



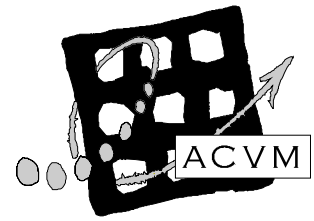
**PRINCES HIGHWAY UPGRADE**

**GERRINGONG TO BOMADERRY**

**VALUE MANAGEMENT WORKSHOP**

Workshop report

May 2008



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## Executive summary

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### Overview of the project

The Princes Highway is the main road link from Sydney and the Illawarra region to the Shoalhaven, south and far south coast of NSW and north-eastern Victoria. The Princes Highway is:

- A major tourist route with peak traffic in holiday periods, particularly in summer.
- A link for local industry and agriculture.
- A link to services in Nowra for residents of the surrounding smaller towns.
- A commuter route to Nowra, the Illawarra and metropolitan Sydney.
- A freight and bus route, particularly for the south and far south coast of NSW and north-eastern Victoria where there are no rail services.

Due to significant changes in land use and population and a review of planning, traffic and safety conditions, the NSW Government has committed to upgrade the Princes Highway between Gerringong and Bomaderry. The proposed upgrade will include a bypass of Berry.

This part of the highway is approximately 30 kilometres in length and serves as part of the local and regional road network. The traffic on this section of road is a mix of heavy and light vehicles. The highway is currently a two-lane single carriageway with occasional overtaking opportunities. In many locations it does not meet current design standards.

The existing highway passes through or near a number of communities and through the main street of Berry township. As vehicle volumes and the number of heavy vehicles have increased, the potential for conflicts between highway and local traffic has increased.

Without upgrading the highway in this Gerringong to Bomaderry area, it is likely the number of crashes and traffic delays would increase as traffic volumes increase. The existing highway in this area would not meet the aims of the NSW Government nor the community needs for improved local access, safety, traffic efficiency and capacity.

In 2006 the Roads and Traffic Authority (RTA) commissioned Maunsell to undertake route option investigation, preferred route selection processes and concept development within the nominated study area (see **Figure 1**).

The aim in selecting a preferred route is to meet current and future transport needs for the highway whilst balancing social, environmental, functional, economic and cost factors.

To assist in consideration of options the study area was divided into four sections. The sections are:

- Section A – Mount Pleasant to south Gerringong.
- Section B – South Gerringong to north Berry.
- Section C – Berry township.
- Section D – South Berry to Bomaderry.

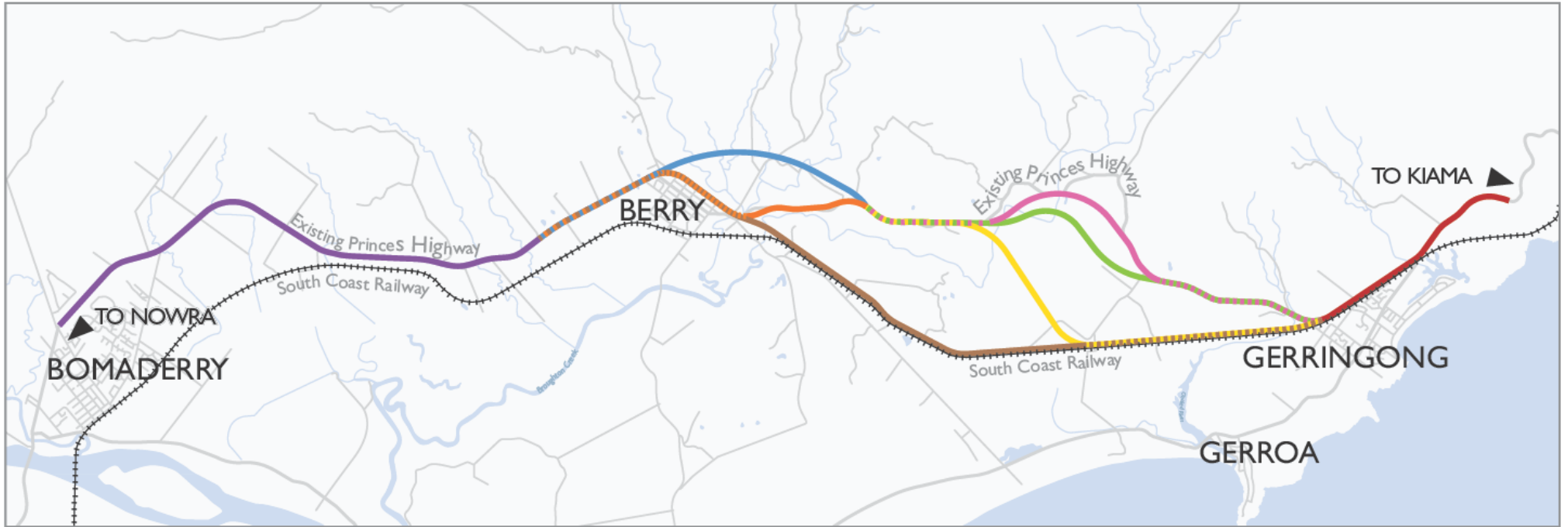
A large number of route options were investigated within the study area. As a result, a short list of seven route options for the upgrade of the highway was placed on public display in November 2007 with public submissions being sought.

The route options placed on public display are identified as:

- Section A – One option was short-listed: Red Route.
- Section B – Three options were short-listed: Pink Route, Green Route and Yellow Route.
- Section C – Two options were short-listed: Blue Route and Orange Route.
- Section B /C – One option, which runs along the existing rail line for these Sections, was short-listed: Brown Route.
- Section D – One option was short-listed: Purple Route.

Combinations of the Pink, Green and Yellow routes in Section B with the Blue and Orange routes in Section C form six of the short-listed options. The Brown Route traversing Section B and C provides a seventh option. Refer to **Figure 1** for route colours.

Figure 1 – Short-listed options displayed for public comment` (source: Maunsell)



This value management workshop (VMW) was undertaken after the route options display period. The workshop was chosen as an appropriate process to bring together a wide range of stakeholder interests and expertise to review the outcomes of investigations undertaken to date and, on the balance of issues and consideration of the options against agreed assessment criteria, to recommend a direction for further investigation to progress the project's development.

The value management workshop is one input into the process of finally determining the preferred route for the project.

The Australian Centre for Value Management (ACVM) was commissioned to facilitate and report on the workshop which was held in Gerringong on 14, 15 and 16 May 2008. A list of participants who attended the workshop can be found in **Appendix 1**.

## Workshop objectives

The purpose of the workshop, as presented to the participants, was ***“To obtain a common understanding of the project and its objectives, review the work undertaken to date and to recommend a preferred direction, if appropriate, so as to progress the project to the next stage of development.”***

The workshop objectives to achieve this were stated as:

- Clarify the objectives of the project.
- Examine the short-listed options developed to meet the project objectives.
- Recommend a preferred direction to the RTA to progress the project.

This report has been compiled by ACVM and seeks to provide an objective overview of the project aspects dealt with and the conclusions formulated by the end of the workshop.

## Workshop activities

A 'Welcome to Country' was provided by Gwenda Jarrett of the local Yuin-Wandandian nation. Dootch Kennedy, one of the workshop participants, then repeated the welcome in his local language.

The workshop process builds on the various perspectives of the workshop participants, and on the detailed and specialist knowledge of each.

There were three main activities or processes associated with this value management workshop. These are detailed later in this report, and were:

- Review of information.
- Development of assessment criteria.
- Evaluation of options.

### The review of information included the following:

- Background papers were issued to value management workshop participants prior to the workshop.
- A bus tour of the study area was held on the morning of 14 May 2008 for participants to gain a detailed understanding of the options, localities and issues.
- A number of presentations relating to the project were made to commence the workshop. Additional data and information was provided and/or presented as required throughout the workshop.
- The various stakeholders identified what was most important to them about the Princes Highway upgrade project between Gerringong and Bomaderry.
- The problems with the existing highway and the project objectives were reviewed.
- The assumptions that have been made were identified and the opportunity to challenge each of them was provided.

### The development of assessment criteria included the following:

- Assessment criteria were developed and weighted under three key themes/perspectives:
  - Functional.
  - Socio-economic.
  - Natural and cultural environment.

These were based on the list of what participants valued as most important as well as the project objectives for the highway upgrade.

The evaluation of options process reviewed the various possible combinations of route options against each of the criteria developed by the workshop group.

The workshop group undertook the evaluation process in five phases, being:

- **Phase 1:** The single routes for Section A (Red) and Section D (Purple) were described in words, plans and computer animations. The group divided into four focus groups – two to focus on issues and fatal flaws for the Red Route and two for the Purple Route.
- **Phase 2:** Three focus groups were formed, one for each of the criteria themes: functional; socio-economic; and natural and cultural environment. Each focus group assessed how the options performed in a relative sense against each of the weighted criteria for the various routes in Section B (Pink, Green and Yellow) and then Section C (Blue, Orange or modified Orange). – **see notes on the Blue Route and the 'modified Orange' below.** The Brown Route was not discussed in this phase of the assessment because it traversed both Sections B and C.
- **Phase 3:** Phase 2 produced two options to be reviewed against the Brown Route – Pink/modified Orange and Green/modified Orange. The three criteria focused groups then conducted an assessment across the three options: Pink/modified Orange, Green/modified Orange, and Brown.
- **Phase 4:** The assessments against each of the three criteria groups were collated and each focus group ranked the three routes from 1 to 3 where possible. Strategic costs were then presented and discussed. The workshop group as a whole were then in a position to draw conclusions from the overall assessment which included the strategic cost estimates and benefit/cost ratios.
- **Phase 5:** The workshop group reached a consensus on which routes and options should progress and what conditions should apply to their assessments. They also recommended a clear direction and way forward for the project.

#### **Note on modified Orange Route**

*The value management workshop scope was aligned to the short-listed options which were placed on public exhibition in November 2007. Discussion followed regarding a modification to the Orange Route that would avoid/minimise cultural and social impacts. This had been considered by the project team previously as a permutation of the Orange Route. It had also been proposed by several respondents during the route options display period. It was decided that there was a risk of a viable option being assessed and lost if the modification was not considered in this value management workshop.*

*The Orange Route has attracted considerable concern from the community in relation to how it impacts the David Berry Hospital and a number of non-Indigenous heritage places and archaeological sites at the north end of the Berry township in the Pulman Street and Tannery Road European heritage precinct. There is also a considerable impact on the Sportsground and the Camp Quality Memorial park.*

*The modified Orange Route turns west of the existing highway immediately north of Berry, at the RTA stockpile site, crossing Broughton Mill Creek and Woodhill Mountain Road. The route skirts the northern side of the playing fields and rejoins the North Street corridor approximately halfway along its length.*

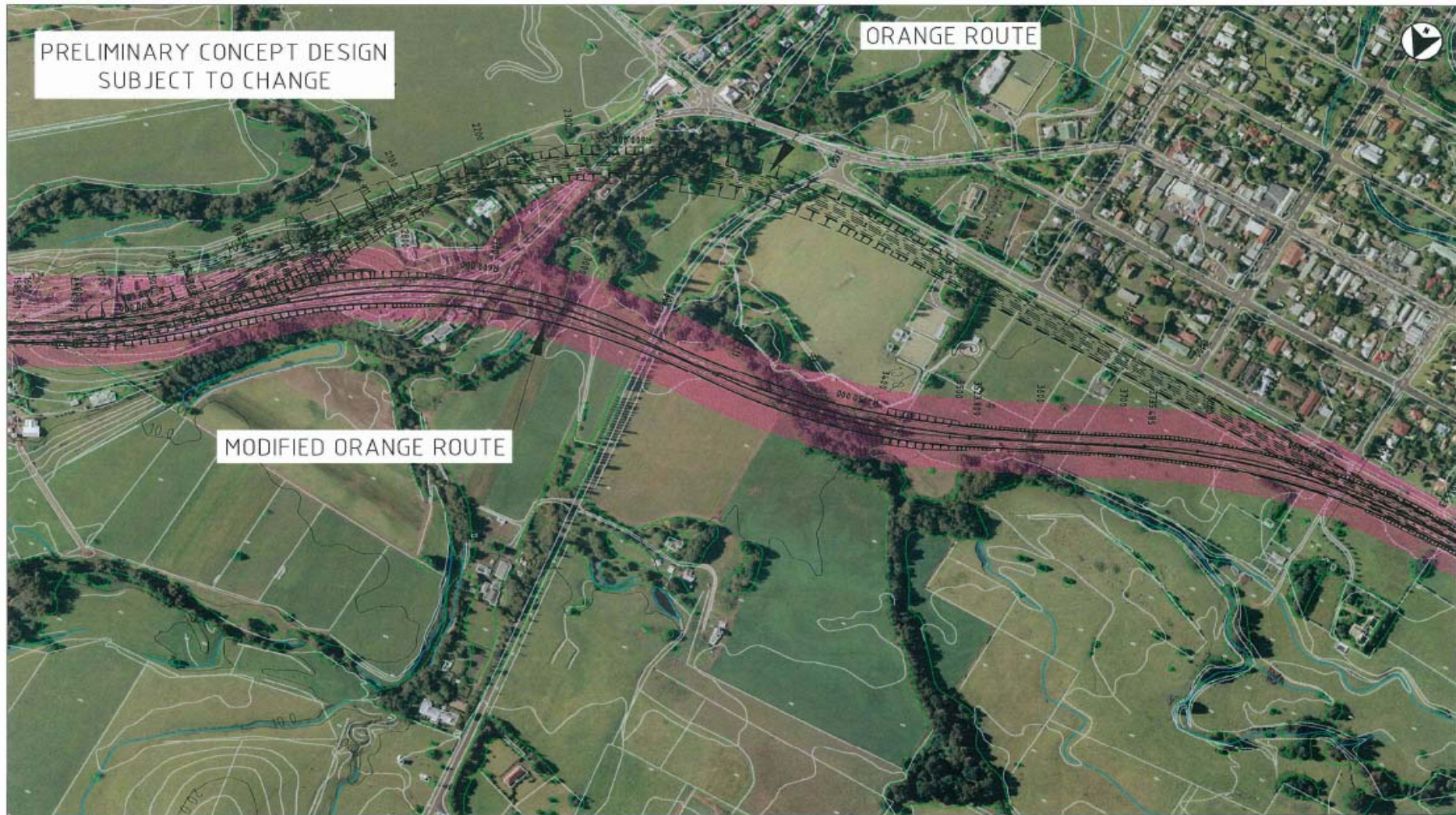
*Based on this advice, the value management workshop group agreed to add the modified Orange Route to the assessment process together with the Orange Route. Refer to **Figure 2** for modified Orange Route.*

