along river to mountains.
Sustainability	Decarbonisation <ul style="list-style-type: none"> • Carbon/resource input for construction is considered in whole of life outcomes. Environmental sustainability <ul style="list-style-type: none"> • Minimise impact to: <ul style="list-style-type: none"> - Coastal Wetlands, - Threatened Ecological Communities (TECs) including critically endangered EECs - Moruya River - Malabar Lagoon - Batemans Marine Park • Minimise impact to marine vegetation • Minimise environmental impact, choose existing cleared land for alignment and avoid wetland habitat where possible.
	Aboriginal Values <ul style="list-style-type: none"> • Avoid impact to listed Aboriginal sites and Aboriginal Conservation Areas.
	Non-Aboriginal Heritage <ul style="list-style-type: none"> • Minimise impacts to non-Aboriginal heritage items.

	Economic Sustainability <ul style="list-style-type: none"> • Consolidate commercial activities along the highway to the main towns – no satellite commercial activities drawing business out of town • Financial sustainability of old assets being handed over • A well-built project that needs minimal maintenance (financial sustainability) • Maintain regional economic growth – want to continue to thrive and be successful places • Minimal impact on businesses. • Allowing growth while retaining the cultural integrity of the town • Construction supports local economy and employment (e.g. quarrying activities locally).
Accessibility and Connectivity	Access to Airport <ul style="list-style-type: none"> • Seamless connection to airport.
	Emergency and hospital access <ul style="list-style-type: none"> • Future access to new Eurobodalla Regional Hospital locally and from Batemans Bay • Access from the bypass to the airport is key to allow movement of patients for transfers • Improve capacity for Ambulance to access residents and hospitals with ease.
	Access and connectivity for Moruya <ul style="list-style-type: none"> • Ensuring ongoing access to Moruya • Proximity to township is perceived as important • Good access to bypass for residents from various places • Connectivity to North Moruya Industrial area important • Maintain access to the marine park • Safe and active access to schools/TAFE/new hospital/Council lands/recreation areas/boat ramps/recreational user groups • Efficient connections between key pieces of infrastructure within Moruya, i.e. the new Eurobodalla Regional Hospital, Airport etc.
	Heavy vehicles <ul style="list-style-type: none"> • Access for newer heavy vehicle classes • New bridges and road geometry that can support larger and heavier vehicles.
	Active transport access <ul style="list-style-type: none"> • Access for all users, in particular vulnerable users (cyclists, pedestrians, school / TAFE access / health access) • Maintain vehicle and bicycle access to South Head and North Head. • Keep existing bridge to maintain internal access.
	Maritime access

	<ul style="list-style-type: none"> • Maintaining maritime traffic access into the Moruya town centre on Moruya River.
	Transport connectivity <ul style="list-style-type: none"> • Consideration of different modes of transport and how they are connecting. • Make the town roads more bearable in peak periods – improve flow through town and access to services for residents.

3.4.3 Agreeing to and weighting the criteria

Prior to the VMW, the project team developed draft assessment criteria for each of the five goals. At the VMW, there was a much broader range of interests and expertise represented, so the group was asked to review the draft criteria, and as necessary, amend to reflect to consensus of the group.

‘Weighting’ criteria means assigning relative importance of the criteria. If a criterion is considered to be more important than others, it is more highly weighted. If it was to be the same importance, it would have equal weighting.

The criteria within each of the five goals were weighted by the group to determine the relative importance to each other. It is important to note that the weighting was only undertaken within each goal (safety, resilience, liveability, sustainability and accessibility and connectivity), not against each other. The reason for this is that each goal is considered important in its own right, as the purpose of decision-making process is to find an option that, on balance, provides the best outcome across all five goals. That is, the goals are not ranked against each other. In the same way, the scores are not amalgamated into one amalgamated score, but are considered within the five goals. This provided the basis for discussion about which option(s), on balance, best meet the criteria.

The weightings were determined by asking participants to indicate which criterion is the most important using a technique called ‘swing weighting’. Using this technique, the criterion that the group considers to be most important is given a nominal ranking of ‘100’. The group is then asked to rank the other criteria in terms of their relative importance to the most important criteria that scored 100. A criterion that has high relative importance would be ranked closer to 100, while a criterion that is less important would be less than 100. Weightings for each criteria are then determined by dividing their respective ranking by the sum of all rankings, expressed as a percentage.

3.4.4 Assessment of the five corridor options – overview

Following initial exploratory phase of the VMW and weighting of the criteria; the participants assessed the performance of the options against each of the five values. This was done as follows:

The performance of the five corridor options was assessed against the criteria. The assessment range was from -2 (significant disbenefit) through to 0 (neutral) to +2 (significant benefit). The minus score allowed the disbenefit or impacts of the project to be recorded.

For the two criteria of safety, and accessibility and connectivity, the assessment was done as one large VMW group.

For the criteria of resilience, liveability and sustainability, the group split into three focus groups for the assessment, and then reconvened as a larger cohort to agree to the assessment by consensus.

The ‘raw score’ in the subsequent tables represents the initial assessment provided by the subject matter experts prior to the VMW. The ‘VMW score’ in the subsequent tables represents the assessment by the VMW participants.

It is also noted that post-VMW, the scoring was checked and reviewed at a technical workshop (refer Section 3.5 of this report). The purpose of this was to ensure that the scoring at the VMW was accurate and a correct representation of the data and discussions. In some cases, the assessment was adjusted to reflect this. Where adjustments occurred, the reasons for this have been noted.

3.4.5 Assessment of the five corridors: safety

Weighting of safety criteria

There were two value criteria for safety:

- 1. Improve network operational safety for all Transport customers, including the river
- 2. Enable safe construction, operation, and maintenance of the transport network for Transport’s people and industry partners

Using the swing weighting method (refer Section 3.4.4), the VMW participants nominated the first criterion as the most important criterion and was ranked as a nominal 100. The second criterion was ranked by the group in a range close to the first, and it was agreed through discussion to be equally important. Both criteria were thus given an equal weighting.

Criteria	Ranking	Weighting (%)
Improve network operational safety for all Transport customers, including the river	100	50%
Enable safe construction, operation, and maintenance of the transport network for Transport’s people and industry partners	100	50%

Assessment of the safety criteria

Safety Criterion 1: Improve network operational safety for all Transport customers, including the river

Table 3-7 Safety Criterion 1 – Improve network safety

Criteria					Weighting
Improve network operational safety for all Transport customers, including the river					50%
Basis of assessment					
Safe systems assessment (SSA) score					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	+1	+0.5	+2	+2	+2
VMW score	+0.25	+0.5	+2	+2	+2
Weighted score	13	25	100	100	100
Assessment outcomes					
<ul style="list-style-type: none"> All options would improve safety. The differentiator is that a higher level of safety is achieved where more of the network is upgraded, and where less intersections/ connection points are retained. Options where intersections/ connection points could be consolidated performed better The scores are proportional to the length of redundant highway within a common northern and southern point. Orange, Yellow and Green had similar scores. Purple was lower because of it retained more highway in a semi-urban environment. Blue potentially retains double the number of intersections/ connection points to the Highway. Blue option has longer length to achieve the same transport task. A shorter bypass length is safer from a whole of network perspective, and for all these reasons, the Blue option was scored down from +1 to +0.25 by the VMW participants. 					

Assessment of the options – safety

Safety Criterion 2: Health and safety in design

Table 3-8 Safety Criterion 2 – Health and Safety In Design

Criteria					Weighting
Deliver safety in design, keeping our people, industry partners and customers safe during construction, operations and maintenance of the transport network					50%
Basis of assessment					
Constructability and HSiD workshop results					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-2	+1	0	-1	-1
VMW score	-2	+0.5	0	-1	-1.5
Weighted score	-100	25	0	-50	-75
Assessment outcomes					
<ul style="list-style-type: none"> There was robust discussion about the extent to which the options were considered to be an HSiD risk, with pros and cons noted for all options. Factors for consideration included the ability to construct using controlled access – with Blue option performing less well in this respect because it interfaces more with the existing network. Purple and Orange will have the largest flood constraints with significant bridge crossings. There was some debate around Purple, however it performed the best in HSiD due to having good access, no significant cuttings or blasting and the least utility impact. Orange performed less well than Purple as it had more uncertainty around the bridge design. While there is HSiD risk around longer bridges, the cuttings are a different type of risk that are more difficult to design-out. The options with cuttings (Yellow and Green) performed less well because of this. Green scored relatively poorly because it retains the use of existing roads and online construction along George Bass Drive. This increases the interface with construction and use of existing road. Overall, it was considered at the technical workshop that all options could be built safely. This increased the scores of all options. 					

3.4.6 Resilience

Weighting of resilience criteria

There were two value criteria for resilience:

1. Improve the Princes Highway’s resilience in emergencies, including bushfire and flood and traffic incidents
2. Improve Moruya’s resilience and response to emergencies, including bushfire and flood.

Using the swing weighting method, the VMW group agreed that the first criterion was the most important criterion and was ranked as a nominal 100. The second criterion was ranked by the group as being close to the first, as it was acknowledged that the resilience of the highway and of Moruya were closely intertwined.

Criteria	Ranking	Weighting (%)
Improve the Princes Highway’s resilience in emergencies, including bushfire and flood and traffic incidents	100	56%
Improve Moruya’s resilience and response to emergencies, including bushfire and flood	80	44%

Assessment of the options – resilience

Resilience criterion 1: Improve the Princes Highway's resilience in emergencies, including bushfire and flood and traffic incidents

Table 3-9 Resilience Criterion 1 – Princes Highway Resilience

Criteria					Weighting
Improve the Princes Highway's resilience in emergencies					56%
Basis of assessment					
Qualitative assessment of resilience including consideration of: <ul style="list-style-type: none"> • Princes Highway's resilience to bushfires • Princes Highway's resilience to flooding • Impact to Princes Highway emergency route management plan 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	1.0	2.0	2.0	1.5	1.5
Weighted score	56	111	111	83	83
Assessment outcomes					
<ul style="list-style-type: none"> • Overall, all options have positive impact on the Princes Highway emergency route management plan by providing an additional crossing of Moruya River. • All options will be able to implement the recommendations of the NSW Bushfire Inquiry. • All options provide 1% AEP flood immunity for the Princes Highway. • The alignment for the Blue option is closer to the area affected by the bushfires in December 2019/January 2020. The scoring is reflective of this. • Purple and Orange alignments would have less risk in terms of bushfires. However, there was seen to be minor disbenefits associated with flooding in a 1% AEP event to the highway. • Yellow and Green would have more risk in terms of bushfires to the highway itself, as they traverse bushland. There is less risk in terms of flooding above 1% AEP flood event. 					