#### **Note on the Blue Route**

*During the value management workshop the project team presented a 3D computer animated 'drive-through' and a 'fly-through' of each route. Although the planning has not reached the level of resolution to determine how intersections between the routes and local roads would be resolved, assumptions had to be made to enable the computer generated fly-through to be completed. On the Blue Route fly-through it showed the new works passing over the local road, eg at Woodhill Mountain Road. This meant the Blue Route level was relatively high in the landscape. The group discussed this and it was agreed that for the evaluation process, the Blue Route option assessed in the value management workshop would have the local roads passing over the top of the Blue Route resulting in a much lower alignment of that route.*



Figure 2 – Modified Orange Route (source: Maunsell)



NOT TO SCALE



## Summary of workshop outputs

By the end of the workshop, the participants had:

- **Confirmed** the objectives for the Princes Highway upgrade between Gerringong and Bomaderry, which reflect what the project must do to be successful in achieving its purpose, and agreed that the achievement of those objectives would address the problems being experienced along this part of the highway. The project objectives are to:
  - Improve road safety.
  - Improve efficiency of the Princes Highway: Gerringong – Bomaderry.
  - Support regional and local economic development.
  - Provide value for money.
  - Enhance potential beneficial environmental effects and manage potential adverse environmental impacts.
  - Optimise the benefits and minimise adverse impacts on local social environment.
- **Identified** what was *most important* about the project to each of the stakeholder participants in the value management workshop.
- **Identified** assumptions being made about the project from various perspectives and assessed whether it was safe to proceed with planning based on these assumptions or whether they needed to be resolved as planning proceeded.
- **Identified** and **weighted** assessment criteria under three key perspectives (functional; socio-economic; and natural and cultural environment) based on what participants considered most important and the highway upgrade project objectives. These were developed for use in the assessment of the short-listed routes and subsequently their various combinations. The criteria agreed for weighting were:
  1. **Functional perspective**
    - A. Route length, grade efficiency, travel time, vehicle operating cost.
    - B. Potential for delays for traffic during construction.
    - C. Constructability and ease of construction.
    - D. Minimise number of accesses (controlled and direct).
    - E. Vertical and horizontal alignment – including orientation.
    - F. Overall network safety – new and residual roads.
  2. **Socio-economic perspective**
    - A. Minimise impact on agricultural lands and business – areas, classes, numbers and severance.
    - B. Loss of residences in communities – consequential viability of communities.
    - C. Connectivity and accessibility impacts for communities.
    - D. Impact on views, from communities, of road.
    - E. Road traveller experience and “wow” factor impacts.
    - F. Impact on community facilities/amenity service.
    - G. Impacts on non-agricultural businesses.
  3. **Natural and cultural environment perspective**
    - A. Impact on threatened species.
    - B. Impact on endangered ecological communities.
    - C. Impact on habitats and wildlife corridors.
    - D. Impacts on wetlands and catchments of wetlands.
    - E. Impact on Indigenous heritage.
    - F. Impact on non-Indigenous heritage.
    - G. Impact on surface water quality.
    - H. Assessment of carbon footprint size.
    - I. Noise impacts.
    - J. Potential to change flooding characteristics.
    - K. Impact on ground water.
    - L. Climate change impact/vulnerability.
- **Reviewed single route options in Section A and Section D**, raised issues and confirmed that there were no fatal flaws in those route options – ie the Red Route and the Purple Route.
- **Assessed** and **comparatively ranked** the alternative routes within Section B and Section C in order to build a further, shorter list of ‘complete’ options.

- **Drawn** the following conclusions from the assessment of alternative routes within Section B and Section C:
  - In Section B remove the Yellow Route from further evaluation because of its relatively poor performance when assessed against the Pink Route and Green Route under the functional and socio-economic criteria. In addition it had the highest capital cost, by a substantial degree, compared to the Pink and Green Routes.
  - In Section C remove the Orange Route from further evaluation (assuming confirmation of the feasibility of the modified Orange Route is assured – see **Figure 2**) because it performs poorly against socio-economic and natural and cultural environment criteria when compared to modified Orange Route.
  - In Section C remove the Blue Route from further evaluation because it performs significantly worse against socio-economic and natural and cultural environment criteria when compared to both the modified Orange Route and the Orange Route.
- **Agreed** on a number of further short-listed, “complete” options for evaluation over Sections B and C of the study area. These were agreed as:
  - Pink/modified Orange option.
  - Green/modified Orange option.
  - Brown option.
- **Assessed** these three ‘complete’ options using the assessment criteria and ranked the performance of each option. Strategic cost estimates and benefit cost ratios for each option were also compared.
- **Concluded** the following as a result of undertaking the assessment:
  - The Pink/modified Orange and the Green/modified Orange Routes were unanimously recommended by the workshop group to move forward to the next stage of development, subject to the issues raised and documented in the workshop being addressed.
  - The Red Route in Section A and the Purple Route in Section D are appropriate to move forward to the next stage of development, with no fatal flaws identified.
  - The Blue Route in Section C should not be further pursued on socio-economic and environmental impact grounds particularly the impact on agricultural land.
  - The Yellow Route in Section B should not be further pursued as the other routes in Section B were seen to be more superior socio-economically and on cost benefit grounds.
  - The Brown Route in Sections B and C should not be further pursued as it was seen to be deficient on environmental, constructability, functionality, socio-economic grounds and left a considerable residue of existing highway which will continue to have safety problems.
  - The modified Orange Route in Section C provides heritage, geometric and socio-economic benefits and should be further pursued (in lieu of Orange Route) subject to proving its feasibility.
  - Further work is required to address the access arrangements on the project eg, access to properties, to Berry, to Gerringong, etc.
- **Identified** a number of issues which need to be resolved as planning proceeds. These were recorded for the benefit of the project team follow-up.
- **Understood** an outline of the process and direction for the project to move forward from here. Key points raised about the next steps in the process included:
  - Make a recommendation that the Red Route in Section A and the Purple Route in Section D form part of the preferred route option.
  - Acknowledge the acceptance/agreement of assessment criteria.
  - Have the findings communicated to community participant nominees and produce a community update.
  - Review the findings of the route option selection peer review and determine follow-up actions (if any).
  - Carry out further actions identified at this value management workshop including:
    - Confirm the feasibility of the modified Orange Route.
    - Refine the cost data for Pink and Green Routes.
    - Review the grade on the Pink and Green Routes south of Belinda Street – *refer post-value management workshop note from the project team on page 52.*
  - Acknowledge acceptance of the findings and conclusions of the value management workshop.
  - Develop list of design refinements/value engineering aspects including:
    - Minimising severance/avoiding dwellings.
    - Careful consideration of North Street/Kangaroo Valley Road impact, solution and mitigation (eg. residents, urban design).
  - Immediately notify the potentially directly affected landowners on the modified Orange Route.

## Project information and analysis

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The information presented in this section of the report is a consolidation of the general inputs and activities of the workshop group as they shared information about the Princes Highway upgrade, Gerringong to Bomaderry, which allowed them to later make comparisons of options based on the analysis of what the project needs to achieve.

### RTA welcome

Jay Stricker, RTA's Southern Region Manager welcomed everyone and thanked the community participants, Council representatives and other agency representatives for committing the time and effort required of this exercise.

The Gerringong to Bomaderry upgrade project is big by any measure; it is approximately 30 kilometres in length; there are many people impacted by the planning, the route options and eventually the construction process.

This upgrade is seen as being very important because of two principal aspects: road safety and economic development.

It is important to understand that the value management workshop is not the determinant for a preferred option. It is, however, an important step and provides key input because the outputs will be a preferred direction and/or framework to allow the project to progress towards a preferred option. In this sort and scale of project it is not unusual to have a number of value management studies. Later we will be convening a value management workshop on the Gerringong interchange.

Currently there is also a peer review in progress to review the processes for dispensing with options and selecting the current short list of options. This has arisen from concerns within the community that a southern bypass of Berry does not remain in the current short-list. The outputs from that review will be taken into account as the project progresses beyond this value management workshop.

### The strategic context of the project

In order to allow the participants to obtain an understanding of the project's context, Dr. Graham Brisbane, Project Director, RTA, outlined the strategic context of the project.

Key points raised in his presentation included:

- He has worked in this region for over 30 years and has seen traffic volumes and associated problems increase and decrease with the implementation of various projects – it is a constantly changing challenge.
- In 1998, the Princes Highway had two lanes to Jervis Bay Road with duplicated sections to the south – there was hope that additional Federal funds would be forthcoming.
- Following other works on safety and upgrades such as Oak Flats to Dunmore which is currently under construction, this Gerringong to Bomaderry section of the Princes Highway upgrade is the next big project and one of the last remaining sections of the highway between Sydney and Jervis Bay Road to be upgraded.
- RTA aims to have a route selected in 2008 so that the funding submissions can be progressed.
- Some big questions and challenges still exist:
  - There have been changes in the numbers of people living and working in the area and using the routes.
  - Changing land uses continue.
  - With the competing needs of other projects in other parts of NSW what can we build for the likely available money?
  - The timing is short for locking in recommendations and decisions – the right option and best value for money.
  - Foxground bend continues to experience accidents.
  - Berry's main street has the potential to experience serious accidents.
- Records confirm there are 40 accidents per year when we look at this area and activity shared by the Princes Highway and the Sandtrack (the alternative route from Gerringong to Nowra).
- Predicting the future is both harder and easier – technology will undoubtedly improve in-car and car-to-car safety, but fuel prices, modes of travel, options for travel and the potential north Nowra bypass are all more difficult to predict and factor into our planning.
- The safety and economic issues demand that this upgrade project proceed to achieve new guidelines, controlled access, a 100 km/h speed, 2 x 2 lane roadway with median separation – grade separation of intersections will likely be guided by funding.

## Project overview presentation

An overview of where the project is up to in its planning was provided by Ron de Rooy, Senior Project Manager, RTA. Key points made in his presentation are summarised below:

- This project has a history stretching back to the 1960's and includes:
  - Late 1960's North Street corridor.
  - 1991 Gerringong to Berry route selection study.
  - 1998 Berry Bypass Environmental Assessment.
  - 2004/05 Quantm Study, Kiama to Nowra.
  - Preparations for this study commenced in February 2006.
  - Consultancy awarded to Maunsell in December 2006.
- Funding has been a limitation on a number of occasions and despite studies in 1991 and 1998 we are still in a position where a major project is yet to be undertaken for this part of the highway.
- Our project drivers are:
  - Savings in road trauma and crash costs through upgrading the existing highway and higher safety standards in new road construction by:
    - Improving road alignment.
    - Enhancing the separation of opposing traffic.
    - Improving roadside environment safety.
- Project objectives are:
  - Improve road safety.
  - Improve efficiency of the Princes Highway: Gerringong to Bomaderry.
  - Support regional and local economic development.
  - Provide value for money.
  - Enhance potential beneficial environmental effects and manage potential adverse environmental impacts.
  - Optimise the benefits and minimise adverse impacts on local social environment.
- Planning options:
  - Verified and built on previous studies.
  - Developed a long list of options.
  - Developed constraint maps of the study area.
  - Refined the project objectives.
  - Went through a process to produce a short-list.
  - Publicly display a short-list of options - which is what we are here to talk about for the next three days!
- Studies for options assessment included:
  - Geotechnical.
  - Urban design.
  - Traffic and road safety.
  - Public utilities.
  - Socio-economic.
  - Flora and fauna.
  - Water quality.
  - Cultural heritage.
  - Flooding and drainage.
  - Land use and planning.
  - Noise and vibration.
  - Climate and air quality.
  - Ecologically Sustainable Development
- The RTA is committed to ongoing community consultation:
  - We will not simply inform the community of what we plan to do.
  - We will not, however, empower the community with final decision making.
  - We will involve the community directly throughout the process to ensure public concerns and aspirations are consistently understood and considered.

- The project program includes:
  - Options display completed 29 Feb 08
  - Route comparison value management workshop 14-16 May 08
  - Submissions report Jul 08
  - Gerringong access VMW Jul/Aug 08
  - Recommend preferred option Nov 08
  - Environmental assessment late 2009
- This value management workshop is going to provide the project with a further step towards refining the number of current options to a single preferred option which we will use to seek funding and progress onwards to a full environmental review as detailed planning proceeds.

## Overview of community consultation

An overview of the community consultation to-date was presented by Leigh O'Dwyer, Community and Social Workstream Leader, Maunsell. Key points made in her presentation are outlined below.

Displays of the short-listed options were held from 26 November 2007 to 29 February 2008 and 996 submissions were received. These comprised three types: written, interviews, and completed Feedback forms.

There was a high level of consistency in what the community was saying, although there were some opposing views. The principle messages included:

- Functional issues:
  - Road safety (vehicle, pedestrians, cyclists).
  - Access – Sydney, towns and local travellers, during construction and once finished.
  - Existing highway use – after completing the new sections.
  - Travel time efficiency including heavy vehicles.
  - Value for money.
- Environmental issues:
  - Environmental values and assets.
  - Flora and fauna bio diversity – wildlife corridors, wetlands, water bodies, endangered ecological communities.
  - Flooding.
  - Agricultural land, agricultural family heritage and history.
  - Indigenous and European history and values.
  - Climate change.
- Socio-economic issues:
  - Sense of place – regionally, townships, communities.
  - Community cohesion – community, networks, support/severance.
  - Noise and visual pollution.
  - Property values.
  - Property impacts – fair property acquisition and compensation.
  - Personal stress.
  - Timing – approvals, certainty, construction, completion.
  - Economic viability – individuals, industry, region – including for business, tourism and agriculture.
  - Access and interchanges for Berry and Gerringong.
  - Agricultural land productivity – access, fragmentation, property acquisition.
  - Environmental values are economic assets.
  - Development opportunities and pressures.
- Process issues:
  - Route options development process - strengths and weaknesses.
  - Alternate and modified routes.
  - Decision and project delivery timeframes.
  - Transparency.
  - Ongoing consultation – for each phase of the project.
  - Options comparison without detailed environmental assessment of each option.

## Overview of ecologically sustainable development

A short presentation was sought by the value management workshop group in relation to ecological sustainability and how it was being addressed by the project team. Matthew Pettersson gave this overview and the following notes have been assembled to summarise what was delivered:

An ecologically sustainable development workshop was held for this project in December 2007. A subsequent study of ecologically sustainable development on the short-listed options has included a review of:

- Climate change adaptation.
- Greenhouse gas emission.
- 'Peak oil' theory.
- Greenfield land consumption.
- Sustainable design and construction opportunities.

Relevant to the region and this type of infrastructure, climate change factors include:

Impacts – predicted climate changes

- Lower average rainfall.
- More intense extreme rainfall events.
- Higher sea level and storm surge events.
- Higher average temperatures.
- More frequent occurrence of extreme temperatures.
- More frequent extreme fire danger days.

Impacts – asset damage

- Accelerated degradation of pavements and formation.
- Significant damage to bridges due to an extreme rainfall event.
- Build up of flood water in an extreme rainfall event.

Sustainability opportunities are possible through:

- Design
  - Minimise energy consumption.
  - Consider renewable energy.
  - Use low impact materials.
  - Innovation
- Construction
  - Recycle materials.
  - Re-use/treat water on site.
  - Use local materials.

The study has concluded that although ecologically sustainable development can differentiate the short-listed options, there is very little to separate them.



## What is most important about the Princes Highway upgrade: Gerringong to Bomaderry.

The group members identified from their personal view points (individually, then within focus groups and finally collectively) what was most important about the highway upgrade project. This is recorded below.

Upon reflection, the workshop group concurred that there was a level of overlap in the list. However, the list did reflect the items considered important for the project to address as planning proceeds. This 'What's important?' list, together with the project objectives, would later be used in the workshop to develop assessment criteria to assess the various routes in the study area.

No.	What is most important to VMW participants about the Gerringong to Bomaderry upgrade
1.	Consider the input of tourism and impact of the new highway on traffic and local business.
2.	Uninterrupted flow of travel on the road.
3.	Road safety for all (pedestrians, cyclists, access to farm gates, etc).
4.	Road efficiency (ie, incident management, travel time, operating cost, capacity, passing lanes, carbon emissions, grades, etc).
5.	Staging of construction to minimise business impact.
6.	Staging construction as a priority for achieving safety and budget targets.
7.	Conserve and compliment Indigenous and non-indigenous cultural heritage values.
8.	Effect on agricultural land (especially economic impacts) including its visual importance and agricultural landscape values.
9.	Lowest carbon footprint (new highway and the residual road).
10.	Removing through traffic from Berry (those who have no reason to enter Berry) and enhance the sustainability of Berry.
11.	Understanding the true extent of township and enabling community connectivity particularly with the 'isolated' communities.
12.	Protecting the lifestyle of current and planned communities (ie, minimising noise, severance, etc).
13.	Protecting heritage, especially environmental landscape, endangered species, aged trees, etc.
14.	Protecting ecologically endangered communities and the natural values of flora and fauna (including wetland catchment swamps).
15.	Having a solution that is appropriate today and meets the needs in 50 years time, allowing community to 'grow and prosper'.
16.	The infrastructure is done properly (do it right the first time).
17.	Understanding Aboriginal community expectations and how they will be met.
18.	That noise impacts are minimised.
19.	Climate change impacts are considered in the solution.
20.	Obtaining best value for money.
21.	Providing multi-user rest areas.
22.	Participation, understanding, ownership and acceptance by the community that the preferred option is the best result.
23.	That life cycle costs and impacts are minimised.
24.	Ensuring the project is 'affordable' to government (ie, staging, etc).
25.	Minimising the impact to the community by utilising the existing highway where appropriate.
26.	Providing a project capable of being approved.
27.	Enhancing the economic benefits that a new highway can provide.
28.	Avoiding significant flora and fauna habitats at an early stage in the process.
29.	Managing flooding and water quality issues.
30.	Minimising the impact of construction on ground water table.
31.	Minimising the impacts to ecologically endangered communities, threatened species, native vegetation and wildlife corridors

No.	What is most important to VMW participants about the Gerringong to Bomaderry upgrade
32.	Identifying ,value-adds, the highway brings to the community from a social and economic perspective.
33.	Providing an effective freight corridor linking Sydney and the South Coast.
34.	That visual impacts are minimised and we keep/enhance the visual “wow” visual factor of the area.
35.	Minimising impacts during construction (ie, delays, safety issues, etc).
36.	Managing additional traffic using the Sandtrack route during construction.
37.	Minimising community impact considerate to environment, social and business aspirations and provide a fit-for-purpose highway.
38.	Adopting and promoting sustainable development principles.
39.	Providing reasonable access to properties and communities.
40.	Minimising direct property access to the routes.
41.	Reduce adverse or maintain or improve environmental outcomes.
42.	Providing the ability to incorporate future changes in technology.
43.	Providing a solution consistent with the Princes Highway vision (ie, functional, look, feel, purpose, etc).
44.	Providing lower grades and minimising bends.
45.	Eliminating the sub-standard alignment at Foxground and Berry’s main street from the highway.
46.	That all geotechnical issues are identified, dealt with and/or avoided.
47.	Preserving agricultural cultural heritage.
48.	Maintaining the visual relationship and connectiveness between Berry and the escarpment.
49.	That the community participants at value management participate and observe a process that is without bias.
50.	That the project incorporates and consolidates truck parking, rest areas, RTA inspection areas and commercial enterprises ( <i>linked to item 21</i> ).
51.	That the project is easily constructable.
52.	Managing the best use of material with appropriate pavement design (ie, no wastage, etc).
53.	Community submissions are considered and the process provides a sound rationale for decisions made (transparent).
54.	Providing a low maintenance asset (ie. appropriate batter designs, etc).
55.	Recognising the heritage and other values of the David Berry Hospital and Camp Quality park.
56.	A solution is considered that factors in future growth.
57.	Maintaining the agricultural capacity at a regional level.
58.	Avoiding loss of agricultural resource resulting in land use change.
59.	Minimising severance of agricultural land ownership.
60.	Recognising the importance of maintaining the project delivery timeframe.

## The problem situation

*What is the problem that is causing us to consider an upgrade?*

The group reflected on the 'problem situation' in terms of the background material for the workshop as well as from their own viewpoints. They then reviewed and added to the list of problems causing the need for the project. These were recorded as the following:

- Increasing traffic volumes.
- Heavy vehicle/pedestrian conflicts through Berry township.
- High accident rate and high levels of road trauma and crash costs on the current highway.
- Poor road alignment and no separation of opposing traffic on existing highway.
- Inefficient road alignment and poor roadside safety environment on existing highway.
- One of a series of weak links in an otherwise safe and efficient road between Sydney and Jervis Bay Road.
- Unsafe/poor access provisions to many properties and poor incident management provisions.
- Through traffic using the Sandtrack.
- Tortuous horizontal alignment as a result of the terrain for heavy vehicles around Foxground.
- The need to cater for future growth due to the regional strategy for the South Coast.
- Varying and lower speed limits on the existing highway.
- Gradual deterioration of the existing road and increasing maintenance costs.

## Project objectives

The group reviewed the project objectives (ie, what must the project achieve to be successful) as recorded in the value management workshop background papers and presented during the value management workshop to ensure a common understanding of what the objectives are.

## Givens and constraints

- Substandard road geometry of the existing highway, particularly at Foxground.
- Floodplains, soft soil and acid sulphate soil conditions located generally in the south and east of the study area.
- The South Coast Railway.
- Agricultural industry including dairy.
- An approved housing development in Berry.
- The Eastern Gas Pipeline.
- Indigenous and non-Indigenous cultural heritage at various locations across the study area.
- Hilly terrain (generally in the north-west of study area with ridges extending south and east).
- Colonies of endangered ecological communities and threatened plant species.
- Residences and existing businesses.
- SWC Effluent Re-use Irrigation Scheme.
- Landscape and urban design values.
- Need to allow for climate changes (ie, flooding levels may increase).
- Separating local and through traffic in the town of Berry.
- Existing community amenities.
- Access into Berry, Gerringong and Bomaderry.

## Assumptions

The value management workshop participants (in focus groups) identified assumptions being made about the project from various perspectives. The assumptions recorded from each focus group were assessed using the assessment table below. This allowed participants to further share information about the project and find out about the various views that are being held within the group.

## Assessment Table

Category	Assessment Explanation
✓	It is <b>safe to proceed</b> with planning on the basis of this assumption.
*	There is <b>some doubt or uncertainty</b> about this assumption and it needs to be resolved as the project planning proceeds.
✓/*	Planning <b>should proceed</b> but the issue still needs to be resolved.

Topics for each group gave focus to the assumptions identified. The topic for each focus group is listed below:

- **Focus group 1: Key planning/design parameters and ecological design principles**
- **Focus group 2: Local and through traffic, access and business/commercial assumptions**
- **Focus group 3: Community/social, safety, environmental and heritage assumptions**
- **Focus group 4: Big picture/strategic and future planning assumptions**

Each focus group's assumptions and the overall group's assessment (comments in italics where required) are listed below.

### Focus group 1: Key planning/design parameters

No.	Assumptions in relation to key planning/design parameters	Category
1.	High standard, four lane highway with minimum design speed of 110km/h (horizontal alignment) and 100km/h (vertical alignment).	✓
2.	Road will have a posted speed of 100km/h.	✓
3.	Off-line construction to be an "M" class road (ie, freeway standard with no uncontrolled access).	✓
4.	On-line construction to be an "A" class road (ie, high standard road with limited direct access).	✓
5.	At pinch points, there is currently no provision for future widening (ie, minimum footprint is planned). However it would not prevent future expansion.	*
6.	Minimum horizontal radii are 750m for off-line (M Class) and 600m for on-line (A Class).	✓
7.	Design grades are: <ul style="list-style-type: none"> <li>• Desirable maximum grade – six per cent (consider the length of grade for this).</li> <li>• Absolute maximum grade – eight per cent (consider the length of grade for this).</li> <li>• Approximately four per cent grade in tunnels (RTA tunnel guidelines).</li> </ul>	✓
8.	Flood immunity (taking into account climate change impacts) are: <ul style="list-style-type: none"> <li>• 1:100 year immunity for off-line (M Class).</li> <li>• 1:20 year immunity for on-line (A Class) as a minimum. There is a need to monitor carefully and justify if 1:20 year flood immunity is required in a particular area.</li> </ul>	✓ *
9.	Two minimum median width scenarios (could be either, both or varied). There is a need to monitor carefully and justify the choice: <ul style="list-style-type: none"> <li>• 5.0m grassed with wire rope – preferable for safety reasons unless mitigating circumstances prevent.</li> <li>• 2.6m with solid concrete barrier.</li> </ul>	✓
10.	Tunnel considerations: <ul style="list-style-type: none"> <li>• How will dangerous goods be handled for Class 3 and above? (This needs to be verified).</li> <li>• Alternative surface route if dangerous goods are not allowed in the tunnel.</li> </ul>	* *

### Focus group 1: Ecological design principles

No.	Assumptions in relation to ecological design principles
1.	Limit the clearance of native vegetation by selecting cleared areas.
2.	Avoid habitat fragmentation by limiting clearing to edges rather than the middle of patches.
3.	Avoid areas of conservation significance.
4.	Include appropriate mitigation and offset strategies.
5.	Protect wetland, waterway and hydrological values.

The above ecological design principles were viewed by the group as targets. Grounds for justification will be required if they cannot be met. The process would be to avoid in the first instance, then minimise impact, followed by mitigate and offset impacts.