Resilience Criterion 2: Improve Moruya's resilience and response to emergencies, including bushfire and flood.

Table 3-10 Resilience Criterion 2 – Moruya Resilience

Criteria					Weighting
Improve Moruya’s resilience and response to emergencies, including bushfire and flood.					44
Basis of Assessment					
Qualitative assessment of the ability to improve resilience for Moruya, including:					
<ul style="list-style-type: none">• Improvements to resilience during flood events• Improvements to resilience during bushfires• Access to emergency services					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	1.0	1.0	1.0	1.5	1.5
Weighted score	44	44	44	67	67
Assessment outcomes					
<ul style="list-style-type: none">• All options provide access for all local roads in Moruya (i.e., no severance).• All options will provide access to the new Eurobodalla Regional Hospital precinct.• In considering this criterion, flooding was considered by the group as a more important factor than bushfire.• The options to closer to the town centre have the greater risk of affecting flooding to the township. This is reflected in the scoring.					

3.4.7 Assessment of Liveability

Weighting of liveability criteria

There were four value criteria for liveability:

1. Improve Moruya's town amenity
2. Support multi modal shift from private vehicles to active and public transport
3. Minimise impacts to landscape character
4. Minimise noise and air quality impact

Using the swing weighting method, the VMW group agreed that the first criterion (improve Moruya's amenity) was the most important value and was ranked as a nominal 100. This criterion, along with landscape character and noise and air quality were considered to be the most important aspects to consider for liveability by the group.

Criteria	Ranking	Weighting (%)
Improve Moruya's town amenity	100	33%
Support multi modal shift from private vehicles to active and public transport	58	19%
Minimise impacts to landscape character	75	25%
Minimise noise and air quality impact	73	24%

Assessment of the options – liveability

Liveability Criterion 1: Impact on Moruya township

Table 3-11 Liveability Criterion 1 – Impact on Moruya township amenity

Criteria				Weighting	
Improve Moruya's town amenity				33%	
Basis of assessment					
Qualitative assessment of change in amenity for residents including consideration of: <ul style="list-style-type: none">• Estimated reduction in traffic volumes and heavy vehicles through Moruya• Appraisal of business impacts and opportunities• Appraisal of opportunities for place making, including LOS for town centre intersections• Social infrastructure, markets and spaces					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-2	0.5	2	-0.5	-1

Weighted score	-65	16	65	-16	-33
Assessment outcomes					
<ul style="list-style-type: none"> Overall, the topic of liveability and amenity was an area of significant discussion for the VMW group. It was considered important to provide amenity to Moruya in order to support businesses and the township. The Blue option was considered to have the highest potential to impact amenity of the Moruya township, as it traverses the western edge of the township. Purple is also closer to town and affects more residential areas. While the Purple option would provide closer access points to the town, its elevated structures segregate the town and would affect Riverside Park. The participants recognised that closer to town is not necessarily better for town. The Orange option was seen a good amenity option. It does not divide the town, but still provides accessibility and proximity to the township and access for the new Eurobodalla Regional Hospital. It provides opportunities for active transport. It would potentially impact on the seaplane operations, and this would need to be managed. It was considered to be close to town, but not so close to have noise impacts. Option Orange was preferred by the Business Chamber and council. The Yellow option was considered to be too remote from the town and industrial lands to provide good amenity, and this was scored accordingly. Green was recognised to be further from the Moruya township, however, overall it was seen to have an overall negative impact on character and amenity because of its proximity to Broulee. 					

Liveability Criterion 2: Support multi-modal shift from private vehicles to active and public transport.

Table 3-12 Liveability Criterion 2 – Modal Shift

Criteria					Weighting
Support multi-modal shift from private vehicles to active and public transport.					19
Basis of assessment					
Qualitative assessment of improvements for active and public transport including consideration of:					
<ul style="list-style-type: none"> Ability to integrate with existing and planned active transport links Ability to integrate access to active and public transport Impacts to existing desire lines 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-2	1.5	1.5-2	-0.5	1.5-2

Weighted score	-38	28	28	-9	28
Assessment outcomes					
<ul style="list-style-type: none"> All options provide connectivity to existing and planned active transport (cycle networks and shared pedestrian paths). The Blue option scored poorly because it would affect existing active and other transport modes including cycling and horse-riding. The Purple and Orange options scored relatively well because they had the most direct access to the town, and allowed for ease of bus pickups. The Yellow option scored more poorly due to its distance from the Moruya township and the industrial area. The Green option scored relatively well because it was considered to provide the best opportunities to improve cycle links along the old coastal road. 					

Liveability Criterion 3: Landscape character and visual amenity

Table 3-13 Liveability Criterion 3 – Landscape character and visual amenity

Criteria					Weighting
Minimise impacts to landscape character and visual amenity					25
Basis of Assessment					
Qualitative assessment of change in amenity for residents including consideration of:					
<ul style="list-style-type: none"> Qualitative assessment of impact on landscape character value 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	0	-1	1	-2	-2
Weighted score	0	-25	25	-50	-50
Assessment outcomes					
<ul style="list-style-type: none"> Overall, all options include a large bridge across the landscape. The Blue option was considered to have a neutral score – while it was the closest to residential areas, it would best fit with the topography of the landscape, and provide views to the surrounding areas. It was acknowledged that this would not necessarily be a good outcome for the community. The Purple option scored poorly as it included a large bridge structure close to the town and would have a visual impact to the town and divide residential areas. The Orange option was the highest performing of the options because it was located midway between the town and the coast. The distance from town would minimise visual impacts, and the proximity to the coast provided opportunities for views from the bridge. The Yellow and Green options performed relatively poorly as they includes significant cuttings to the through higher ground and a large, high bridges. 					

Liveability Criterion 4: Noise quality

Table 3-14 Liveability Criterion 4 – Noise and air quality

Criteria					Weighting
Minimise noise impact					24
Basis of assessment					
Quantitative measure of estimated nuisance noise levels					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-2.0	-1.5	-1.0	-1.0	-0.5
Weighted score	-48	-36	-24	-24	-12
Assessment outcomes					
<p>The notes related to this are as follows:</p> <ul style="list-style-type: none"> Overall: All options would reduce heavy vehicles and noise within the town centre itself. All options would also have new or additional noise impacts as they represent a new route, and would affect additional residences and noise receivers. It is noted that a more detailed investigation as to how to mitigate these impacts would be undertaken in the next phase of design. Overall: impacts on air quality were not seen to be a differentiator and were not part of the assessment. The Blue and Purple options scored poorly as their alignment are adjacent to the residential areas of Moruya. The Orange and Yellow options are located at a further distance from Moruya township, and would have some, but lesser, noise impacts. The Green option performed the best of the options, as it is located at the furthest distance from Moruya. 					

3.4.8 Assessment of Sustainability

Weighting of sustainability criteria

There were six criteria for sustainability. Using the swing weighting method, the VMW group agreed that all the criteria were equally important and all were thus equally weighted:

Criteria	Ranking	Weighting (%)
Minimise impacts on terrestrial ecology	17	17%
Minimise impact on aquatic ecology	17	17%
Minimise impact to Aboriginal heritage	17	17%
Minimise impact to non-Aboriginal heritage	17	17%
Minimise social impact from direct property and business impacts	17	17%
Maximise integration with existing and future land use planning	17	17%

Assessment of the options – sustainability

Sustainability Criterion 1: Minimise impacts on terrestrial ecology

Table 3-15 Sustainability Criterion 1 – Terrestrial Ecology

Criteria					Weighting
Minimise impacts on terrestrial ecology					17
Basis of assessment					
Consideration of impacts to:					
<ul style="list-style-type: none"> Commonwealth listed Threatened Ecological Communities (TEC) (area) State listed TEC (area) Native vegetation Fauna connectivity and impacts to fauna corridors 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-1.0	-0.5	-1.0	-1.5	-2.0
Weighted score	-17	-8	-17	-25	-33
Assessment outcomes					
<ul style="list-style-type: none"> Overall, it was noted that impact doesn't necessarily equate to the area of the footprint – edge effect and fragmentation of habitat also need to be considered. It was also noted that the GIS mapping may not reflect the current biodiversity status after the 2019/20 bushfires. 					

- The Blue option was assessed as having a moderate impact on terrestrial ecology. It was noted that it affected comparatively poor-quality native vegetation.
- The Purple option was assessed as having a low impact on terrestrial ecology. It affected comparatively less native vegetation.
- The Orange option was assessed as having a moderate impact on threatened ecological communities (TECs), and with a potential fragmentation of biodiversity corridors to the south east of the corridor.
- Option Yellow was assessed as having a moderate-high impact to TECs.
- Option Green was assessed as having the highest impacts on TECs, including important parcels of Mogo State Forest.

Sustainability Criterion 2: Aquatic ecology

Table 3-16 Sustainability Criterion 2 – Aquatic Ecology

Criteria					Weighting
Minimise impact on aquatic ecology					17
Basis of assessment					
Consideration of impacts to:					
<ul style="list-style-type: none"> • Coastal Management SEPP wetlands • Marine vegetation 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	0.0	-0.5	-1.0	-1.5	-2.0
Weighted score	0	-8	-17	-25	-33
Assessment outcomes					
<ul style="list-style-type: none"> • The assessment does not include impacts to Moruya River. All options would cross the Moruya River. • The Blue option was assessed as having a nil impact on mapped aquatic ecology. • The Purple option was assessed as having a low impact on mapped aquatic ecology. • The Orange option was assessed as having a moderate impact on mapped aquatic ecology. • The Yellow option was assessed as having a moderate-high impact on mapped aquatic ecology. 					

- The Green option was assessed as having the highest impacts on mapped aquatic ecology.

Sustainability Criterion 3: Aboriginal Heritage

Table 3-17 Criterion 3 – Aboriginal Heritage

Criteria					Weighting
Minimise impacts to Aboriginal heritage					17
Basis of assessment					
Considerations of impacts to:					
Known AHIMS sites					
Identified areas of Aboriginal cultural heritage					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	0.0	-0.5	-1.0	-1.5	-2.0
Weighted score	0	-8	-17	-25	-33
Assessment outcomes					
<ul style="list-style-type: none"> • Overall, it is noted that the known Aboriginal Heritage Information Management System (AHIMS) sites only exist from previous studies – there may be additional sites that will be found during ongoing surveys. • The Blue option was assessed as having a neutral score as it has limited impact on known Aboriginal heritage. • The Purple option was assessed as having a low impact on known Aboriginal heritage, including impacts to Malabar Creek and Malabar lagoon. • The Orange option was assessed as having a moderate impact on known Aboriginal heritage, including impacts to Malabar Creek and Malabar lagoon. • The Yellow option was assessed as having a moderate-high impact on known Aboriginal heritage. • The Green option was assessed as having the highest impacts on Aboriginal heritage as it passes through areas of known Aboriginal significance. 					