### Focus group 2: Local and through traffic, access and business/commercial assumptions

No.	Assumptions in relation to local and through traffic, access and business/commercial	Category
1.	There will be separation of through traffic from local Berry traffic.	✓/✱
2.	Private properties may not have the same level of access (ie, level of convenience) as at present (could be restricted and via longer routes).	✓
3.	Gerringong and Berry will have an improved level of flood access for all movements.	✓
4.	A comprehensive strategy will be developed to promote business opportunities within the area (eg, signs, marketing campaigns) during and after construction.	✓
5.	There will be a need to address the local traffic arrangements within Berry and Gerringong upon completion of adjacent highway works.	✓
6.	Property accesses will be maintained during construction (however they may not be the same access as now).	✓
7.	Construction issues will require addressing before commencement of work.	✓
8.	There will remain a need to maintain sections of the old route after completion of new works.	✓
9.	There will be no at-grade four way intersections on the new route.	✓
10.	Provision will be made for cyclists and pedestrians.	✓
11.	Emergency services access will be maintained.	✓
12.	Livestock/access will be grade separated and maintained for severed properties.	✓

### Focus group 3: Community/social, safety, environmental and heritage assumptions

No.	Assumptions in relation to community/social, safety, environmental and heritage	Category
1.	Some land and homes will have to be acquired.	✓
2.	Doing nothing will not meet the project objectives.	✓
3.	There will be a need to clear some vegetation.	✓
4.	Some values will have to be traded off against other competing values.	✓
5.	The project will not achieve 100 per cent community acceptance.	✓
6.	All values have a non-negotiable limit and the limits are different across the values.	✓
7.	Impact to significant values will be minimised and mitigated.	✓
8.	Where guidelines exist they will be considered and adhered to where appropriate.	✓
9.	We will not break the law in undertaking the project.	✓
10.	We will look to optimise mitigation impacts within project limits.	✓
11.	Climate change is happening – the level of impact is unknown.	✓
12.	We can travel safer on new road at 100km/h.	✓
13.	Any immediate negative visual impact of the road will 'soften' over time.	✱
14.	Urban design will accelerate the softening of the immediate visual impact.	✱

No.	Assumptions in relation to community/social, safety, environmental and heritage	Category
15.	There is a need to assume there will be some resource losses that cannot be mitigated (eg, agricultural land loss, etc).	✓
16.	Communities can adapt to change.	Outside scope
17.	Separation of local from through traffic is a good thing for Berry township.	✓/✱
18.	Traffic volumes will increase.	✓
19.	The South Coast population will increase.	✓
20.	Every effort will be made to assist and be empathetic with those that are directly adversely effected by the project.	✓
21.	Compensation will be in line with the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> .	Given
22.	Flood prone land north of North Street will not be developed for residential purposes.	✓
23.	Where secondary benefits/opportunities to improve things can happen it will be considered.	✓
24.	Knowledge of cultural heritage is limited by the scope of the investigations so far.	✓
25.	Investigation of cultural values, especially oral traditions, is an ongoing process.	✓

#### Focus group 4: Big picture/strategic and future planning assumptions

No.	Assumptions in relation to – big picture/strategic	Category
1.	'Do nothing' is not an acceptable option.	✓
2.	This section of the highway is the next priority for upgrading Sydney to Jervis Bay Road.	✱
3.	The project could be funded for construction commencement in the next three years utilising State and Federal funding.	✱
4.	Road transport will continue to accommodate the majority of freight.	✓
5.	Rail is unlikely to meet the freight task.	✓
6.	Population and employment will grow in the Shoalhaven, Eurobodalla and Bega Valley areas.	✓
7.	Tourism on the South Coast will continue to grow.	✓
8.	Nowra – Bomaderry will continue to grow as a major regional centre as will Batemans Bay and Bega.	✓
9.	Berry and Gerringong will not grow beyond the scale of a small/medium town – Berry will only grow to the north-west and south-west.	✓
10.	Agricultural value of the south coast agricultural land will increase.	✓
11.	Significant growth in Nowra and Bomaderry will be north of Cambawarra Road and west of the Princes Highway and will require access to the Princess Highway.	✓
12.	There is a need for a truck stop/inspection site between Boxalls/Lamonds Lane and Meroo Road intersection at North Bomaderry.	✱
13.	Second access chances to the towns of Gerringong and Berry will be provided.	✱
14.	The Princes Highway upgrade will impact (positively and negatively, during and after construction) on local feeder roads outside its corridor (ie, Wharf Road, the Sandtrack, Fern Street, etc. as well as remnants of the existing highway).	✓
15.	Capacity of the new highway design will accommodate further traffic growth.	✓
16.	A B-double loop exists from the Princes Highway – MR92 – ACT – Monaro and the Hume.	✱
17.	The highway upgrade and its intersections will cater for B-doubles.	✓



## Developing the assessment criteria

As a result of the information shared in the workshop (in particular, the 'What is most important' statements and the project objectives), a focus group was formed. This focus group consisted of a representative cross section of the workshop participants ie, RTA, Council, community member, Aboriginal representative, business representative, government agencies, a representative of the environmental perspective, study team representative.

The task of this focus group was to cluster the 'What is most important' statements and the project objectives and develop criteria which might help to differentiate the route options. The group presented its conclusions to the whole value management workshop group for comment, amendment and if acceptable, endorsement as a basis on which they would assess the various short-listed routes and options in the study area. The approach adopted was to:

- (1) Separate from the list of 'What is most important' statements, those items that would not assist in differentiating between the options. Some of the statements were expressed as objectives, others referred to process, givens and/or questions.
- (2) Review the remaining 'What is most important' statements and considered the project objectives under three key themes or perspectives being: **functional; socio-economic; and natural and cultural environment.**
- (3) Develop criteria statements within each theme which could be used as assessment criteria to meaningfully compare and differentiate the routes and various combined options within the study area. The focus group highlighted points for resolution by the whole group which were either, adopted as an assessment criteria, or listed as an issue that still needed their input.
- (4) Present the approach and the outputs to the workshop group for consideration, discussion, adjustment and endorsement.

### Agreeing to the “non-differentiators”

The focus group agreed the following statements would not help to differentiate between the options.

No.	What is most important – <i>but will not assist in differentiating between options</i>
1.	Having a solution that is appropriate today and meets the needs in 50 years time, allowing community to “grow and prosper” and is sustainable.
2.	The infrastructure is done properly (do it right the first time).
3.	Understanding Aboriginal community expectations and how they will be met.
4.	Obtaining best value for money.
5.	Providing multi user rest areas.
6.	Community participation, understanding, ownership and acceptance that the preferred option is the best.
7.	That life cycle costs and impacts are minimised.
8.	Ensuring the project is 'affordable' to government (ie, staging, etc).
9.	Providing a project capable of being approved.
10.	Adopting and promoting sustainable development principles.
11.	Reduce adverse or maintain or improve environmental outcomes.
12.	Providing the ability to incorporate future changes in technology.
13.	Providing a solution consistent with the Princes Highway vision ( functional, look, feel, purpose, etc).
14.	Providing lower grades and minimising bends.
15.	Eliminating Foxground Hill and Berry's main street from the highway.
16.	That all geotechnical issues are identified, dealt with and/or avoided.
17.	That the community participants at VM participate and observe a process that is without bias.
18.	That the project incorporates and consolidates truck parking, rest areas, RTA inspection areas and commercial enterprises ( <i>linked to item 21</i> ).
19.	Managing the best use of material with appropriate pavement design (ie, no wastage, etc).
20.	Community submissions are considered and the process provides a sound rationale for decisions made (transparent).
21.	A solution is considered that factors in future growth.

No.	What is most important – <i>but will not assist in differentiating between options</i>
22.	Recognising the importance of maintaining the project delivery timeframe.

After review, comment and amendment by the whole workshop group, the assessment criteria (within each of the three perspectives) to evaluate the routes and options later in the workshop were agreed as:

**1. Functional perspective**

- A. Route length, grade efficiency, travel time, vehicle operating cost.
- B. Potential for delays for traffic during construction.
- C. Constructability and ease of construction.
- D. Minimise number of accesses (controlled and direct).
- E. Vertical and horizontal alignment – including orientation.
- F. Overall network safety – new and residual roads.

**2. Socio-economic perspective**

- A. Minimise impact on agricultural lands and business – areas, classes, numbers and severance.
- B. Loss of residences in communities – consequential viability of communities.
- C. Connectivity and accessibility impacts for communities.
- D. Impact of road on views from communities.
- E. Road traveller experience and ‘wow’ factor impacts.
- F. Impact on community facilities/amenity service.
- G. Impacts on non-agricultural businesses.

**3. Natural and Cultural Environment Perspective**

- A. Impact on threatened species.
- B. Impact on endangered ecological communities.
- C. Impact on habitats and wildlife corridors.
- D. Impacts on wetlands and catchments of wetlands.
- E. Impact on Indigenous heritage.
- F. Impact on non-Indigenous heritage.
- G. Impact on surface water quality.
- H. Assessment of carbon footprint size.
- I. Noise impacts.
- J. Potential to change flooding characteristics.
- K. Impacts on ground water.
- L. Climate change impact/vulnerability.

## Weighting of assessment criteria

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

The paired comparison technique compares the preference, ‘on balance’, by the whole group of one criteria against each other criteria, but only within a specific perspective (functional; social and local economic; natural environment). The group also determined whether the preference of one criteria over another is a major, medium or minor one (and in some cases equal). This assists in relatively weighting the criteria within each perspective.

It should be noted that in some cases, the paired comparison process resulted in some criteria receiving a weighting of zero. This should be interpreted as, the group believed the evaluation and recommendation of the preferred direction would not rely on the performance of the option against this criteria even though the criteria is important and requires careful consideration during the next stage of the project development.

The discussion in undertaking the paired comparison process was extensive and allowed the group to understand and appreciate the various perspectives represented within the group. The final weightings were reached on a consensus. The group’s workings and their weightings of the assessment criteria for each perspective are shown in the tables that follow.

The extent one criteria was preferred by the group over another was indicated using the scoring system below:

- 3. Major preference
- 2. Medium preference
- 1. Minor preference

Note: In transferring the raw scores to relative weighting percentages ACVM rounded the numbers up or down to form whole numbers. Consequently not all add to 100 per cent.

### Functional perspective – weighting of assessment criteria

No	Assessment	Raw score	Relative weightings
A.	Route length, grade efficiency, travel time, vehicle operating cost.	7	22%
B.	Potential for delays for traffic during construction.	0	-
C.	Constructability and ease of construction.	2	6%
D.	Minimise number of accesses (controlled and direct).	7	22%
E.	Vertical and horizontal alignment – including orientation.	7	22%
F.	Overall network safety – new and residual roads.	9	28%

### Scoring matrix

The workings for the paired comparison are shown below.

	B	C	D	E	F
A	3A	3A	A/D	A/E	1F
B		2C	3D	3E	3F
C			3D	3E	3F
D				D/E	1F
E					1F
F					

### Socio-economic perspective – weighting of assessment criteria

No	Assessment	Raw score	Relative weightings
A.	Minimise impact on agricultural lands and business – areas, classes, numbers and severance.	6.5	21%
B.	Loss of residences in communities – consequential viability of communities.	7.5	25%
C.	Connectivity and accessibility impacts for communities.	7.5	25%
D.	Impact of the road on views from communities.	2	7%
E.	Road traveller experience and ‘wow’ factor impacts.	2.5	8%
F.	Impact on community facilities/amenity service.	0	-
G.	Impacts on non-agricultural businesses.	4.5	15%

### Scoring matrix

The workings for the paired comparison are shown below.

	B	C	D	E	F	G
A	A/B	A/C	1.5A	2A	1A	1A
B		B/C	2B	2B	2B	B/G
C			2C	2C	2C	C/G
D				1D	1D	1G
E					2E	E/G
F						2G

## Natural and cultural environment perspective – weighting of assessment criteria

No	Assessment	Raw score	Relative weightings
A.	Impact on threatened species.	15	14%
B.	Impact on endangered ecological communities.	15	14%
C.	Impact on habitats and wildlife corridors.	12.5	12%
D.	Impacts on wetlands and catchments of wetlands.	9.5	9%
E.	Impact on Indigenous heritage.	13.5	13%
F.	Impact on non-Indigenous heritage.	13.5	13%
G.	Impact on surface water quality.	6.5	6%
H.	Assessment of carbon footprint size.	0.5	0.5%
I.	Noise impacts.	7.5	7%
J.	Potential to change flooding characteristics.	3	3%
K.	Impacts on ground water.	7	7%
L.	Climate change impact/vulnerability.	0.5	0.5%

### Scoring matrix

The workings for the paired comparison are shown below.

	B	C	D	E	F	G	H	I	J	K	L	
A	A/B	1A	A/D	A/E	A/F	2A	2A	1A	3A	1A	3A	
B		1B	B/D	B/E	B/F	2B	2B	1B	3B	1B	3B	
C			1C	C/E	C/F	1C	2C	1C	3C	1C	3C	
D				1D	D/F	D/G	1D	1D	3D	D/K	1D	
E					1E	2E	2E	3E	1E	2E		
F						1F	2F	2F	3F	1F	2F	
G							1G	2G	G/I	2G	G/K	1G
H								1H	2H	2H	H/L	
I									1I	1I	2I	
J										1J	1J	
K											1K	2K
L												1L

## Summary of weightings of assessment criteria

A summary of the weightings of the assessment criteria within the various themes as determined by the group appears below. These weighted assessment criteria were used to evaluate the options for the project.

Themes					
FUNCTIONAL		SOCIO-ECONOMIC		NATURAL AND CULTURAL ENVIRONMENT	
Criteria	Wt	Criteria	Wt	Criteria	Wt
Route length, grade efficiency, travel time, vehicle operating cost.	22%	Minimise impact on agricultural lands and business – areas, classes, numbers and severance.	21%	Impact on threatened species.	14%
Constructability and ease of construction.	6%	Loss of residences in communities – consequential viability of communities.	25%	Impact on endangered ecological communities.	14%
Minimise number of accesses (controlled and direct).	22%	Connectivity and accessibility impacts for communities.	25%	Impact on habitats and wildlife corridors.	12%
Vertical and horizontal alignment – including orientation.	22%	Impact on views, from communities, of road.	7%	Impacts on wetlands and catchments of wetlands.	9%
Overall network safety – new and residual roads.	28%	Road traveller experience and 'wow' factor impacts.	8%	Impact on Indigenous heritage.	13%
		Impacts on non-agricultural businesses.	15%	Impact on non-Indigenous heritage.	13%
				Impact on surface water quality.	6%
				Assessment of carbon footprint size.	0.5%
				Noise impacts.	7%
				Potential to change flooding characteristics.	3%
				Impacts on ground water.	7%
				Climate change impact/vulnerability.	0.5%

## Routes, options and evaluation

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### Routes that form options

The study area for the Gerringong to Bomaderry section of the Princes Highway was divided into four (4) sections to assist in the clarification of potential routes.

- Section A, from Mount Pleasant to south Gerringong and Section D, from south Berry to Bomaderry, had only one option short-listed in each section – Red and Purple Routes, respectively.
- Section B, from south Gerringong to north Berry had three route options – Pink (furthest north-west), Yellow (furthest south-east) and Green (between in a more direct alignment).
- Section C, the Berry township had two route options, Blue (a wider skirting of the town on the north side) and Orange (a nearer deviation along near North Street).
- Sections B/C had a Brown Route which follows the rail corridor.

A strategy was adopted to enable effective review of the multiple routes within Sections B and C to see whether all six options needed to be assessed against the Brown Route.

The single short-listed routes in Sections A and D were also dealt with separately.

### Single Option Routes – Sections A and D

Section A only had one short-listed route, the Red Route, whilst Section D had only the Purple Route.

A description of the route options in Sections A and D is outlined in summary:

#### SECTION A – FROM MOUNT PLEASANT TO SOUTH GERRINGONG

##### RED ROUTE

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- The Red Route follows the existing highway corridor alignment subject to some very minor adjustments to meet the required design and safety parameters. This Red Route is common to all options.

##### Key features of the Red Route

- Combined grade of eight per cent over 1000m and four per cent over 600m cannot be lessened easily.
- Existing horizontal alignment is generally conforming.
- Poor ground conditions at Omega Flat.
- Embankment required for flood immunity across Omega Flat – approximately 1.5m to 2.0m above existing road level.
- Few dwellings in close proximity to existing highway.
- Opportunity for improved access to Gerringong.

##### Community feedback on the Red Route

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Red Route (a summary is included in the value management background paper and the submissions report). No significant opposition was communicated with regards to the Red Route.

#### SECTION D – FROM SOUTH BERRY TO BOMADERRY

##### PURPLE ROUTE

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- The Purple Route follows the existing highway corridor alignment subject to some very minor adjustments to meet the required design and safety parameters. This Purple Route is common to all options.

##### Key Features of the Purple Route

- Existing horizontal alignment generally conforming.
- Existing vertical alignment is undulating and non-conforming to design parameters.
- Route is not subject to flooding.
- All grades are three per cent or less.
- Likely to be constructed as a duplication with traffic switches



### **Community feedback on the Purple Route**

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Purple Route (a summary is included in the value management background paper and the submissions report). No significant opposition was communicated with regards to the Purple Route.

### **VALUE MANAGEMENT WORKSHOP GROUP FEEDBACK**

A detailed presentation was made by the project team on each of these routes.

Then the value management group was asked to form into two focus groups to consider how these routes perform against the project objectives and the 'what is most important' statements. Their feedback appears below as material for the project team to review and consider as they progress this project.

A symbol (\*) was placed against aspects where there may be a time imperative for action considered in relation to that item.

#### ***Red Route key issues***

<b>Issue</b>	<b>Potential time imperative</b>
There is a need for a property access strategy.	*
Appropriate drainage and spill containment issues to downstream catchments/State Environmental Planning Policy (SEPP) 14 wetlands need to be considered and addressed.	*
Viability of residual lots and minimising land use impacts.	*
Flooding of Omega Flat.	*
Safety of Fern Street and railway level crossing.	*
Junction treatments to local road network (safety).	*
Property access (safety issues).	*
Manage SEPP 14 issues of Werri Lagoon.	*
In some areas there is eight per cent vertical grade – what are the opportunities for less than six per cent vertical grade?	*
What is the approval process? Opportunity for separate determination to allow staging.	
Constructability over Omega Flats.	
Where is the borrow-material coming from? Can we balance earthworks?	
Maintaining access to Rose Valley Road. Possibly go under? Possibly provide service road	
Management of construction under traffic.	
Omega School – heritage footprint.	
Stock (and farm machinery) movement.	
Treatment of noise.	
Mitigation of cultural landscape values.	
Consider town access to the highway.	
Interface of the upgrade with existing highway at the northern end.	

Summary conclusion by the group was that there were '**No show-stoppers**' (ie, no fatal flaws) on the Red Route, as identified at this stage.

**Purple Route key issues**

Issue	Potential time imperative
Managing access/egress points around the entry into Bomaderry (one kilometre north).	
Managing access/egress points along the highway (eg, Silos restaurant, vineyard, turf farm, milk dairies, milk trucks, farm contractors, etc). Particularly vehicles turning left and right (limited) as well as the need to move from left to right side of the highway.	
Need to provide safe and frequent pick up points for buses.	
Intersection with Meroo Road with heavy vehicles (north bound).	
Consider the value of the strip of land required for the highway widening (ie, might be highest land for stock to escape floods).	
Recognising and allowing for the location of the future for deviation of the highway at Nowra.	
The heritage value of Meroo Union Church and school house as well as the trees associated with heritage items.	
Further investigation of a truck weighbridge and service centre north of Bomaderry.	
Where there are a number of accesses within parts of the highway, possibly the accesses can be joined (ie, Lamonds Lane and Merschels Lane).	
Potential for separate carriageway construction?	
Access: <ul style="list-style-type: none"> <li>• Residential – consolidate local roads. Divert to alternate existing road. Consider left-in/left-out with U-turn bays. Opportunities to link cul-de-sacs.</li> <li>• Industrial – milk and livestock trucks accessing farms, Meroo Road turning right to lead north.</li> <li>• Businesses (wineries, Turfco, etc).</li> <li>• School buses/pedestrians crossing highway – consider pullover bays.</li> </ul>	
Noise impacts on adjoining residences.	
Aboriginal archaeological issues to be addressed.	
Vegetation clearance at selected sites (eg, new bridges).	
No major planning issues. All to be addressed during design.	

*Note: the sub-group focusing on the Purple Route did not note any aspects as having a time imperative, although when asked, they indicated that all need to be considered as important as the project moves into the next phase of development,*

Summary conclusion by the group was that there were '**No show-stoppers**' (ie, no fatal flaws) on the Purple Route, as identified at this stage.

## Multiple route options - Section B and Section C

A description of the route options in Sections B and C is outlined in summary:

### SECTION B – FROM SOUTH GERRINGONG TO NORTH BERRY

#### PINK ROUTE

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- The Pink Route generally follows the existing highway corridor except for the section past Foxground. The existing highway alignment is particularly poor in this location and has to be improved to meet the required design and safety parameters. A large cutting is made through the ridgeline as it passes through the escarpment. Grades remain relatively high and passing lanes are included.

#### Key features of the Pink Route

- Challenging grades.
- One small bridge at Crooked River and three small bridges at Broughton Creek.
- Embankment required for flood immunity in vicinity of Broughton Creek.
- Marginal impact on patches of native vegetation – similar to Green Route.
- Maximum 27 metres deep, 900 millimetre long cutting at crest of Toolijooa Ridge.
- Optic fibre cable in road reserve (800 metres in length).
- Interaction with Eastern Gas Pipeline.
- Impact on Aboriginal battlegrounds in the vicinity of Broughton Village.

#### Community feedback on the Pink Route

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Pink Route (a summary is included in the value management background paper and the submissions report).

#### GREEN ROUTE

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- The Green Route is the same as the Pink Route apart from a section between Toolijooa Road and Thompsons Road. The Green Route follows a more direct alignment and passes under the Toolijooa ridge's 'north saddle' in a 350 metre long tunnel before rejoining the existing highway corridor.

#### Key features of the Green Route

- Challenging grades – alleviated by tunnel.
- Twin bore tunnels (350 metres). Suitable ground conditions.
- Tunnels pass under a very high significance endangered ecological communities with known threatened flora and fauna.
- One small bridge at Crooked River and three small bridges at Broughton Creek – common with Pink Route.
- Embankment required for flood immunity in vicinity of Broughton Creek – common with Pink Route
- Marginal impact on patches of native vegetation – similar to Pink Route.
- Maximum 15 metre deep cutting at western tunnel portal.
- Optic fibre cable in road reserve (800 metres in length) – common with Pink, Green, and Yellow Routes.
- Interaction with Eastern Gas Pipeline – common with Pink, Green, and Yellow Routes.
- Impact with Aboriginal battlegrounds in the vicinity of Broughton Village.

#### Community feedback on the Green Route

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Green Route (a summary is included in the value management background paper and the submissions report).

Value management workshop comment: If climbing lane extends into tunnel it must go 500 metres beyond the exit portal to avoid lane changing risks.

## **YELLOW ROUTE**

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- The Yellow Route follows an alignment parallel to the South Coast railway line until just past the dwellings at Toolijooa. The route then turns to follow a north-west alignment. It passes under the Toolijooa ridge's 'south saddle' in a 350 metre long tunnel before meeting and following the existing highway corridor for the remainder of Section B with the Pink and Green routes.

### **Key features of the Yellow Route**

- One small bridge at Crooked River, three adjacent to railway, and one small bridge at Broughton Creek.
- Embankment required for flood immunity parallel to railway (2.0 – 2.5m height).
- Poor ground conditions adjacent to railway line.
- Multiple cross drainage culverts adjacent to railway.
- Co-location with existing infrastructure.
- Close proximity to Crooked River and Foys Swamp Wetland Complex with high significance Estuarine Fringe Forest – common with Brown Route.
- Twin bore tunnels (350 metres). Suitable ground conditions.
- Direct impact on organic farm and associated youth mentoring program.
- Impact on a patch of native vegetation of low conservation significance to the south west of Toolijooa Ridge.
- Optic fibre cable in road reserve (800 metres in length) – common with Pink and Green Routes.
- Interaction with Eastern Gas Pipeline - crosses four times.
- Interference with Sydney Water Effluent Re-use Irrigation Scheme – common with Brown Route.

### **Community feedback on the Yellow Route**

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Yellow Route (a summary is included in the value management background paper and the submissions report).

#### **Value management workshop comments:**

- Potential of change to the Effluent Re-use Irrigation Scheme is seen as a potential major concern to Sydney Water Corporation and the community in general.
- If climbing lane extends into tunnel it must go 500 metres beyond the exit portal to avoid lane changing risks.

## **SECTION C – BERRY TOWNSHIP**

### **BLUE ROUTE**

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- The Blue Route follows a circular arc bypassing Berry in the north and passing close to the western edge of the main town. The Blue Route then follows the existing highway corridor until the southern end of the section at Croziers Road.

### **Key features of the Blue Route**

- Small bridge crossings at Broughton Mill Creek, Connollys Creek, and Bundewallah Creek.
- Over-bridge at Tindells Lane – potential location of northern Berry interchange.
- Over-bridge at Kangaroo Valley Road – potential location of southern Berry interchange. Similar to Orange Route.
- Embankments required to span local roads and to provide flood immunity.
- Use existing highway corridor south of Kangaroo Valley Road – common with Orange Route.

### **Community feedback on the Blue Route**

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Blue Route (a summary is included in the value management background paper and the submissions report).

#### Value Management Workshop comments:

- Height of Blue Route as represented in presentation at local road junctions/connectivity is a major concern – the project team explained that this was merely an assumption when the digital fly-through specialists were developing the presentation. No decisions had been taken on intersection treatments at this stage of planning and design. The current estimates would cater for either one to pass over the other.
- It was agreed that the Blue Route to be considered in the value management workshop assessment should allow for local roads to run over the top of the Blue Route, ie the vertical alignment of the Blue Route will be relatively low across the countryside it traverses.
- Varying views on what a 'bypass' is/means for Berry.
- Questions about future growth directions for Berry.
- Considerable concerns about impacts on prime agricultural lands and families who are on the land.

## **ORANGE ROUTE**

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- The Orange Route provides an upgrade of the existing highway alignment north of Berry and then follows the North Street corridor as it bypasses Berry close to the north side of town. North Street itself would remain a local road. At the western end of North Street the route turns to the south to follow the existing highway corridor until the southern end of the section at Croziers Road.

#### Key features of the Orange Route

- Attempts to track existing highway alignment on ridgeline.
- Existing highway used for northbound on-load ramp.
- Impact on Pulman Street and Tannery Road European heritage precinct – similar to Brown Route.
- 300 metre long bridge at Broughton Mill Creek and Woodhill Mountain Road.
- Interference with sports fields and the Camp Quality memorial park.
- Potential to reduce the degree of flooding in Berry township – common with the Brown Route.
- Requirement for consideration of extensive noise mitigation along the North Street corridor – common with the Brown Route.
- Over-bridge at Kangaroo Valley Road – potential location of southern Berry interchange. Similar to Blue and Brown routes.
- Use existing highway corridor south of Kangaroo Valley Road – common with Blue and Brown routes.

#### Community feedback on the Orange Route

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Orange Route (a summary is included in the value management background paper and the submissions report).

#### Value Management Workshop comments:

- Major concerns that part of this route is a 'non-route' because of the considerable impacts on:
  - Non-Indigenous cultural heritage in the places and archaeological sites at the north end of Berry township in the Pulman Street and Tannery Road European heritage precinct.
  - Sports fields.
  - The David Berry Hospital.
- The project team advised that they had investigated alignments which avoided the above and were of the view that a **modified Orange Route** is feasible.
- The value management workshop group discussed this situation at length and it was agreed that although the workshop was commissioned to focus on the routes and options that were placed on public exhibition, it seemed a process shortcoming if a modified Orange option, as described to the group, was not included in the assessment during this workshop.

## **SECTION B/C – SOUTH GERRINGONG TO SOUTH BERRY**

### **BROWN ROUTE**

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- The Brown Route spans Sections B and C and runs along the western side of the railway line from south of Gerringong to the north of Berry. It heads westwards from the David Berry Hospital and crosses the existing highway, Broughton Mill Creek and Woodhill Mountain Road. It then continues along the North Street corridor and from Kangaroo Valley Road it follows the existing highway corridor to Croziers Road. North Street would remain a local road.

#### **Key features of the Brown Route**

- Eight small bridges adjacent to railway and a 300 metre bridge at Broughton Mill Creek.
- Embankment required for flood immunity parallel to railway (2.0 – 2.5m height). Similar to Yellow Route.
- Need to import 500,000 cubic metres of fill for embankments.
- Poor ground conditions adjacent to railway line.
- Co-location with existing infrastructure.
- Multiple cross drainage culverts adjacent to railway in Toolijooa area.
- Close proximity to Crooked River and Foys Swamp Wetland Complex with high significance Estuarine Fringe Forest – common with Yellow Route.
- Interaction with Eastern Gas Pipeline - crosses once.
- Interference with Sydney Water Effluent Re-use Irrigation Scheme – common with Yellow Route.
- Impact on Pulman Street and Tannery Road European heritage precinct – similar to Orange route.
- Impacts on sports fields.
- Potential to reduce the degree of flooding in Berry township – common with the Orange Route.
- Requirement for consideration of extensive noise mitigation along the North Street corridor – common with the Orange Route.
- Over-bridge at Kangaroo Valley Road – potential location of southern Berry interchange. Similar to Blue Route.
- Use existing highway corridor south of Kangaroo Valley Road – common with Blue and Orange routes.