Sustainability Criterion 4: Non-Aboriginal Heritage

Table 3-18 Sustainability Criterion 4 – Non-Aboriginal Heritage

Criteria					Weighting
Minimise impacts to non-Aboriginal heritage					17
Basis of assessment					
Basis of assessment <ul style="list-style-type: none"> Consideration of impacts to known non-Aboriginal heritage items identified in LEP 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	0.0	-0.5	-0.5	-0.5	-2.0
Weighted score	0	-8	-8	-8	-33
Assessment outcomes					
<ul style="list-style-type: none"> The Blue option was assessed as having a neutral score as it has limited impact on non-Aboriginal heritage. The Purple, Yellow and Orange options were assessed as having a minor impact on non-Aboriginal heritage. The Green option was assessed as having the highest impacts on non-Aboriginal heritage as it directly affected areas of heritage significance. 					

Sustainability Criterion 5: Economic and financial sustainability

Table 3-19 Criterion 5: Economic and Financial Sustainability

Criteria					Weighting
Minimise social impact from direct property and business impacts					17
Basis of assessment					
Consideration of impacts to:					
<ul style="list-style-type: none">• Adjacent properties and their land use (e.g. residential, rural, environmental)• Crown Land subject to Aboriginal Land Claims• Businesses including South Coast Seaplanes and agricultural land• Proximity of bypass to Moruya					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-1.5	-1.5	+1.0	-1.0	+1.0
Weighted score	-25	-25	17	-17	17
Assessment outcomes					
<ul style="list-style-type: none">• Overall, the literature on bypasses is that although bypasses have short term business impacts, typically they result in long term positive impact. While bypasses reduce through traffic, the quality of sales improve. Less congestion and delay also means more opportunity for active transport connections and placemaking. The design of bypass should incorporate intersections/connections to allow people to easily travel to the town from the bypass route and easily re-join the highway.• It is noted that all options impact agricultural land, which is typically located on the floodplains south and north of Moruya River.• The Blue option was assessed as having a major disbenefit in terms of economic sustainability as its alignment is in close proximity to existing residential areas. The Business chamber stated a preference for a bypass to east.• The Purple option was assessed as having a major disbenefit in terms of economic sustainability as its alignment bisects Riverside Park resulting in adverse impacts to community activities and may impact the seaplanes take-off and landing area.• The Orange option was assessed as providing a good benefit in terms of economic sustainability as it is in reasonable proximity to the town, and also provides good connectivity to the industrial area, which was considered a key driver for the town. It was recognised that this option would have the greatest impact on the seaplanes and that it would impact on cattle grazing and operations.					

- The Yellow option was assessed as having a moderate disbenefit because of its distance from the township.
- The Green option was assessed as having a good benefit in terms of economic sustainability as it connected to the airport and north-east townships of Broulee and Tomakin.

Criterion 6: Land use integration

Table 3-20 Criterion 6 – Land use integration

Criteria					Weighting
Maximise integration with existing and future land use planning					17
Basis of Assessment					
Consideration of integration with existing and future land use including:					
<ul style="list-style-type: none"> • State Forest • Residential and industrial areas • Eurobodalla Regional Hospital 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	-	-	-	-	-
VMW score	-2.0	-1.5	+2.0	+1.5	0
Weighted score	-33	-25	33	25	0
Assessment outcomes					
<ul style="list-style-type: none"> • All options would support access to the new Eurobodalla Regional Hospital. • Option Blue was assessed as having a major disbenefit in terms of land use integration as it has the biggest impact on existing settlements and planned release areas. • The Purple option was also assessed as having a substantial disbenefit as its alignment cut the towns in half, and limits future expansion. • The Orange option was assessed as providing a major benefit to future land use planning as it allows for town expansion. • The Yellow option was assessed as having a moderate benefit. • The Green option was assessed as having neutral score in terms of land use planning. 					

3.4.9 Assessment of Accessibility and Connectivity

Weighting of accessibility and connectivity criteria

There were two value criteria for accessibility and connectivity:

1. Improve travel time on the Princes Highway
2. Improve efficiency across the transport network

Using the swing weighting method, the VMW participants nominated the network efficiency as the most important criterion, and this was ranked as a nominal 100. The other criterion was ranked by the group as being of less comparative importance.

Criteria	Ranking	Weighting (%)
Improve travel time on the Princes Highway	75	43%
Improve efficiency across the transport network	100	57%

Assessment of the options – accessibility and connectivity

Accessibility and Connectivity Criterion 1: improve travel time on the Princes Highway

Table 3-21 Accessibility and Connectivity Criterion 1 – Princes Highway Travel Time

Criteria					Weighting
Improve travel time on the Princes Highway					43
Basis of assessment					
<ul style="list-style-type: none"> Estimated normal AM and PM peak period travel time savings on Princes Highway in 2036 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	+0.5	+1	+1	+2	+1.5
VMW score	+0.5	+1	+1	+2	+1.5
Weighted score	21	43	43	86	114
Assessment outcomes					
<ul style="list-style-type: none"> The Blue option was assessed as representing a moderate improvement to travel time on the Princes Highway, with an average travel time savings of 14%. It was the longest route between common start and end points. The Purple option was assessed as having a good travel time savings of 21%. The Orange option was assessed as having a good travel time savings of 20%. 					

- The Yellow option was assessed as having a significant travel time savings of 28%.
- The Green option was assessed as having a good-significant travel time savings of 25%.

Accessibility and Connectivity Criterion 2: Transport network efficiency

Table 3-22 Accessibility and Connectivity Criterion 2: Transport network efficiency

Criteria					Weighting
Improve efficiency across the transport network					43
Indicators					
<ul style="list-style-type: none"> • Estimated normal peak period AM and PM network operation in 2036 (VHT, VKT, delay per vehicle) • Travel time savings for the length of the route 					
Option	Blue	Purple	Orange	Yellow	Green
Raw score	+1.0	+2.0	+1.5	+2.0	+2.0
VMW score	+1.0	+2.0	+1.5	+2.0	+2.0
Weighted score	57	114	86	114	114
Assessment outcomes					
<ul style="list-style-type: none"> • Option Blue provided moderate improvements to efficiency across the network. • Option Purple, Yellow and Green provided significant savings across the network. • Option Orange provided good savings across the network. 					

3.4.10 Action plan – concluding comments and next steps

Following the assessment of the five options, the VMW participants reviewed the overall rankings and provided their conclusions and recommendations.

It is important to note that the performance of each of the five visions (safety, resilience, liveability, sustainability and connectivity and accessibility) was considered within their own 'silos' rather than as an aggregated number. In the same way, the weightings are within each of the five visions, and no one vision is considered higher than the other.

The purpose of this is to allow the VMW group to consider the that the pros and cons of each option and determine which option(s) represent the best balance across all values. This is part of Transport value management processes.

3.4.11 Assessment of five shortlisted options

Overall rankings

The overall conclusion following the assessment of the five shortlisted outcomes against project goals, objects values was as follows in Table 3-23.

Table 3-23 Values assessment ranking summary – end of VM

Goals	Option Blue	Option Purple	Option Orange	Option Yellow	Option Green
Safety	5	2	1	2	4
Resilience	5	1	1	1	1
Liveability	5	2	1	4	3
Sustainability	2	2	1	2	5
Accessibility and connectedness	5	1	4	1	1

- Option Blue provided the least improvement in travel time and was the poorest performing corridor in the goals of safety, connectivity and accessibility, resilience and liveability. It was equal second in terms of sustainability due to its comparatively lower impact to ecological habitats and species, as well as Aboriginal and non-Aboriginal heritage values, however, there was a large gap between the performance of Orange and second place in terms of sustainability. Overall, and on balance of all considerations, it was ranked fifth in terms of meeting the project goals and objectives.
- Option Purple performed more highly in terms of accessibility and connectivity because of its connection points close to the town. It also performed well in the goal of resilience as it was outside of the bushland areas and had a low bushfire risk associated with it. It was among the best performing corridors in safety. While it was second in terms of liveability, it lagged significantly behind Orange, due to the closer proximity to the town, and potential impacts in terms of noise and amenity. Overall, it was ranked second by the VMW group in terms of meeting the goals.
- Option Orange was the best-performing corridor in the goals of safety, however it is acknowledged that all roads would provide significantly improved safety compared to the existing highway. It performed well in terms of resilience because it had a lower bushfire risk associated with it. When considered across the weighted scores for sustainability the Orange corridor scored the highest when compared to the other four corridors. In terms of liveability – the distance of the preferred strategic corridor from the Moruya

town-ship means that potential noise impacts are minimised and the corridor would allow for future growth of the town, while still providing connections to key destinations where seen as positive. It would not affect important social infrastructure such as the riverfront parks and supports existing and planned active transport networks. While the Orange corridor performed less well in terms of accessibility and connectivity, this was because it was a longer route compared to some other corridors. However, it would still improve congestion and journey reliability in Moruya and reduce travel time on the Princes Highway. On balance, it was considered that the Orange corridor best met the project's goals and objectives. Overall, it was ranked first in terms of meeting the values and goals.

- Option Yellow performed well in connectivity and accessibility because it is a shorter route, providing significant travel time savings. It performed well in terms of resilience because of its resilience against floods. While it performed second in sustainability (equal with Purple and Blue), there were residual concerns about impacts to environmental and cultural values. It performed less well in terms of liveability because it was further from the Moruya township. Overall, it was ranked third in terms of meeting the goals.
- Option Green performed well in terms accessibility and connectivity as it provided significant savings in travel time. It also performed well in terms of resilience due to being away from the floodplain. It performed less well in terms of safety mainly because of additional safety risk associated with construction close to the airport and numerous existing roads. It also performed less well in terms of liveability as it was the farthest away from the town, and in sustainability because of potential impacts to environmental and cultural values. Overall, it was ranked fourth in terms of meeting the goals.

What were the outcomes of the VMW?

The workshop participants concluded that:

- On balance, option Orange best met the goals and objectives of the project
- Options Blue and Green should not be progressed any further due to their poor performance against the goals and objectives
- While option Orange performed well against the values, it was recognised that all options included significant bridge structures, engineering and environmental risks that should be investigated further prior to making a decision
- Options Purple, Orange and Yellow be recommended to be taken forward for further investigation.

Next Steps

- Cost estimates would be taken into consideration to determine Value for Money
- The environmental impacts and planning pathway would be reviewed.