#### **Community feedback on the Brown Route**

The project team presented a summary of the feedback received from the community throughout the community consultation process in relation to this Brown Route (a summary is included in the value management background paper and the submissions report).

#### **Value management workshop comments:**

- A number of ideas to 'improve' the Brown Route were voiced by some participants, eg split height of carriageways to reduce fill, deliver fill materials via rail, dredge for the sand fill locally to benefit the wetlands, etc.
- Proximity to existing rail line and to the Eastern Gas Pipeline were concerns and risks.
- Some participants referred to the GHD study (1999) which rated this option (or one very similar to the Brown Route) as "embodying all the worst issues, overall".
- SWC contract obligations for 80% re-use and the history of gaining approval and acceptance by the community places SWC in direct opposition to any option which would open their current arrangements to change or challenge.

## Evaluation and assessment

The value management workshop group was now in a position to evaluate the route options against the assessment criteria under the three themes/perspectives developed earlier in the workshop.

The evaluation process used for the workshop worked through the various routes in a logical manner so as to determine:

- In Section B which of the Pink, Green or Yellow Routes might either be clearly favoured or if there was agreement that one or more were so inferior they could be discarded from further evaluation.
- Then the same was done in Section C for the Blue and Orange Routes (and modified Orange Route – see below).

As mentioned earlier in this report the value management workshop group decided to include a **modified Orange Route** that had been given initial review by the project team in the Section C route assessment.

The evaluation process aims to establish, within the Section being reviewed, relativity between each of the alternative route options when looking at a specific criterion, ie does one route option perform better or worse than another route option against that particular criterion. The proforma uses abbreviated descriptors to endeavour to help workshop participants differentiate the route options. In the proforma used at this value management workshop the descriptors ranged from **E** – excellent; **VG** – very good; **G** – good; **F** – fair; to **P** – poor. In some instances they were inappropriate descriptors, particularly where an aspect could never be considered “excellent” or even “good”. But the focus groups were still able to differentiate the route options against each criterion by focusing on the relativities rather than the potentially emotive implications of the descriptors.

It is also important to recognise that this process is a qualitative evaluation.

Once completed, the evaluation was then scored using the weightings of the criteria and the relative rating against each criterion. A comparative ranking for each option within each of the three assessment perspectives was established.

A coarse sensitivity analysis is used in this assessment process to assist determining whether differentiation can be achieved. Where the difference in ‘total score’ between route options was not greater than the numerical value of the highest weighted criteria within that perspective, the options were considered equally ranked.

Lastly, during this evaluation and assessment phase each focus group recorded key observations made during the discussions as they undertook the assessment process. These are recorded in this report following each evaluation matrix.

The results of the assessments are shown in the following evaluation matrices:

## Section B - Assessment of route options

### Comparing Pink, Green and Yellow Routes

#### Functional criteria review

Assessment Criteria		Route length, grade efficiency, travel time and vehicle operating costs	Constructability and ease of construction	Minimise no. of accesses (controlled and direct)	Vertical and horizontal alignment (including orientation)	Overall network safety (new and residual roads)	
Weighting → Score ↓		22%	6%	22%	22%	28%	
Pink Route	5	E	E	E	E	E	Rank <b>2</b>
	4	VG	VG	VG	VG	<b>VG</b>	
	3	<b>G</b>	<b>G</b>	G	<b>G</b>	G	
	2	F	F	<b>F</b>	F	F	
	1	P	P	P	P	P	
Sub-total		<b>66</b>	<b>18</b>	<b>44</b>	<b>66</b>	<b>112</b>	<b>306</b>
Green Route	5	E	E	E	<b>E</b>	<b>E</b>	Rank <b>1</b>
	4	<b>VG</b>	<b>VG</b>	VG	VG	VG	
	3	G	G	<b>G</b>	G	G	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		<b>88</b>	<b>24</b>	<b>66</b>	<b>110</b>	<b>140</b>	<b>428</b>
Yellow Route	5	E	E	E	E	E	Rank <b>2</b>
	4	VG	VG	<b>VG</b>	VG	VG	
	3	<b>G</b>	G	G	<b>G</b>	G	
	2	F	<b>F</b>	F	F	<b>F</b>	
	1	P	P	P	P	P	
Sub-total		<b>66</b>	<b>12</b>	<b>88</b>	<b>66</b>	<b>56</b>	<b>288</b>

#### Ranking of routes against functional criteria

Routes in Section B	Rank	Summary of focus group comments
Pink	2	Better alignment and significantly overall better network safety.
Green	1	
Yellow	2	

#### Key observations on 'relativity' discussions

For route length, grade efficiency, travel time and vehicle operating costs:

- Length of routes are:
  - Pink - 9,390 metres
  - Green - 9,050 metres
  - Yellow - 9,490 metres
  - Blue - 6,650 metres
  - Orange - 6,650 metres
  - Brown - 15,700 metres



- For travel times:
  - Discussion took place regarding impact of grades and length of grade on travel times.
  - The project team undertook some comparative analysis, during the value management workshop, based loosely on design guide information eg, percentage of the grade travelled at 100km/h, 80km/h, 60km/h.
  - Pink Route (southbound) – estimated 10 seconds loss in 338 seconds (at 100kph).
  - Green Route (southbound) – estimated 2.5 seconds in 325 seconds.
  - Yellow Route (southbound) – estimated 1.8 seconds loss.
  - Pink Route (northbound) – 5 seconds loss.
  - Green Route (northbound) – 2 seconds loss.
  - Yellow Route (northbound) – nil loss.
  - Potential to improve grade south from Belinda Street on Pink and Green Routes.

The project team provided details of vehicle operating costs and concluded: Green Route is the best, followed by Pink and Yellow equal and one rating lower than Green Route.

#### For constructability

- Discussion on the complexity that tunnel construction introduces.
- Acid sulphate/soft soils add complexity to Yellow Route.
- Inability to balance earthworks on Yellow Route adds complexity.
- On-line as against off-line construction influences complexity.
- Concluded Yellow Route is worst, then Pink Route and then Green Route.

#### For minimising accesses

- Influenced by length of off-line construction.
- Concluded Yellow Route the best, then the Green Route and then Pink Route.

#### For vertical and horizontal alignment

- Green Route offers high standard alignment.
- Pink Route has very long continuous horizontal curve.
- Yellow Route has a long straight.
- Concluded Green Route the best followed by Pink and Yellow routes equal.

#### For overall network safety

- Green Route is marginally safer but does it differentiate enough from the Pink Route?
- Yellow Route leaves significant length of residual highway with lower incidence but higher severity accidents.
- Concluded Green Route the best followed by Pink Route and followed by Yellow Route.

## Section B Comparing Pink, Green and Yellow Routes

### Socio-economic criteria review

Assessment criteria		Minimise impact on agricultural lands and businesses.	Loss of residences in communities (consequential viability of communities).	Connectivity and accessibility impacts for communities.	Impact on views of the road from communities	Road traveller experience and "wow" factor impacts.	Impacts on non-agricultural businesses.	
Weighting → Score ↓		21%	25%	25%	7%	8%	15%	
Pink Route	5	E	E	E	E	E	E	Rank <b>2</b>
	4	VG	VG	VG	VG	VG	VG	
	3	G	G	<b>G</b>	G	<b>G</b>	<b>G</b>	
	2	<b>F</b>	<b>F</b>	F	F	F	F	
	1	P	P	P	<b>P</b>	P	P	
Sub-total		<b>42</b>	<b>50</b>	<b>75</b>	<b>7</b>	<b>24</b>	<b>45</b>	<b>243</b>
Green Route	5	E	E	E	E	E	E	Rank <b>1</b>
	4	VG	VG	VG	<b>VG</b>	<b>VG</b>	VG	
	3	<b>G</b>	<b>G</b>	G	G	G	<b>G</b>	
	2	F	F	<b>F</b>	F	F	F	
	1	P	P	P	P	P	P	
Sub-total		<b>63</b>	<b>75</b>	<b>50</b>	<b>28</b>	<b>32</b>	<b>45</b>	<b>293</b>
Yellow Route	5	E	E	E	E	E	E	Rank <b>3</b>
	4	VG	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	G	
	2	F	F	F	F	<b>F</b>	F	
	1	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	P	<b>P</b>	
Sub-total		<b>21</b>	<b>25</b>	<b>25</b>	<b>7</b>	<b>16</b>	<b>15</b>	<b>109</b>

Routes in Section B	Rank	Summary of focus group comments
Pink	2	Less impact on communities and properties.
Green	1	
Yellow	3	

### Key observations on "relativity" discussions

For impact on agricultural lands and business – areas, classes, numbers and severance:

- Discussed that assessment needs to consider loss of productive lands/severance issues as well as number of properties (smaller properties) impacted.
- One view is that Yellow Route is least desirable (agriculture focus – from resource mapping).
- Other view is that Pink Route is least desirable (economic focus).
- To resolve this, the group split the criteria and assessed it in three sub-criteria categories.
- More informed investigation into cost benefits level of impact.
- Areas and classes of agricultural land:
  - Pink Route – very good; uses worst agricultural land.
  - Green Route – good.
  - Yellow Route – poor: uses best land, most area and highest production.

- Numbers and severances of agricultural land lots:
  - Green Route – good relative to other two routes.
  - Pink Route – fair.
  - Yellow Route – poor.
- Flow on business impacts:
  - Green and Yellow Routes – fair.
  - Pink Route – poor.
- Properties
  - Green Route – 24 affected (10 major).
  - Pink Route – 34 affected (15 major).
  - Yellow Route – 25 affected (19 major).
- Concluded overall that Green Route is best (good), followed by Pink Route (fair) and Yellow Route (poor).

For loss of residences in communities and consequential viability to community

- This is an instance where the descriptors used in the template for differentiating the route options were not seen as appropriate but the relativity could still be assessed.
- Pink Route is 'fair', Green Route is 'good' and Yellow Route is 'poor', based on presumption of residences lost being Pink Route – 13, Green Route – 5 to 6 and Yellow Route – 5 to 9.

For connectivity and accessibility impacts for communities:

- Used an indicator of what brings most change (ie. Pink Route – some change (good); Green Route – somewhat more (fair) and Yellow Route – most change (poor)).

For impact on views from communities of the road:

- Green Route – tunnel is a good visual solution (very good).
- Pink Route – cutting as visual impact (poor).
- Yellow Route – impact is a significant change introduced to area (poor).

For road traveller experience and 'wow' factor impacts:

- Green Route – takes driver to number of landscape experiences (very good).
- Pink Route – less than Green due to cutting, but does follow landscape (good).
- Yellow Route – does not follow the landscape as well as Pink or Green (fair).
- Green Route – tunnel length design is 350 metres, if extended could reduce length of cutting – need to investigate further.

For impacts on non-agricultural businesses:

- Consider only one business in this area (ie, winery) – important to the district.
- Yellow Route – worst for winery due to loss of passing trade (poor).
- Pink Route – good.
- Green Route – good.
- This project must address appropriate access to the winery and local homes.

**Section B**  
**Comparing Pink, Green and Yellow Routes**  
*Natural and cultural environment criteria review*

Assessment criteria		Impact on threatened species	Impact on endangered ecological communities.	Impact on habitats and wildlife corridors.	Impacts on wetlands and catchments of wetlands.	Impact on indigenous heritage.	Impact on non-indigenous heritage.	Impact on surface water quality.	Assessment of carbon footprint size.	Noise impacts.	Potential to change flooding characteristics.	Impacts on groundwater.	Climate change impact/vulnerability.	
Weighting → Score ↓		14%	14%	12%	9%	13%	13%	6%	0.5%	7%	3%	7%	0.5%	
<b>Pink Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>3</b>
	4	VG	VG	VG	VG	VG	VG	VG	<b>VG</b>	VG	VG	<b>VG</b>	VG	
	3	G	G	G	<b>G</b>	G	G	<b>G</b>	G	G	<b>G</b>	G	<b>G</b>	
	2	F	F	F	F	F	F	F	F	F	F	F	F	
	1	<b>P</b>	<b>P</b>	<b>P</b>	P	<b>P</b>	<b>P</b>	P	P	P	P	P	P	
Sub-total		<b>14</b>	<b>14</b>	<b>12</b>	<b>27</b>	<b>13</b>	<b>13</b>	<b>18</b>	<b>2</b>	<b>35</b>	<b>9</b>	<b>28</b>	<b>1.5</b>	<b>186.5</b>
<b>Green Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>2</b>
	4	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	
	3	G	G	<b>G</b>	<b>G</b>	G	G	<b>G</b>	<b>G</b>	G	<b>G</b>	<b>G</b>	<b>G</b>	
	2	<b>F</b>	<b>F</b>	F	F	F	<b>F</b>	F	F	<b>F</b>	F	F	F	
	1	P	P	P	P	<b>P</b>	P	P	P	P	P	P	P	
Sub-total		<b>28</b>	<b>28</b>	<b>36</b>	<b>27</b>	<b>13</b>	<b>26</b>	<b>18</b>	<b>1.5</b>	<b>14</b>	<b>9</b>	<b>21</b>	<b>1.5</b>	<b>223</b>
<b>Yellow Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>1</b>
	4	VG	VG	<b>VG</b>	VG	VG	VG	VG	VG	VG	VG	VG	VG	
	3	<b>G</b>	<b>G</b>	G	G	<b>G</b>	<b>G</b>	G	G	G	G	G	G	
	2	F	F	F	F	F	F	F	F	F	F	F	F	
	1	P	P	P	<b>P</b>	P	P	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
Sub-total		<b>42</b>	<b>42</b>	<b>48</b>	<b>9</b>	<b>39</b>	<b>39</b>	<b>6</b>	<b>0.5</b>	<b>7</b>	<b>3</b>	<b>7</b>	<b>0.5</b>	<b>243</b>

Routes in Section B	Rank	Summary of focus group comments
Pink	3	Some concerning aspects can/should be able to be mitigated but others, in particular the cultural sites, are finite. This saw Pink suffer and Yellow perform marginally better than Green.
Green	2	
Yellow	1	

**Key observations on “relativity” discussions**

For impact on threatened species:

- Department of Environment, Conservation and Climate raised issue of impacts on vulnerable species by Pink and Green Routes.
- Pink Route rated worst due to proximity of cutting.
- Green Route next worst due to proximity of tunnel.
- Yellow Route best because of threatened species habitat.

For impact on endangered ecological communities:

- Yellow Route rated best because marginal impacts on endangered ecological communities more defined than Green Route.
- Pink Route rated worst.

For impact on habitats and wildlife corridors:

- Pink Route rated worst by large margin due to large cutting being a large physical barrier.
- Yellow Route rated better than Green Route due to larger separation from vulnerable habitats, therefore less impact on wildlife corridors.

For impact on wetlands and wetland catchments:

- Pink Route and Green Route rated equal.
- Yellow Route rated worst because it crosses flood plain.

For impact on Indigenous heritage:

- Pink Route poor because cut disrupts ridgeline.
- Yellow Route is best because historical sites in Broughton Creek avoided.
- No options rate highly regarding Indigenous heritage.

For impact on non-Indigenous heritage:

- Sedgeford (historical homestead) impacted by Pink and Green Routes.
- Pink Route passes close to listed bridge.
- Yellow Route passes near the previous (long ago) Toolijooa Village which has heritage values, but no remaining physical context.
- Pink Route introduces 21 Century scar on 19 Century landscape.
- Pink Route is worst, Green Route next best, Yellow Route best.

For impact on surface water quality:

- Yellow Route brings road closer to Crooked River system, which is most sensitive receiving water.

For assessment of carbon footprint size:

- Yellow Route highest impact because of tunnel and fill.
- Green Route has tunnel therefore second worst.
- Pink Route best because no tunnel, but cutting.

For noise impacts:

- Pink Route is best because closest to existing route therefore differential noise impacts are less.
- Green Route next best for the same reason.
- Yellow Route is worst because it passes closer to areas previously unaffected by noise.

For the potential to change flooding characteristics:

- Yellow Route worst because it crosses floodplain.
- Pink and Green routes rated the same.

For impacts on groundwater:

- Compression from preloading squeezes water out of soft agricultural soils on Yellow Route.
- Green Route next best and Pink Route is best.

For climate change vulnerability/impacts:

- Yellow Route more vulnerable than Green or Pink Routes.

## Section C - Assessment of route options

### Comparing Blue, Orange and modified Orange routes

#### Functional criteria review

Assessment criteria		Route length, grade efficiency, travel time and vehicle operating costs.	Constructability and ease of construction.	Minimise no. of accesses (controlled and direct).	Vertical and horizontal alignment (including orientation).	Overall network safety (new and residual roads).	
Weighting → Score ↓		22%	6%	22%	22%	28%	
<b>Blue Route</b>	5	<b>E</b>	E	E	<b>E</b>	E	Rank <b>1</b>
	4	VG	<b>VG</b>	<b>VG</b>	VG	VG	
	3	G	G	G	G	<b>G</b>	
	2	F	F	F	F	F	
	1	P	P	P	P	P	
Sub-total		<b>110</b>	<b>24</b>	<b>88</b>	<b>110</b>	<b>84</b>	<b>416</b>
<b>Orange Route</b>	5	<b>E</b>	E	E	E	<b>E</b>	Rank <b>1</b>
	4	VG	VG	VG	VG	VG	
	3	G	G	<b>G</b>	<b>G</b>	G	
	2	F	<b>F</b>	F	F	F	
	1	P	P	P	P	P	
Sub-total		<b>110</b>	<b>12</b>	<b>66</b>	<b>66</b>	<b>140</b>	<b>394</b>
<b>modified Orange Route</b>	5	<b>E</b>	E	E	E	<b>E</b>	Rank <b>1</b>
	4	VG	VG	VG	VG	VG	
	3	G	G	<b>G</b>	<b>G</b>	G	
	2	F	<b>F</b>	F	F	F	
	1	P	P	P	P	P	
Sub-total		<b>110</b>	<b>12</b>	<b>66</b>	<b>66</b>	<b>140</b>	<b>394</b>

Routes in Section B	Rank	Summary of focus group comments
Blue	1	No significant difference in functionality between all routes. Blue Route's better alignment is balanced by better network safety for Orange Route (and modified Orange)
Orange	1	
modified Orange	1	

#### Key observations on "relativity" discussions

For route length, grade efficiency, travel time and vehicle operating costs:

- Length of routes are:
  - Blue - 6,650 metres.
  - Orange - 6,650 metres.
  - Brown - 15,700 metres.
- For travel times:
  - Blue Route (southbound) – no significant inclines.
  - Orange Route (southbound) – no significant inclines.
  - Blue Route (northbound) – 0.75 seconds loss at 100kmh.
  - Orange Route (northbound) – 1.8 seconds loss at 100kmh.
- For vehicle operating costs – the project team provided details of vehicle operating costs and concluded: *all routes were equal.*

For constructability:

- Discussion that bridges on Blue Route are not as difficult to construct as the large bridge on Orange Route.
- Concluded that Blue Route is easier and the issues on the Orange Route and modified Orange Route are equal.
- Blue Route is prone to flooding during construction – although it is all off-line.
- Orange and modified Orange Routes are less flood prone during construction, but a significant amount is on-line construction.

Concluded that Blue Route is better than Orange and modified Orange Routes

For minimising accesses:

- Discussion that there is no distinction between the Orange and modified Orange Routes.
- No direct accesses have been provided to the Blue Route

Number of accesses to Orange and modified Orange Routes is not a large amount – Orange and modified Orange Routes ranked lower than Blue Route

For vertical and horizontal alignment:

- Blue Route performs well.
- Could not distinguish between Orange and modified Orange Routes
- Discussion regarding how much better the Blue Route is compared to the other routes

Ultimately concluded that Blue Route was significantly better

For overall network safety:

- Discussion that for Blue Route existing residual road would have high accident rate with interchange at Tindalls Lane. This was considered the differential.
- The Blue, Orange and modified Orange Routes would have similar accident rates – it is the residual that will influence safety (Blue Route leaves 30% residual).
- Some debate regarding how many accidents will occur on residual and by what degree this is different to the Orange and modified Orange Routes.

Concluded that Orange and modified Orange better than Blue Route.

## Section C

### Comparing Blue, Orange and modified Orange routes

#### Socio-economic criteria review

Assessment criteria		Minimise impact on agricultural lands and businesses.	Loss of residences in communities (consequential viability of communities).	Connectivity and accessibility impacts for communities.	Impact on views of the road from communities.	Road traveller experience and "wow" factor impacts.	Impacts on non-agricultural businesses.	
Weighting → Score ↓		21%	25%	25%	7%	8%	15%	
<b>Blue Route</b>	5	E	E	E	E	E	E	Rank <b>3</b>
	4	VG	VG	VG	VG	VG	VG	
	3	G	G	G	<b>G</b>	G	G	
	2	F	F	F	F	<b>F</b>	F	
	1	<b>P</b>	<b>P</b>	<b>P</b>	P	P	<b>P</b>	
Sub-total		<b>21</b>	<b>25</b>	<b>25</b>	<b>21</b>	<b>16</b>	<b>15</b>	<b>123</b>
<b>Orange Route</b>	5	E	E	E	E	E	E	Rank <b>2</b>
	4	<b>VG</b>	VG	VG	VG	VG	VG	
	3	G	<b>G</b>	<b>G</b>	G	G	<b>G</b>	
	2	F	F	F	F	<b>F</b>	F	
	1	P	P	P	<b>P</b>	P	P	
Sub-total		<b>84</b>	<b>75</b>	<b>75</b>	<b>7</b>	<b>16</b>	<b>45</b>	<b>302</b>
<b>modified Orange Route</b>	5	E	E	E	E	E	E	Rank <b>1</b>
	4	<b>VG</b>	<b>VG</b>	<b>VG</b>	VG	VG	VG	
	3	G	G	G	G	G	<b>G</b>	
	2	F	F	F	<b>F</b>	<b>F</b>	F	
	1	P	P	P	P	P	P	
Sub-total		<b>84</b>	<b>100</b>	<b>100</b>	<b>14</b>	<b>16</b>	<b>45</b>	<b>359</b>

Routes in Section B	Rank	Summary of focus group comments
Blue	3	Modified Orange has less impact on agricultural land, communities, severances and business communities
Orange	2	
modified Orange	1	

#### Key observations on "relativity" discussions

For impact on agricultural lands and business – areas, classes, numbers, severance:

- Areas and classes of agricultural land:
  - Orange Route and modified Orange Route – takes some adjacent land so not excellent (very good).
  - Blue Route – poor.
- Numbers and severances of agricultural land lots:
  - Orange and modified Orange Routes – some severance near Tindalls Lane. 14 properties affected (zero major) (very good).
  - Blue Route – 19 properties effected (11 major) (poor).
  - Note modified Orange Route traverses a turf farm which has high value.
- Flow on business impacts:
  - Orange and modified Orange Routes very good.
  - Blue Route – poor.



- Concluded overall that Orange and modified Orange Routes are the best (very good) and Blue Route (poor)

For loss of residences in communities and consequential viability to community:

- This is an instance where the descriptors used in the template for differentiating the route options were not seen as appropriate but the relativity could still be assessed.
- Orange Route – impact on eight homes.
- Blue Route – impact on five homes but greater effect on rural community
- Modified Orange Route – impact on five homes

For connectivity and accessibility impacts for communities:

- Modified Orange Route – avoids community facilities (very good).
- Blue Route – impacts rural community along the route (poor).
- Orange Route – relative impact on functioning of the community. Houses lost do not significantly impact community or impact interaction (good).

For impact on views of the road from communities:

- Blue Route – good.
- Modified Orange Route – fair.
- Orange Route – affects greater concentration of community mass, noise walls may be required (poor).

For road traveller experience and “wow” factor impacts

- Orange, modified Orange and Blue Routes – no differentiation, subjective (all fair).

For impacts on non-agricultural businesses

- Blue Route – less trade coming into Berry (poor).
- Orange Route – good.
- Modified Orange Route – good.

## Section C Comparing Blue, Orange and modified Orange Routes

### Natural and cultural environment criteria review

Assessment criteria		Impact on threatened species.	Impact on endangered ecological communities.	Impact on habitats and wildlife corridors.	Impacts on wetlands and catchments of wetlands.	Impact on indigenous heritage.	Impact on non-Indigenous heritage.	Impact on surface water quality.	Assessment of carbon footprint size.	Noise impacts.	Potential to change flooding characteristics.	Impacts on groundwater.	Climate change impact/vulnerability.		
Weighting → Score ↓		14%	14%	12%	9%	13%	13%	6%	0.5%	7%	3%	7%	0.5%		
Blue Route	5	E	E	E	N/A	E	E	E	E	E	E	E	E	Rank  <b>3</b>	
	4	VG	VG	VG		VG	<b>VG</b>	VG	VG	VG	VG	VG	VG		
	3	G	G	G		F	F	F	F	<b>G</b>	G	G	G		
	2	F	F	F		P	P	P	P	F	<b>F</b>	F	F		
	1	<b>P</b>	<b>P</b>	<b>P</b>		P	P	<b>P</b>	<b>P</b>	P	P	P	P		
Sub-total		<b>14</b>	<b>14</b>	<b>12</b>	-	<b>39</b>	<b>52</b>	<b>6</b>	<b>0.5</b>	<b>21</b>	<b>6</b>	<b>14</b>	<b>1</b>	<b>179.5</b>	
Orange Route	5	E	E	E	N/A	E	E	E	E	E	<b>E</b>	E	E	Rank  <b>2</b>	
	4	VG	VG	<b>VG</b>		VG	VG	VG	VG	VG	VG	VG	<b>VG</b>		<b>VG</b>
	3	<b>G</b>	<b>G</b>	G		F	F	<b>G</b>	<b>G</b>	G	G	G	G		G
	2	F	F	F		P	P	F	F	F	F	F	F		F
	1	P	P	P		P	<b>P</b>	P	P	<b>P</b>	P	P	P		P
Sub-total		<b>42</b>	<b>42</b>	<b>48</b>	-	<b>26</b>	<b>13</b>	<b>18</b>	<b>1.5</b>	<b>7</b>	<b>15</b>	<b>28</b>	<b>2</b>	<b>242.5</b>	
modified Orange Route	5	E	E	E	N/A	E	E	E	E	E	E	E	E	Rank  <b>1</b>	
	4	VG	VG	VG		VG	VG	VG	VG	VG	<b>VG</b>	<b>VG</b>	<b>VG</b>		
	3	<b>G</b>	<b>G</b>	<b>G</b>		F	F	<b>G</b>	<b>G</b>	G	G	G	G		
	2	F	F	F		P	P	F	F	<b>F</b>	F	F	F		
	1	P	P	P		P	P	P	P	P	P	P	P		
Sub-total		<b>42</b>	<b>42</b>	<b>36</b>	-	<b>39</b>	<b>39</b>	<b>18</b>	<b>1.5</b>	<b>14</b>	<b>12</b>	<b>28</b>	<b>2</b>	<b>273.5</b>	

Routes in Section B	Rank	Summary of focus group comments
Blue	3	Existing routes are already 'contaminated'. Modification improvements are possible.
Orange	2	
modified Orange	1	

#### Key observations on "relativity" discussions

For impact on threatened species:

- Blue Route is worst because of greenfield construction.

For impact on endangered ecological communities:

- Same as for threatened species assessment.