3.5 Technical Workshop (Post-VM Workshop)

3.5.1 Technical workshop – overview

The VMW recognised that on balance, the Orange option best meets the goals and objectives of the project – safety, resilience, liveability, sustainability and connectivity and accessibility. However, it also recognised that there were risks that required additional investigation before the Orange option could be ratified and recommended as the preferred strategic corridor.

An internal technical post-VMW was held on Thursday 1 October 2020. The Technical Workshop was conducted in an online workshop format and brought together a range of Transport subject matter experts and technical specialists from a range of disciplines similar to the VMW (refer Appendix A for participants).

The purpose of the technical workshop was to check and review the outcomes of the VMW, consider costs and determine if further design effort could improve the performance of any of the short listed options.

At the workshop, participants:

- Participated in a recap and sensitivity test on the VMW
- Reviewed the project costs
- Undertook value engineering to see if the performance of any of the short listed options could be improved against the criteria established at the VMW
- Agreed to a short list
- Undertook a risk session

3.5.2 Moruya bypass Technical Workshop – outcomes

Recap of VMW

The participants at the technical workshop first considered the outcomes of the VMW workshop. The discussion was as follows:

- While the outcome of the VMW was accepted, there is a need to understand where it might be possible to drive down costs.
- It would be good now to take a step back and look at how the project will function as a corridor and how Moruya will operate. Significant investment is required for Orange. We need to look at the investment, differentiators and viable options.
- From a Geotech perspective, the cuttings in the Yellow and Green options are ambitious. It would be good to explore refinements before making a decision.
- There are environmental approval and planning pathway implications of Yellow.
- A lot of assumptions are made around environmental components. This is to be expected at the VMW stage, but may need consideration if we have two close options.
- We need to understand more about the flooding impacts in order to make a decision. Work has been done to understand the result.
- There were a lot of assumptions at play, for example, the economic impacts as a result of impacts to Riverside Park.

Post VMW scoring and sensitivity testing

The technical workshop participants also reviewed the VMW outcomes which resulted in the amendments to the VMW ranking as per Table 3-24:

Table 3-24 Values assessment ranking summary – VMW compared to (Technical Workshop)

Goals	Option Blue	Option Purple	Option Orange	Option Yellow	Option Green
Safety	5 (5)	2 (2)	1 (1)	2 (1)	4 (2)
Resilience	5 (5)	1 (1)	1 (1)	1 (1)	1 (1)
Liveability	5 (5)	2 (2)	1 (1)	4 (2)	3 (4)
Sustainability	2 (3)	2 (1)	1 (1)	2 (3)	5 (5)
Accessibility and connectedness	5 (5)	1 (1)	4 (4)	1 (1)	1 (1)
<p>Safety</p> <ul style="list-style-type: none"> All options had their score increased in the Health and Safety in Design due to it being agreed that all options could be built safely. This changed the relative rankings of Yellow and Green, however, it is considered that all options can be built safely. <p>Resilience</p> <ul style="list-style-type: none"> There were no amendments to the scoring. <p>Liveability</p> <ul style="list-style-type: none"> The Orange score for Amenity was reduced by 0.5 due to its potential impacts to existing river users. This did not affect its ranking. The Yellow score for amenity was originally considered by the VMW participants to be too remote from the town and industrial area to provide good amenity. The amenity score was improved as it would significantly reduce traffic, would not divide the town and would provide opportunities for place making similar to option Orange. The Yellow score for Mode Shift also improved as it was seen to provide flexibility in modal shift opportunity and would remove more traffic from the town, improving active transport opportunities within the town. Together, this improved its performance and affected the comparative ranking of Green. <p>Sustainability</p> <ul style="list-style-type: none"> The overall amendments to scoring below resulted in the reduced ranking for the Blue Option. The Purple score for Economic sustainability was improved because of the economic benefits of having a bypass closer to town, both during construction and operation. This improved its ranking. The Orange score for land use integration was reduced, as it is further away from the Moruya township than Purple. This did not change its ranking. The Yellow score for land use integration was reduced, as it is further away from the Moruya township than Purple. This reduced its ranking. <p>Accessibility and connectedness</p> <ul style="list-style-type: none"> For Purple, Orange and Yellow options, there were minor amendments to the 'Princes Highway Travel time' scores which did not affect the ranking. 					

The results of the testing were as follows:

- A range of sensitivity tests were undertaken. The sensitivity testing ratified that Option Blue and Option Green performed less well on a values basis.
- The performance of Orange against values remained consistently high, with Purple and Yellow also performing well.
- The sensitivity analysis highlighted that there were areas where the scoring between the Orange, Purple and Yellow options were close.
- The analysis showed that if the performance of Purple and Yellow were able to be optimised, they would score closer to Orange in terms of values.

3.5.3 Project costs

The workshop participants reviewed the project costs and cost drivers.

	Purple	Orange	Yellow
Project costs	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Length of bypass	6 km	7 km	9 km
Cost per km	\$ [REDACTED]	\$ [REDACTED]	\$ [REDACTED]
Bridge length	2900m	3200m	1800m
Cost drivers	Earthworks Imported material	Bridge structures	Cut and fill Haulage fees

Notes from this session were as follows:

- The cost drivers are the bridge and earthworks
- The haulage and tipping fees mean there was a significant opportunity to reduce cost
- Moving grades to improve earthworks is relatively simple – to manage flood aspects, bridges get longer, not shorter.
- Floodplain options tend to get more expensive, not less
- Being open to Tier 2 contractors will drive competitiveness
- The comparative benefits need to be reviewed
- Remoteness will add 2-3% to the cost estimates.

3.5.4 Value engineering

Following the short listing session, a value engineering session was held to determine whether the performance of any of the short listed options could be improved against the project cost or the criteria established at the VMW. The recommendations for further investigation to improve performance were as follows:

- Further design effort required at northern and southern tie-ins to understand the footprint
- Refine Orange at the northern tie-in to explore cost reductions
- Refine Orange to avoid Aboriginal, non-Aboriginal, terrestrial and aquatic values
- Refine Orange and Yellow to have a common treatment at South Head Road
- Refine cut design north of river for Yellow to reduce cost
- Explore utilisation of excess material on other projects across the program
- Explore feasibility of stockpiling excess material
- Obtain works as executed costs of other longer bridges, e.g. Kempsey bypass

3.5.5 Agreement to a short list

Following the discussion regarding the sensitivity testing, the participants discussed the shortlisting of the options. It was agreed that the Blue and Green options would not be considered further, and that the shortlisting of the Purple, Orange and Yellow options was supported. It was considered that the outcomes of the VMW were validated.

3.5.6 Recommendations

The recommendations, further work and action plan following the Technical workshop were as follows:

- Purple, Orange and Yellow options are proposed to take forward for further consideration.
- While Orange performed well against the values, there were some remaining risks and opportunities that needed to be reviewed before a decision could be made:
 - A review of how the corridor will function and Moruya will operate
 - Ability to optimise traffic on the route
 - Ability to optimise the cuttings
 - Cost drivers and the ability to drive down costs
 - Economic benefit to create value for money
 - The need for further discussion with Health Infrastructure
 - The residual risk profile for high risks

3.6 Corridor Review Workshop

3.6.1 Corridor review workshop – background and overview

A corridor review workshop was held on 20 October 2020. The workshop brought together a range of Transport subject matter experts and technical specialists from a range of disciplines similar to the VMW.

The purpose of the corridor review workshop was to recommend a preferred strategic bypass corridor, taking into account the outcomes of the VMW, post-VMW workshop and technical investigations.

The recommendation was required to be a corridor that best meets:

- project need
- residual risk profile for targeted risks
- corridor performance
- cost and benefit to create value for money

At the workshop, participants:

- Shared their perspectives as subject matter experts
- Reviewed the outcomes of the VMW and technical workshops including design refinements to achieve the value engineering opportunities identified in the technical workshop
- Learned about the work undertaken after the VMW and technical workshops and reviewed options Purple, Orange and Yellow for construction, flooding, design, environmental and approval risks and opportunities
- Considered updated costs, benefits and value for money
- Participated in a risk review to assess which option ranked best in terms of having the lowest residual risk for each risk category
- Made a recommendation on the preferred strategic bypass corridor.

3.6.2 Corridor review workshop – outcomes

Corridor review workshop perspectives

As the first exercise of the day, participants shared their perspectives about what is important in selecting a preferred corridor, and what are the key risks. The discussion was as follows:

Strategic requirement and risk	<ul style="list-style-type: none"> • It is important to have an option that meets the objectives. • There is a need to identify where the higher risk areas are. If we de-risk most risky options how will this affect decision? • We need look at long term as an operational route, not just on easiest and cheapest. • Need to consider future proofing, future technology and alternative modes of transport e.g. walking, cycling. • Connectivity, efficiency and safety. Long bridges limits connectivity options. • Need to consider how the project fits into the future Moruya, not just now and doesn't inhibit future development. Don't want it to be an eyesore or manmade barrier. • Need to achieve a good, safe highway. • How do we balance an option that gets used in the best way by the community. Balance safety, efficiency with utilisation performance. Northern end – tie ins, airport, industrial. Southern, educational and other precincts. Not just a through driver.
Environment	<ul style="list-style-type: none"> • Minimise environmental impacts • We need to ask how the project fits into the Moruya environment.

Constructability and maintenance	<ul style="list-style-type: none"> • Constructability – little tweaks to the worst option could make the performance better. • It is important to have a bridge with less maintenance in the future, especially bearings and joints etc. Need balance constructability, dollars and maintenance. • We need floodplain options that drain the bridge. Environmental capture of runoff from the bridge. Issues on Nowra Bridge with not being able to provide scuppers. • Construction and design will be very important • Bridges that have good long term performance and won't be a maintenance headache. • We need to try to understand the geology and soft soils. Material import and balance – where will import come from? • Need to do a good set of investigations to arrive at sensible options. Hydraulic investigations.
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The participants were then provided with a recap and status of the project following the VMW and Technical workshops. For further information, refer to Sections 3.4 and 3.5 of this report.

3.6.3 Work undertaken after the VMW

Following the discussion on what's important, and recap on the process to date, the workshop participants reviewed the work that had been undertaken following the VM and Technical Workshop, including refinements to the options.

A report-back on discussions with Health Infrastructure also noted that three sites had been shortlisted for the new hospital, and a preferred site was anticipated by early November 2020.

The refinements to the options were as follows in Table 3-25 and

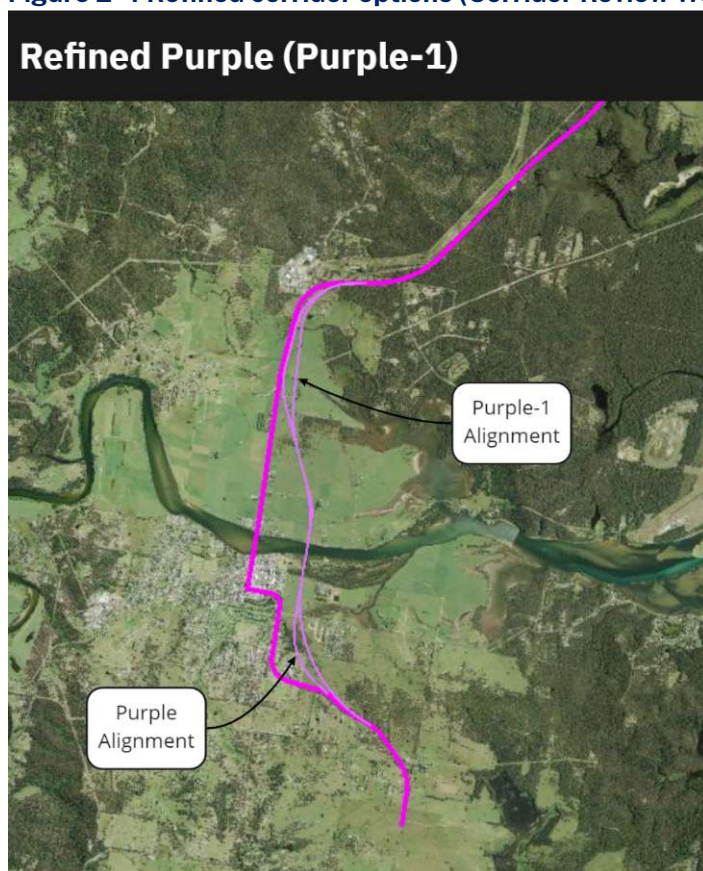
Figure 2-4:

Table 3-25 Description of refined corridor options

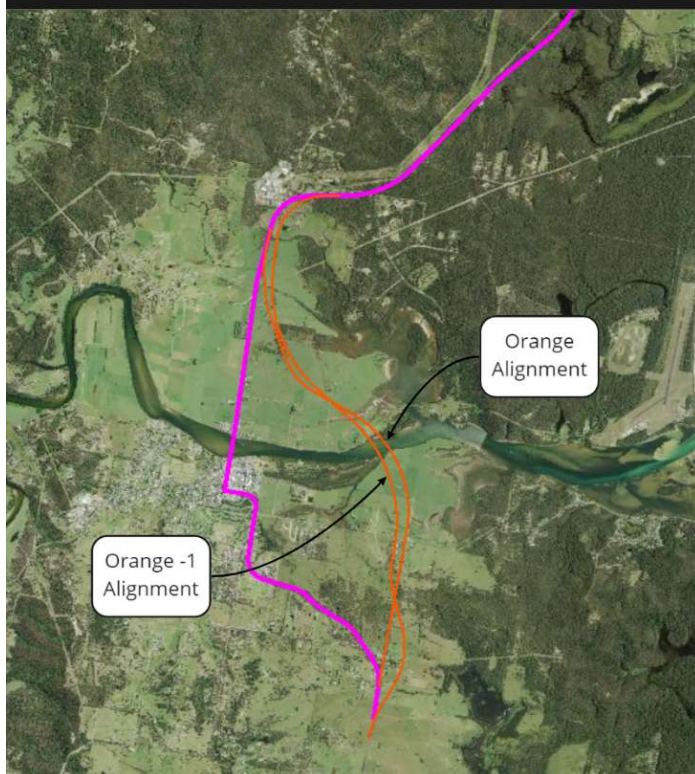
Long list corridor name	Shortlist corridor name	Refined corridor Key features
Option E	Option Purple	<p>Key features of refined option PURPLE-1</p> <ul style="list-style-type: none"> • Option remains shortest bypass but is extended marginally in north and south – revised total length is 6.60 km. • Revised formation clear of existing highway and at better crossing point for Dooga Creek resulting in shorter bridge. • New alignment at northern end allows more room for a four way roundabout near Shelley Road. • Larrys Mountain Road intersection retained as is. • Horizontal alignment adjustments have been made to provide minimum radii on main bridge to simplify geometry, reduce construction complexity and to assist with drainage and water quality measures.

		<ul style="list-style-type: none"> Alignment modifications are relatively minor on floodplain but are more substantial at southern end around Moruya TAFE and residential area.
G	Option Orange	<p>Key features of refined option ORANGE-1</p> <ul style="list-style-type: none"> Option has been extended at both ends replicate Purple option in north and Yellow option in south – revised total length is 8.40 km. Revised formation clear of existing highway and at better crossing point for Dooga Creek resulting in shorter bridge. New alignment at northern end. Larrys Mountain Road intersection retained as is. Horizontal alignment adjustments have been made on bridge. Vertical alignment of bypass at southern end to be optimised by potential lowering of crest on South Head Road to provide proposed grade separation (no access) – most cost effective solution. New alignment at southern end (identical to Yellow) allows more flexibility for four way roundabout, possibly including Donnellys Road. Mountain View Road intersection retained as is.
H-I	Option Yellow	<p>Key features of refined option YELLOW-1</p> <ul style="list-style-type: none"> Option has been marginally reduced in length due to horizontal alignment modification – revised total length is 9.10 km. Revised horizontal and vertical alignment north of Moruya River has significantly reduced both size of cuttings and overall earthworks volumes, leading to a potentially balanced mass haul. Revised alignment (location and height) has offered opportunity to reduce bridge length by 200 m on northern side of river – to be confirmed by additional flood modelling. Horizontal alignment adjustments have been made on main bridge to simplify geometry, reduce construction complexity and to assist with drainage and water quality measures. Vertical alignment of bypass at southern end to be optimised by potential lowering of crest on South Head Road to provide proposed grade separation (no access) – most cost effective solution. Alignment at southern end allows more flexibility for four way roundabout, possibly including Donnellys Road. Mountain View Road intersection retained as is.

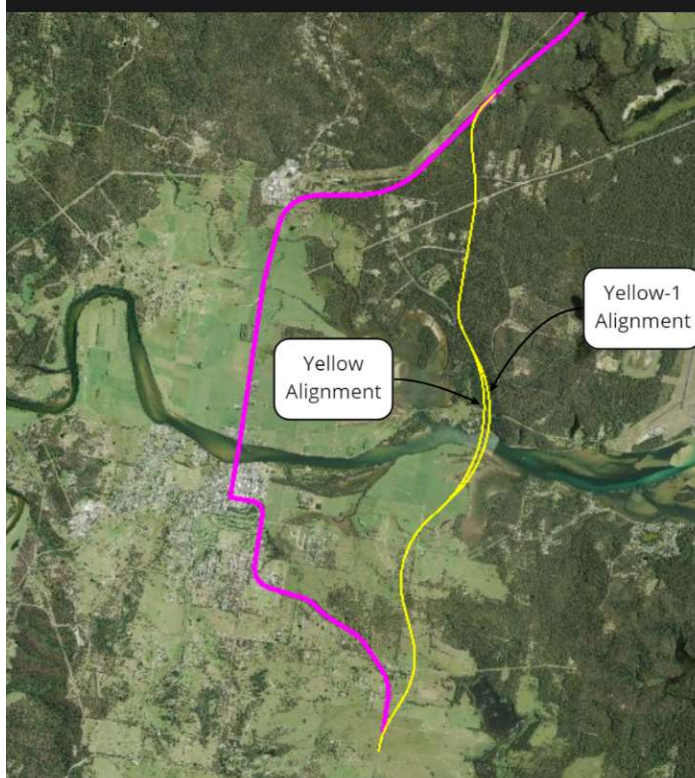
Figure 2-4 Refined corridor options (Corridor Review Workshop 20 October)



Refined Orange (Orange-1)



Refined Yellow (Yellow-1)



3.6.4 Shortlisted options – risk review

The Corridor Review workshop participants then undertook a risk review of the projects top three risks:

- Construction and flooding
- Design
- Approval pathways and environmental

Construction and flooding risks

Construction and flooding risks associated with the Moruya bypass were discussed as follows:

- The opportunity to use the fill to balance across the program.
- How to stockpile materials and use it elsewhere?
- There is quite a high residual risk with cut and fill. However, this can be mitigated/ reduced with Geotech/ survey.
- Northern section between river and Larrys Mountain Road is an area of high velocity and large depth flow. There needs to be a construction management plan.
- It would be unacceptable to have high afflux to Moruya during construction. Under contract, would have to comply with no adverse impact. This would put Purple higher in terms of risk given high velocities closer to town. There would be likely to need to dig the platform into the floodplain. High velocity flows would be a problem. This also applies to Orange. Further away, risk would be reduced.
- With Orange the structure is likely to be running parallel to the flow and create erosion and scouring?
- There is a risk of damage and work required if a flood occurs to foundations and piers, until you get above the floodplain. Purple and Orange – exposure to the risk is increased.
- Would you need to rotate the piers. Orange may be worse than Purple. This is an unknown. Skewed alignment.
- Orange and Purple was agreed to be a slightly higher risk.

Risk ranking

Following the discussion about risk, a risk ranking process was undertaken. This was done using a 'swing weighting' method. Swing weighting asks participants to indicate which criterion is the most important. This is given a nominal ranking of '100'. The participants are then asked to rank the other criteria in terms of their relative importance to the one that has scored 100. A criterion that is has close relative importance will be ranked closer to 100. A criterion that is less importance will be scored further away from 100. The swing weighting was undertaken using Menti – an online interactive means of capturing the sentiment of the group and which allows the relative scores to be seen by the group. The weighting of the criteria were then discussed and agreed to by consensus by the group.

For constructability and flooding, the question was asked: 'Which corridor has the highest residual risk in terms of construction and flooding. Overall, there was significant discussion as to the relative risk performance of Purple versus Orange, with the longitudinal flow of Orange considered to be problematic. In discussion with the group, it was agreed that the Yellow option performed the best, and the Purple and Orange options were ranked equally in terms of a poor risk performance. The relative scores and rankings are as followings:

Corridor	Risk scoring Higher score – higher risk	Risk performance 1 – best performance
Purple	100	3
Orange	100	3
Yellow	72 (average)	1

Design risk

Design risk issues associated with the Moruya bypass were discussed as follows:

- Yellow adopts an R1800 curve which is borderline for allowing 2-way crossfall on the bridge. Super elevating the curve is possible but will likely result in more frequent drainage outlets (and thereby additional treatment locations).
- The Purple alignment is very constrained with several parameters at the minimum end of the scale. There is a risk further refinement of the design may identify issues which are difficult to resolve, such as the ability for a lateral movement either east or west in the south or with the existing Princes Highway in the north. Orange and Yellow have far greater capacity to adapt to changes in the design to manage constraints not yet identified.
- Orange and Purple require long bridge structures with almost no level difference between northern and southern extents. To manage runoff from the bridge deck, and in particular to capture and treat before discharge into sensitive receivers, the design will require grades to be forced into the vertical alignment, and ideally horizontal curves large enough to allow 2-way crossfall to minimise flow widths in the shoulder requiring more frequent relief points. This has the potential to add constructability and cost risks to the bridge design and has the potential to have negative urban design (visual) outcomes.
- Yellow has the potential for the northern extent of the bridge to be sufficiently higher than the southern extent to allow north/south drainage flow on the bridge without any need for the vertical geometry changes that required for Orange and Purple.
- Vertical longitudinal grading will be challenging for all alignments traversing the flood plain. Due to the existing flat terrain and desire to keep the structure visually aligned with this terrain, the grading design will need to force up-grades and down-grades at several locations along the bridge alignment / extents.

Risk ranking

Following the discussion about risk, a risk ranking process was undertaken. For design risks, the question was asked: 'Which corridor has the highest residual risk in terms of design.'

The group unanimously considered that the Purple option had the highest risk in terms of design. Overall, there was significant discussion as to the relative risk and it was noted that Yellow would still have a high residual design risk in terms of earth works. In discussion with the group, it was agreed that the Yellow option performed the best, with Orange and Purple following in order. The relative scores and rankings are as followings:

Corridor	Risk scoring Higher score – higher risk	Risk performance 1 – best performance
Purple	100	3
Orange	67 (average)	2
Yellow	53 (average)	1

Approval pathways and environmental risks

A summary of the discussion held at the workshop around this risk was as follows:

Risk ranking

Following the discussion about risk, a risk ranking process was undertaken.

For design, the question was asked: 'Which corridor has the highest residual risk in terms of approval pathways and environmental risks'. Overall, it was agreed that yellow had highest approvals and environmental risk which may result in an EIS and longer approval time frames. In discussion with the group, it was agreed that the Orange and Purple performed the best, with Yellow representing a risk to the project.

The relative scores and rankings are as followings:

Corridor	Risk scoring Higher score – higher risk	Risk performance 1 – best performance
Purple	46 (average)	1
Orange	41 (average)	1
Yellow	100	3

Other risks and opportunities

Other risks and opportunities were raised by the group, for example maintenance requirements, the hospital site and as an opportunity, urban design. It was agreed by the group that these risks and opportunities formed a normal part of project development and did not require further discussion in order to take forward a preferred corridor.

Summary

The review concluded the following for each risk category:

Construction and Flooding

- Option Yellow was considered to have the lowest residual risk due to its shorter floodplain crossing and distance from town, which reduced the risk of flooding impacts to the town
- Option Purple and Orange were considered to have the highest residual risk due to their proximity to town, longer floodplain crossing and potential pier configurations.

Design risk

- Option Yellow was considered have to the lowest residual design risk, with Orange and Purple following in that order.

Environmental pathways and approvals:

- Options Purple and Orange were considered to have the lowest residual risk as require the same planning approval.
- Option Yellow had the highest risk due to the likelihood of requiring an Environmental Impact Statement rather than a Review of Environmental Impacts for its planning approval.

3.6.5 Reviewed the performance of the shortlisted corridor

A review of the performance of the shortlisted corridors was made to check that the design refinements had not materially affected the VMW and Technical Workshop assessment. There were no changes to the scores.

3.6.6 Value for money

A Value-for-Money review was undertaken by the group in order to recommend the preferred option. This review considered the outcomes of the VWM and Technical workshops, the updated costs and economic benefits and the risk assessment undertaken as part of the Corridor Review workshop.

Table 3-26 Corridor review workshop ranking summary

Assessment factors	Option Purple	Option Orange	Option Yellow
Values			
Safety	2	1	2
Resilience	1	1	1
Liveability	2	1	4
Sustainability	2	1	2
Accessibility and connectedness	1	4	1
Costs			

Cost factor (base cost)	1.13X	1.21X	1.0X
Economic benefits	1.2X	1.0X	1.3X
Per lane km benchmark	1.55X (6.6km)	1.31X (8.4km)	1.0X (9.1km)
Risk			
Constructability and flooding	3	3	1
Design risk	3	2	1
Planning pathways and enviro risk	1	1	3
Final ranking	3	2	1

3.6.7 Recommendation from the Corridor Review Workshop

The corridor review workshop participants recommend the Yellow corridor (with refinements mentioned above) because it is the best performing across a range of considerations, including:

- It has the lowest travel time along the Princes Highway corridor for its users
- Provides a true bypass and allows for future development of Moruya
- The bypass corridor option does not provide direct access to the Eurobodalla Regional Hospital it does make access easier compared to the existing Princes Highway.
- Performed well against the values assessment when considered in a multi-criteria process
- Is furthest from the Moruya township and provides the greatest amenity to Moruya
- It is located on higher ground and minimises risk of flooding and during construction.
- Provides value for money through the lowest estimated costs and highest estimated economic benefits. It also provides the lowest per km benchmark.

This is subject to:

- Further consideration of the retention or removal of the existing bridge.
- Further consideration of project cost
- Consideration of environmental and approval pathway risks.

3.7 Preferred Corridor Selection Workshop

3.7.1 Preferred Corridor Selection workshop – background and overview

The Preferred Corridor Selection Workshop was held on Friday 5 February 2020. The workshop brought together a range of Transport subject matter experts and technical specialists from a range of disciplines similar to the VMW.

The role of the Preferred Corridor Selection Workshop was a second corridor recommendation workshop for the Moruya bypass. The recommendation was required to be a corridor that best met the requirements of:

- Project need
- Residual risk profile for targeted risks
- Corridor performance
- Cost and benefit to create value for money

The Preferred Corridor Workshop examined whether the conclusions of the Corridor Review Workshop were still valid.

Following the Corridor Review workshop on 20 October 2020, the project team was asked to further investigate the following for the project:

- Additional flood studies, economic analysis, traffic modelling, cost estimating to provide more certainty around high risk areas
- Additional design options including low immunity, do minimum and a lower cost bypass solutions
- Additional work on the planning pathway and environmental risks

Additional field work was undertaken in late 2020 and early 2021. Temporary cameras were installed at various locations in and around Moruya to collect traffic data over the peak 2020/2021 holiday period. Geotechnical investigations and vegetation, local habitat and Aboriginal heritage studies were carried out in early 2021 to get a better understanding of the environmental, Aboriginal heritage and geotechnical conditions of the area.

At the workshop, participants:

- Reviewed the work completed to date including the outcomes of all previous workshops
- Learned about the work undertaken after the corridor review workshop including the development of lower cost options and technical investigations.
- Reviewed and assessed the performance of the shortlisted and low cost bypass options

3.7.2 Preferred Corridor Selection Workshop – outcomes

Design work undertaken after the Corridor Review Workshop

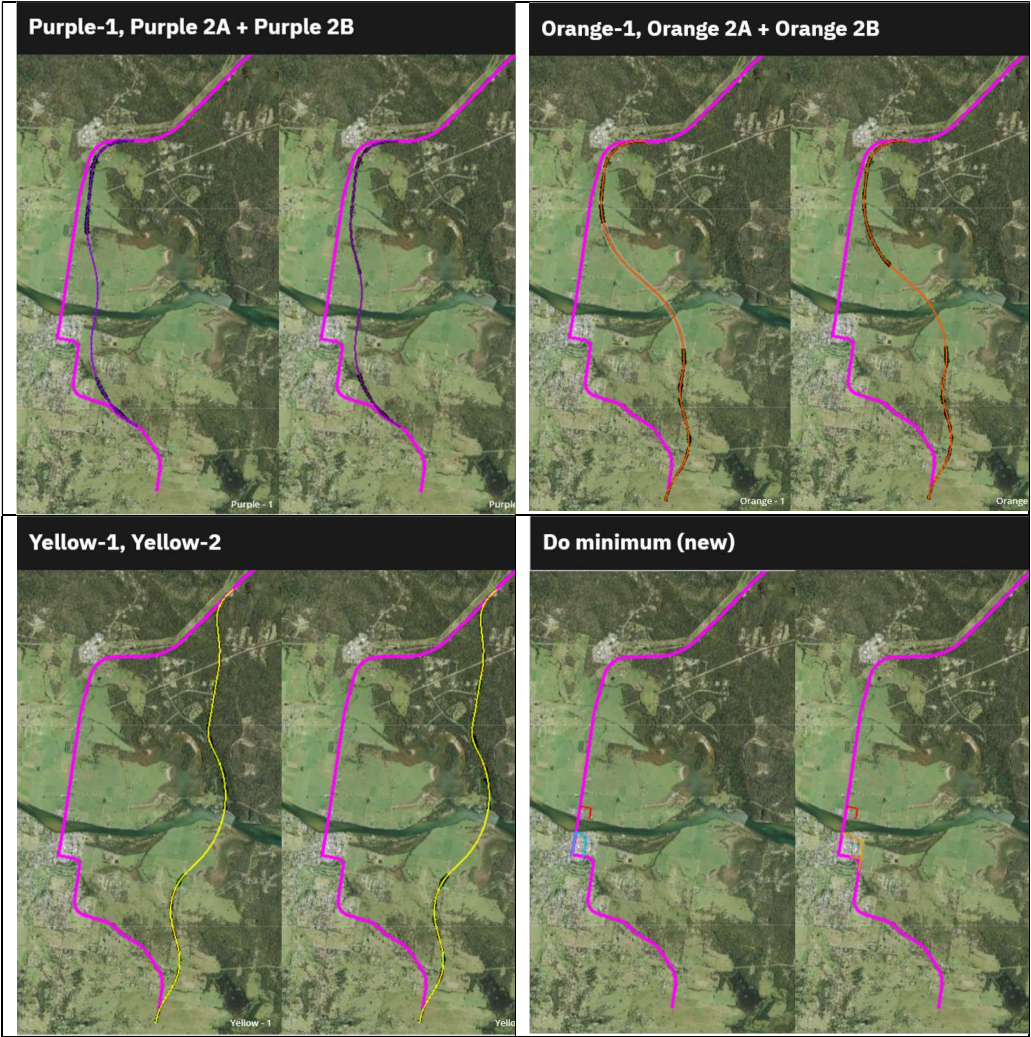
To commence the workshop, participants were provided with a recap and status of the project.

The participants then reviewed the design refinements that had been undertaken following the Corridor Review Workshop. A report-back on discussions with Health Infrastructure noted the progress of planning for that project.

The refinements to the options included a number of refinements to Options Purple, Orange and Yellow to lower cost; as well as three new options – called Do Minimum, Grey and Pink, and also included the investigation of the removal of the old bridge. In general, the lower cost options consisted of reducing the flood immunity of options Purple and Orange, noting there was limited opportunity to

lower the flood immunity of option Yellow due to the height of the bridge north of the river. Descriptions of these options are follows in Table 3-27.

Figure 3-5 Refined corridor options (Preferred Corridor Selection Workshop 5 Feb 2021)



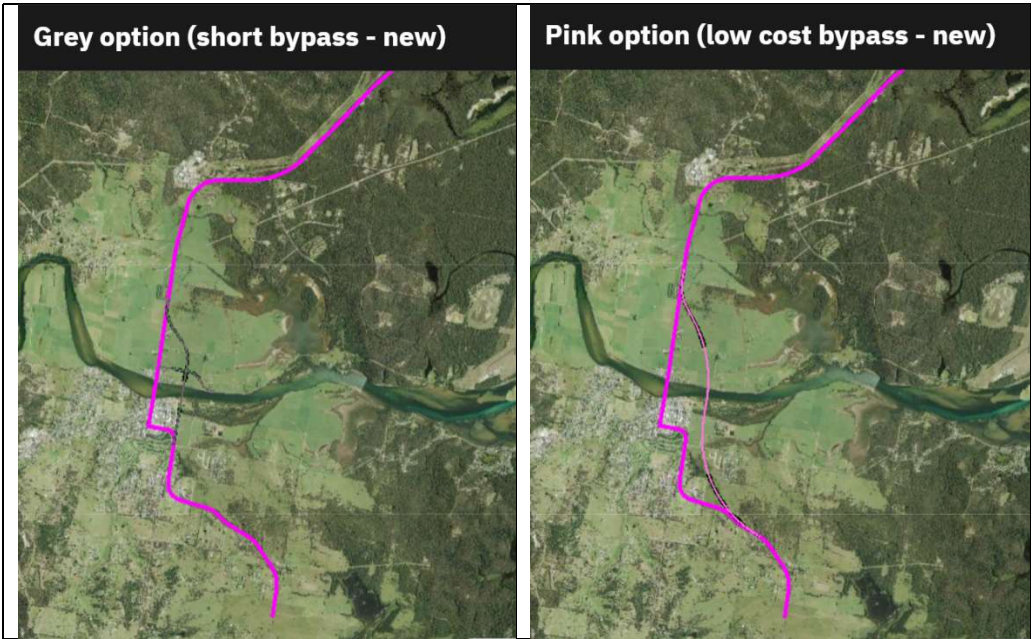


Table 3-27 Description of refined corridor options (Preferred Corridor Selection Workshop)

Long list corridor name	Shortlist corridor name	Refined corridor Key features
Option E	Option Purple	<p>Purple – 1</p> <ul style="list-style-type: none">• Full 1% AEP immunity with optimum bridge length 2.9 km <p>Purple – 2A</p> <ul style="list-style-type: none">• Full 1% AEP immunity with reduced bridge length at 2.0 km <p>Purple – 2B</p> <ul style="list-style-type: none">• As per 2A but with 5% AEP immunity on (lower) northern floodplain embankment
Option G	Option Orange	<p>Orange – 1</p> <ul style="list-style-type: none">• Full 1% AEP immunity with optimum bridge length 2.9 km <p>Orange – 2A</p> <ul style="list-style-type: none">• Full 1% AEP immunity with reduced bridge length at 2.0 km <p>Orange – 2B</p> <ul style="list-style-type: none">• As per 2A but with 5% AEP immunity on (lower) northern floodplain embankment <p>Note: All Orange options should now include an overpass (no connection) at South Head Road</p>

Option H-I	Option Yellow	<p>Yellow – 1</p> <ul style="list-style-type: none"> Full 1% AEP immunity with optimum bridge length 1.58 km <p>Yellow – 2</p> <ul style="list-style-type: none"> Full 1% AEP immunity with slightly reduced bridge length and grade separation at South Head Road. <p>Note: All Yellow options should now include an overpass (no connection) at South Head Road</p>
Option D	NA	<p>DO MINIMUM</p> <p>DM0</p> <ul style="list-style-type: none"> Do minimum 0 is a minor intersection treatment to address efficiency issues at North Head Drive and Princes Highway intersection. Relocate North Head Road intersection to existing Toose Street intersection to eliminate northbound queueing on existing bridge. <p>DM1</p> <ul style="list-style-type: none"> Do minimum 1 comprises minor intersection upgrades along the Princes Highway to improve traffic efficiency within Moruya town centre. It would upgrade existing Princes Highway intersections on Vulcan Street to improve highway capacity and reduce delays – includes potential alternative route for light vehicles only. <p>DM2</p> <ul style="list-style-type: none"> Do minimum 2 is an internal town bypass connecting to Shore Street, Church Street and John Street from the existing bridge to the Princes Highway north of South Head Road. It would provide new network links connecting Shore Street, Church Street and John Street to the existing Princes Highway – potential for this internal town route to be adopted as a levee for short term flood relief and protection from future bypass construction.

New	New	<p>OPTION GREY</p> <ul style="list-style-type: none"> • Option Grey is a short bypass option which left the Princes Highway south of Larrys Mountain Road, crossing the river in line with the John Street road corridor before connecting with the Princes Highway north of South Head Road. • Short bypass aligns with John Street road corridor on the eastern edge of the town centre. • Substantially lower flood immunity – less than 5%. • Much shorter bridge at 430 m; comparable to the existing Moruya River bridge. • Overall bypass as arterial connection with multiple at grade intersections – North Head Road, Queen St, Campbell St. • Northern connection south of Larrys Mountain Road – about 2.5 km of existing highway retained. • Southern connection along John Street, re-joins existing highway north of Murray Street / South Head Road intersection.
New	New	<p>OPTION PINK</p> <ul style="list-style-type: none"> • Option Pink is a shorter version of option Purple, leaving the existing Princes Highway south of Larrys Mountain Road. • Medium bypass aligns with Purple – 2 over 2 km length of the bridge. • Substantially lower flood immunity – less than 5%. • Northern connection south of Larrys Mountain Road – about 2 km of existing highway retained. • Southern connection identical to Purple.
New	New	<p>Old Bridge removal option</p> <ul style="list-style-type: none"> • The only option that can facilitate this scenario is Grey. • The closest other option (Purple / Pink) would require major on structure intersections for Queen St and South Head Rd. • All other options would require substantial east-west connections and new intersections – major traffic inefficiencies • Estimated to cost \$4000-\$7500/m2 to demolish or \$13.0M to \$25.6M • Additional infrastructure to support efficient traffic flow: • Pink/Purple – 2 major interchanges

3.7.3 Project costs

The workshop participants reviewed the preliminary project costs and cost drivers.

Table 2-28 Preliminary project costs comparison

Assessment factors	Option Purple-1	Option Purple-2	Option Purple-3
Cost (P90, \$2020)	\$■	\$■	\$■
NPB	\$■	\$■	\$■
BCR	■	■	■
	Option Orange-1	Option Orange-2	Option Orange-3
Cost (P90, \$2020)	\$■	\$■	\$■
NPB	\$■	\$■	\$■
BCR	■	■	■
	Option Yellow-1	Option Yellow-2	
Cost (P90, \$2020)	\$■	\$■	
NPB	\$■	\$■	
BCR	■	■	
	DM0 + DM1	DM0 + DM2	
Cost (P90, \$2020)	\$■ - \$■	\$■ - \$■	
NPB	\$■	\$■	
BCR	■	■	
	Option Grey	Option Pink	
Cost (P90, \$2020)	\$■	\$■	
NPB	\$■	\$■	
BCR	■	■	

Notes from this session were as follows:

- Lowering the resilience and flood immunity of the options reduces benefits by \$10M.
- Discussion was held around the need to demolish the old bridge. It was noted that the rate for demolition is about the same rate as building a new bridge. Utilities on the old bridge would need to be relocated.
- It was noted that road user benefits are the primary drivers. Shorter bypasses generate greater flows as locals use them. Longer bypasses do not provide

local benefits to the same extent. Do min options also generate substantial benefits, especially DM01. Local intersections will fail in the future which generates travel time benefit. There is \$100M of cost associated with flooding. \$15M associated with travel time delay. About \$100M relates to flood resilient access to the proposed hospital.

- There are several thousand critical emergency arrivals. If this coincides with road closure, this is associated with loss of life.

3.7.4 Review of assessed and new corridors

Following the presentations on technical and design work undertaken since the Corridor Review Workshop, the group considered the previously assessed and new corridors.

3.7.5 Recommendation

The workshop was not definitive on reaching a consensus on the preferred strategic bypass corridor option it due to a number of differing views by workshop participants, in particular:

- Option Yellow was preferred by some participants due to its cost.
- However, there was also greater value placed on organisational sustainability outcomes such as Transport' s Environment and Sustainability Policy. The highest environmental impacts and planning approval risks are associated Option Yellow.
- Option Orange was preferred by some participants due to the way it meets overall objectives and its performance at the VMW.
- Options Pink and Purple were preferred by some participants because of the potential opportunities to stage a hybrid of options.

While the final recommendation was Option Yellow, this was subject to the following requirements to:

- Gauge the appetite internally for reserving a corridor and progressing with interim works.
- Consult with participants to understand and resolve the weaknesses of Option Yellow.

3.8 Preferred Strategic Corridor Decision

A number of inputs were considered in the decision for a preferred strategic corridor for the Moruya bypass. No one part of the process is stand-alone in making this decision. All are considered in determining which option, on balance, provides the best balance across all values to provide Value for Money.

Inputs to reaching a recommended preferred strategic corridor include:

- Community engagement and input
- VMW
- Technical workshop
- Cost and value for money

- Technical investigations
- Risk
- Transport and Ministerial approval

For Moruya bypass, while the Yellow option was recommended by the project team as the preferred corridor, a number of other factors were taken into consideration. This included the outcome of the VMW and the technical, economic, constructability, flooding, environmental and risk studies held both before and after the VMW.

Acknowledging that cost was a significant driver for the recommendation of Yellow, it was also acknowledged that the Orange option performed consistently higher in terms of meeting project values.

With the cost of the Orange option accepted, Orange corridor was selected because the corridor overall outperformed all other options in terms of meeting the project objectives and the wider Princes Highway upgrade roadmap goals, and because the risks raised during the VMW and Corridor Review workshops have been shown to be able to be planned for, managed and mitigated through ongoing design processes.

Preferred strategic corridor

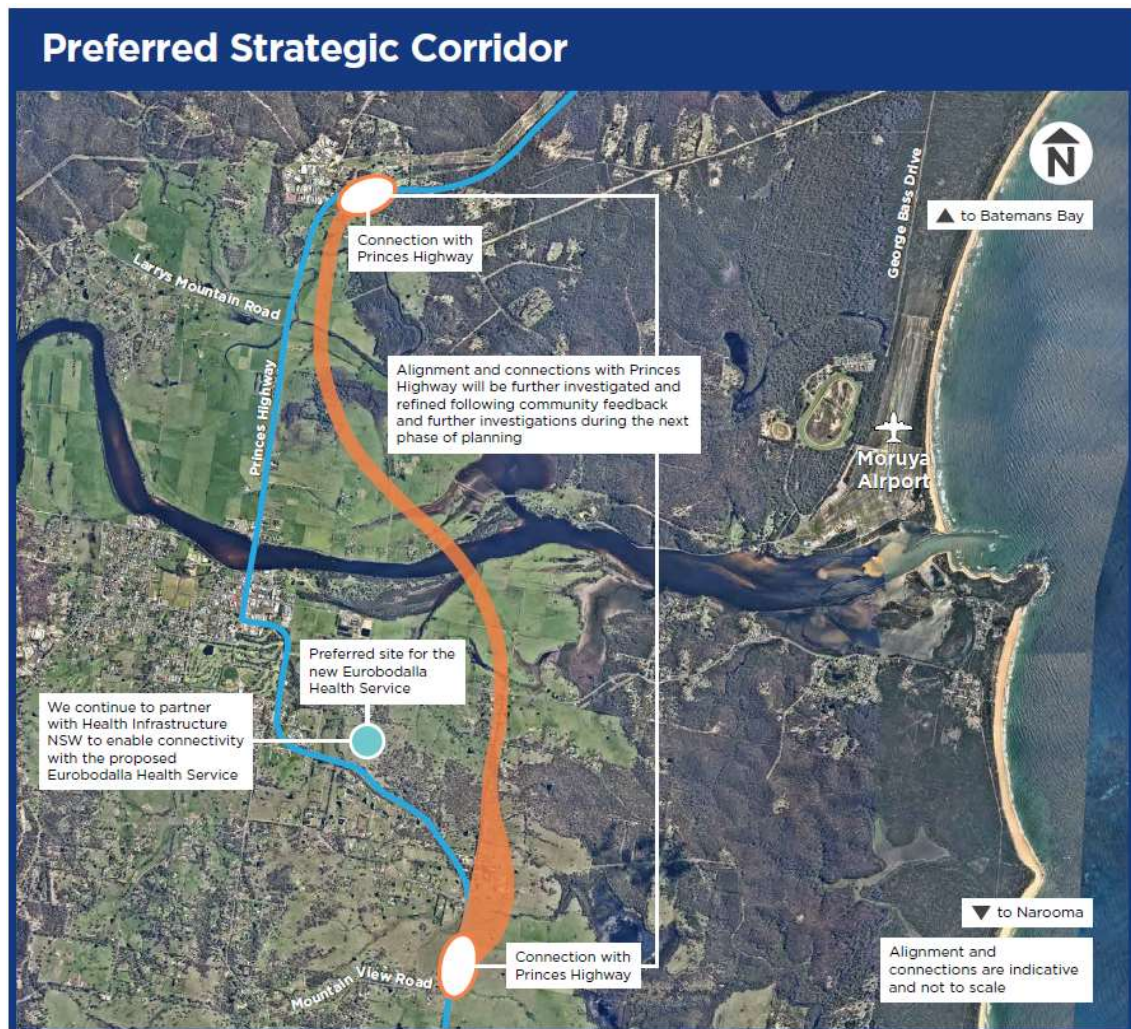
The preferred strategic bypass corridor (Orange corridor) is around 8 kilometres in length, starting near Shelley Road, running parallel and to the east of the existing highway to the Larrys Mountain Road intersection.

From Larrys Mountain Road, the corridor veers further east with a new bridge crossing of the floodplain and Moruya River about 2 kilometres east of the existing bridge. South of the Moruya River, the preferred strategic corridor crosses over South Head Road and continues south to re-join the existing highway.

The preferred strategic corridor would provide connections to the local traffic network at the northern end of the corridor near the North Moruya Industrial Estate and southern end near Mountain View Road.

It would also improve travel time and accessibility to the proposed Eurobodalla Regional Hospital, maintaining connectivity during flood events. The southern extent of the corridor is shown as a wider corridor as the connection to the Princes Highway and Eurobodalla Regional Hospital are still to be determined. Transport is continuing to partner with NSW Health Infrastructure as plans for the new Eurobodalla Regional Hospital progress.

Figure 3-6 Preferred Strategic Corridor



The benefits of the preferred strategic corridor are as follows:

- **Safety:** while all the options would improve safety, the technical studies found that the preferred strategic bypass corridor provided significant safety improvements to the existing network and within the township.
- **Resilience:** the preferred bypass corridor would improve the flood immunity of the highway and has a lower bushfire risk associated with it. It has a positive impact on emergency route management and resilience by providing an additional crossing of the Moruya River. It would improve accessibility during emergency events.
- **Liveability:** the main performance area of the Orange option was seen to be in terms of liveability – the removal of trucks and through traffic from the Moruya township would improve amenity and mode shift, opening up future planning and possibilities for Moruya for transport choice and as a place and destination. The distance of the preferred strategic corridor from the Moruya township means that potential noise impacts would be minimised and the corridor would allow for future growth of the town, while still providing connections to key destinations. It would not divide the town or affect

important social infrastructure such the riverfront parks and supports existing and planned active transport networks.

- **Sustainability:** the preferred strategic corridor avoids the bushland areas in the eastern parts of the study area, particularly north of the Moruya River, but does impact terrestrial ecology including TEC's. While there are potential impacts to other biodiversity values and Aboriginal heritage sites, these impacts would be minimised through ongoing design and investigations. In terms of economic sustainability, lower traffic volumes in the town centre provides the opportunity for enhanced amenity, including improvements streetscapes, town entrances and community facilities as a means to improve economic sustainability, visitor and investment attraction. The proximity of the corridor to Moruya and the northern industrial area was also valued highly.
- **Connectivity and accessibility:** The preferred strategic corridor on balance improves congestion and journey reliability in town and reduces travel time on the Princes Highway while maintaining good connections to Moruya and the planned Eurobodalla Regional Hospital.

Appendix A – Workshop Attendance

Princes Highway Upgrade Programme - Moruya Bypass Strategic Investigation and Design									
Workshops attendance and participation register									
Participant	Organisation	Objectives workshop	Options workshop	Key result indicators	Pre Value Management	Value Management	Post Value Management	Technical Review workshop	Preferred Corridor workshop
Transport for NSW									
Aaron Monger	Transport		Yes				Yes	Yes	Yes
Adam Gray	Transport								Yes
Andrew Destry	Transport					Yes	Yes	Yes	
Cameron McKinnon	Transport			Yes					Yes
Chris Millett	Transport								Yes
Colin Gould	Transport	Yes				Yes	Yes	Yes	Yes
Dan McClure	Transport	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Daniel Horan	Transport					Yes	Yes	Yes	Yes
David Norman	Transport	Yes	Yes			Yes	Yes	Yes	Yes
Dan Rushman	Transport	Yes	Yes	Yes		Yes			Yes
Dony Castro	Transport								Yes
Deon Voyer	Transport					Yes			
Erika Garbayo	Transport								Yes
Fiona Mclauchlan	Transport					Yes			Yes
Graham Roche	Transport			Yes		Yes	Yes	Yes	
Ian Archer	Transport					Yes			Yes
Jesse Baaner	Transport					Yes			
Jesse Fogg	Transport			Yes		Yes			Yes
Joanne Parrott	Transport								Yes
Joseph Le	Transport								Yes
Julian Watson	Transport			Yes		Yes	Yes	Yes	Yes
Julie Lacy	Transport		Yes	Yes		Yes	Yes	Yes	Yes
Kristian Pinochet	Transport	Yes							
Malcolm Hill	Transport							Yes	Yes
Marc Desmond	Transport								Yes
Maribel Servillon	Transport								Yes
Mark Keulen	Transport					Yes			
Martin Cocca	Transport								Yes
Michelle French	Transport					Yes			Yes
Michelle Toms	Transport			Yes		Yes	Yes	Yes	Yes
Nadira Yapa	Transport					Yes		Yes	
Paul Vecovski	Transport		Yes			Yes	Yes	Yes	Yes
Rajanthi Ravindra	Transport							Yes	
Rodger Wall	Transport					Yes			Yes
Simon Mahy	Transport	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Scott Fayars	Transport		Yes					Yes	Yes
Steve Arnold	Transport								Yes
Stephen Lum	Transport		Yes				Yes	Yes	Yes
Syed Nowmani	Transport							Yes	Yes
NSW Government Stakeholders									
Norm Lenehan	DPI					Yes			
Raymond Laine	DPIE					Yes			
Matthew Malone	Health Infrastructure					Yes			
NSW Government Services									
Gregory Flood	NSW Police					Yes			
Steve Owen	NSW Ambulance					Yes			
Community Stakeholders									
Stuart Scobie	Moruya business chamber					Yes			
Warren Sharpe	Eurobodalla SC					Yes			
Carlyle Ginger	Eurobodalla SC					Yes			
Lindsay Usher	Eurobodalla SC					Yes			
Arup project team									
Kavan Illangakoon	Arup		Yes						
Nathan Cheah	Arup		Yes						
Aashel Karan	Arup		Yes						
Adrian Wiggins	Arup	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Andrew Spinks	Arup			Yes					
Ashling Callan	Arup		Yes		Yes	Yes			
Barry Hancock	Arup		Yes	Yes	Yes		Yes	Yes	Yes
Diana Loges	Arup	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emma Davies	Arup					Yes			
Hugo Nichols	Arup							Yes	
Jade Chen	Arup							Yes	Yes
Jennifer Drummond	Arup	Yes	Yes	Yes	Yes	Yes	Yes		
Kathryn Nation	Arup								Yes
Lauren Elvidge	Arup		Yes			Yes			
Marlo Yu	Arup		Yes						
Mitch Lee	Arup	Yes							
Suan Guo	Arup		Yes						
Rhelm									
Louise Collier	Rhelm								Yes
Rhys Thomson	Rhelm		Yes			Yes			Yes
Leo Drynan	Rhelm								Yes
Joel Fraleigh	Rhelm		Yes			Yes			
North Projects									
James Durney	North Projects		Yes						
Lee Mullins	North Projects		Yes						
Michael James	North Projects		Yes			Yes			
Ranbury									
Ed Brown	Ranbury			Yes		Yes		Yes	Yes
David Lee	Ranbury		Yes						

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