For impact on habitats and wildlife corridors:

- Blue Route is worst because of impact on riparian corridors.

For impacts on wetlands and wetland catchments:

- No impacts.

For impact on Indigenous heritage

- Potentially less below ground archaeology on Orange Route than Blue Route due to the number of creek crossings in Blue Route.
- Modified Orange Route avoids more known sites than Orange Route. Orange Route impacts known sites.
- Blue Route is best, then modified Orange Route and Orange Route is the worst.

For impact on non-Indigenous heritage

- Blue Route has least heritage impacts because Pulman Street precinct avoided.

For impacts on surface water quality:

- Blue Route is worse because of greater number of creek crossings.

For assessment of carbon footprint size:

- Blue Route worse because it is a greenfield build and requires more excavation. Blue Route will have more bridges therefore more embodied emissions.

For noise impacts

- Blue Route is better because noise further from more residences.

For potential to change flooding characteristics

- Orange Route and modified Orange Route provide opportunities to mitigate flooding at Berry, whereas the Blue Route does not.

### Intermediate summary of section route option assessment

SECTION B - south Gerringong to north Berry					
	Functional	Socio-economic	Natural and cultural environment	Strategic estimate \$M	Benefit cost ratio (BCR)
Route	Rank	Rank	Rank		
Pink Route	2	2	3	235	1.4
Green Route	1	1	2	340	1.2
Yellow Route	2	3	1	390	0.9

SECTION C - Berry township					
	Functional	Socio-economic	Natural and cultural environment	Strategic estimate \$M	Benefit cost ratio
Route	Rank	Rank	Rank		
Blue Route	1	3	3	155	1.0
Orange Route	1	2	2	155	1.0
modified Orange Route	1	1	1	~155	1.0

## Agreement on complete options for assessment

### ***Culling of routes to form complete options for assessment against the Brown Route***

As a result of the evaluation of alternative route options in Sections B and C the following conclusions relating to options for Sections B and Section C were made:

**Remove** the following routes from further evaluation as they were considered inferior to the other routes:

- In Section B ***remove the Yellow Route*** from further evaluation because of its relatively poor performance when assessed against the Pink Route and Green Route under the functional and socio-economic criteria. In addition it had the highest capital cost, by a substantial degree, compared to the Pink and Green Routes.
- In Section C ***remove the Orange Route*** from further evaluation (assuming confirmation of the feasibility of the modified Orange Route is assured) because it performs poorly against socio-economic and natural and cultural environment criteria when compared to modified Orange Route.
- In Section C ***remove the Blue Route*** from further evaluation because it performs significantly worse against socio-economic and natural and cultural environment criteria when compared to both the modified Orange Route and the Orange Route.

### ***Assessment complete options through Sections B and C***

The value management workshop participants agreed to **continue** with a comparative assessment of the following combination of route options in relation to the three themes of criteria agreed earlier in the value management workshop:

- **Pink/modified Orange Route;**
- **Green/modified Orange Route; and**
- **Brown Route**

**Note:** the Pink/modified Orange routes were retained for the 'complete' option assessment in this value management workshop primarily because the strategic cost estimate and benefit cost ratios for these routes are attractive when compared to the other routes.

Once the qualitative evaluation was completed, the evaluation was scored using the weightings of the criteria and a comparative ranking for each option within each perspective was established. Each focus group discussed their findings and recorded their observations and conclusions as a result of their deliberations.

The findings of each focus group were presented to the whole group for discussion, debate and finally endorsement of the assessment to assist the group move forward. Their final findings are listed below:

## Assessment of complete options against functional criteria

Assessment criteria		Route length, grade efficiency, travel time and vehicle operating costs.	Constructability and ease of construction.	Minimise no. of accesses (controlled and direct).	Vertical and horizontal alignment (including orientation).	Overall network safety (new and residual roads).	
Weighting → Score ↓		22%	6%	22%	22%	28%	
<b>Brown Route</b>	5	<b>E</b>	E	<b>E</b>	E	E	Rank <b>2</b>
	4	VG	VG	VG	VG	VG	
	3	G	G	G	<b>G</b>	G	
	2	F	F	F	F	<b>F</b>	
	1	P	<b>P</b>	P	P	<b>P</b>	
Sub-total		<b>110</b>	<b>6</b>	<b>110</b>	<b>66</b>	<b>42</b>	<b>334</b>
<b>Pink + modified Orange Route</b>	5	E	E	E	E	E	Rank <b>2</b>
	4	VG	VG	VG	VG	<b>VG</b>	
	3	<b>G</b>	<b>G</b>	G	<b>G</b>	G	
	2	F	F	<b>F</b>	F	F	
	1	P	P	P	P	P	
Sub-total		<b>66</b>	<b>18</b>	<b>44</b>	<b>66</b>	<b>112</b>	<b>306</b>
<b>Green + modified Orange Route</b>	5	E	E	E	E	<b>E</b>	Rank <b>1</b>
	4	<b>VG</b>	VG	VG	<b>VG</b>	VG	
	3	G	G	<b>G</b>	G	G	
	2	F	<b>F</b>	F	F	F	
	1	P	P	P	P	P	
Sub-total		<b>88</b>	<b>12</b>	<b>66</b>	<b>88</b>	<b>140</b>	<b>394</b>

### Key observations on "relativity" discussions

For route length, grade efficiency, travel time and vehicle operating costs:

- For travel times:
  - Brown Route – 9 minutes 25 seconds with no significant grades at 100kph.
  - Pink Route (southbound) – 5 minutes 38 seconds at 100kph.
  - Pink (northbound) - 4.8 seconds time loss at 100kph.
  - Orange Route (southbound) – 3 minutes 59 seconds at 100kph.
  - Orange Route (northbound) - 1.8 seconds time loss at 100kph.
  - Green Route (southbound) – 5 minutes 25 seconds leading to a 2.5 second time loss at 100kph.
- Consensus was that the Brown Route was best, with Pink/modified Orange Route and Green/modified Orange Route equal and second best.
- For vehicle operating costs – the project team provided details of vehicle operating costs and agreed that there is no difference between the Brown Route and Green/modified Orange Route and Pink/modified Orange Route is worst.

Overall the focus group concluded for these criteria that Brown Route is best followed by Green/modified Orange Route and Pink/modified Orange Route is worst

For constructability

- Brown Route does not have a tunnel (positive).
- Brown Route is a greenfield construction (positive).
- Soft soil is a negative for the Brown Route (very significant).
- Need to import significant fill for the Brown Route (negative).
- Tunnel on the Green/modified Orange Route adds complexity.
- Wet site for Brown route means constructing from one advancing face (still some opportunity to work from other fronts where Toolijooa Road crosses rail line) – more weather susceptible (negative).
- Ranked Pink/modified Orange Route as best followed by Green/modified Orange Route then the Brown Route.

For minimise accesses

- Green Route is more off-line than Pink Route – therefore less accesses on the Green/modified Orange Route.
- Brown Route has large sections of off-line and therefore ranks best.
- Ranking is Brown Route as best followed by Green/modified Orange Route then the Pink/modified Orange Route.

For vertical and horizontal alignment

- Brown Route has reduced road safety (refer Ausroads road design guidelines) due to long lengths of straights.
- Debate regarding whether this is worse, or equal to, the Pink Route with its curvilinear alignment. Focus group decided that these issues were equal.
- Long straight is approximately 1.5 – 2.0 hours south of Sydney (in the fatigue zone).
- Ranked Green/modified Orange Route as best followed by Pink/modified Orange Route and Brown Route equal.

For overall network safety

- Brown Route leaves large quantity of residual highway.
- Brown Route requires a large quantity of off-line construction leaving traffic on existing highway for longer periods.
- Considerable debate regarding the traffic volume and mix on residual route post-construction.
- Ranked Green/modified Orange Route as best followed by Pink/modified Orange Route then the Brown Route

## Assessment of complete options against socio-economic criteria

Assessment criteria		Minimise impact on agricultural lands and businesses.	Loss of residences in communities (consequential viability of communities).	Connectivity and accessibility impacts for communities.	Impact on views of road from communities.	Road traveller experience and "wow" factor impacts.	Impacts on non-agricultural businesses.	
Weighting → Score ↓		21%	25%	25%	7%	8%	15%	
<b>Brown Route</b>	5	E	E	E	E	E	E	Rank <b>3</b>
	4	VG	VG	VG	VG	VG	VG	
	3	G	G	G	G	G	G	
	2	F	F	F	F	F	F	
	1	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	
Sub-total		<b>21</b>	<b>25</b>	<b>25</b>	<b>7</b>	<b>8</b>	<b>15</b>	<b>101</b>
<b>Pink and modified Orange Route</b>	5	E	E	E	E	E	E	Rank <b>2</b>
	4	VG	VG	<b>VG</b>	VG	VG	VG	
	3	<b>G</b>	<b>G</b>	G	<b>G</b>	<b>G</b>	<b>G</b>	
	2	F	F	F	F	F	F	
	1	P	P	P	P	P	P	
Sub-total		<b>63</b>	<b>75</b>	<b>100</b>	<b>21</b>	<b>24</b>	<b>45</b>	<b>328</b>
<b>Green and modified Orange Route</b>	5	E	E	E	E	E	E	Rank <b>1</b>
	4	VG	<b>VG</b>	<b>VG</b>	<b>VG</b>	<b>VG</b>	VG	
	3	<b>G</b>	G	G	G	G	<b>G</b>	
	2	F	F	F	F	F	F	
	1	P	P	P	P	P	P	
Sub-total		<b>63</b>	<b>100</b>	<b>100</b>	<b>28</b>	<b>32</b>	<b>45</b>	<b>368</b>

### Key observations on "relativity" discussions

For impact on agricultural lands and business – areas, classes, numbers, severance:

- Areas and classes of agricultural land:
  - This is an instance where the descriptors used in the template for differentiating the route options were not seen as appropriate but the relativity could be still assessed.
  - Brown Route – poor.
  - Pink/modified Orange Route – good.
  - Green/modified Orange Route – good.
- Numbers and severances of agricultural land lots:
  - Brown Route – 50 properties effected (30 major).
  - Pink/modified Orange Route – 60 properties effected (25 major)
  - Green/modified Orange Route – 53 properties effected (20 major)
- Flow on business impacts:
  - Brown Route – poor.
  - Pink/modified Orange Route – poor.
  - Green/modified Orange Route – poor.
- Concluded overall that Pink/modified Orange and Green/modified Orange Routes are the best (good) and the Brown Route (poor).

For loss of residences in communities and consequential viability to community (relatively):

- This is an instance where the descriptors used in the template for differentiating the route options were not seen as appropriate but the relativity could still be assessed.
- Brown Route – impact on 18 homes and loss of two communities.
- Green/modified Orange Route – impact on 14 homes and no communities.
- Pink/modified Orange Route – impact on 21 homes and no communities.

For connectivity and accessibility impacts for communities (relatively):

- Brown Route – poor.
- Pink/modified Orange Route – very good.
- Green/modified Orange Route – very good.

For impact on views from communities of the road:

- Brown Route – Cannot be modified to take benefit of view (poor).
- Pink/modified Orange Route – good.
- Green/modified Orange Route – very good.
- Note – Brown Route is adjacent to David Berry Hospital. Need to consider views from hospital community and palliative care unit.

For road traveller experience and “wow” factor impacts:

- Brown Route – poor.
- Pink/modified Orange Route – good.
- Green/modified Orange Route – very good.

For impacts on non-agricultural businesses:

- Brown Route – poor.
- Pink/modified Orange Route – good.
- Green/modified Orange Route – good.



## Assessment of complete options against the natural and cultural environment criteria

Assessment criteria		Impact on threatened species.	Impact on endangered ecological communities.	Impact on habitats and wildlife corridors.	Impacts on wetlands and catchments of wetlands.	Impact on indigenous heritage	Impact on non-Indigenous heritage.	Impact on surface water quality.	Assessment of carbon footprint size.	Noise impacts.	Potential to change flooding characteristics.	Impacts on groundwater.	Climate change impact/vulnerability.	
Weighting → Score ↓		14%	14%	12%	9%	13%	13%	6%	0.5%	7%	3%	7%	0.5%	
<b>Brown Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>3</b>
	4	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	VG	
	3	G	G	G	G	<b>G</b>	G	G	G	G	G	G	G	
	2	F	F	F	F	F	F	F	F	F	<b>F</b>	F	F	
	1	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	P	<b>P</b>	<b>P</b>	<b>P</b>	<b>P</b>	P	<b>P</b>	<b>P</b>	
Sub-total		<b>14</b>	<b>14</b>	<b>12</b>	<b>9</b>	<b>39</b>	<b>13</b>	<b>6</b>	<b>0.5</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>0.5</b>	<b>128</b>
<b>Pink and modified Orange Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>2</b>
	4	VG	VG	VG	VG	VG	VG	VG	VG	<b>VG</b>	<b>VG</b>	VG	<b>VG</b>	
	3	<b>G</b>	<b>G</b>	G	<b>G</b>	G	G	G	G	G	G	<b>G</b>	G	
	2	F	F	<b>F</b>	F	F	<b>F</b>	<b>F</b>	<b>F</b>	F	F	F	F	
	1	P	P	P	P	<b>P</b>	P	P	P	P	P	P	P	
Sub-total		<b>42</b>	<b>42</b>	<b>24</b>	<b>27</b>	<b>13</b>	<b>26</b>	<b>12</b>	<b>1</b>	<b>28</b>	<b>12</b>	<b>21</b>	<b>2</b>	<b>250</b>
<b>Green and modified Orange Route</b>	5	E	E	E	E	E	E	E	E	E	E	E	E	<b>Rank</b>  <b>1</b>
	4	<b>VG</b>	<b>VG</b>	<b>VG</b>	VG	VG	VG	VG	VG	VG	<b>VG</b>	VG	<b>VG</b>	
	3	G	G	G	<b>G</b>	G	G	G	G	<b>G</b>	G	<b>G</b>	G	
	2	F	F	F	F	<b>F</b>	<b>F</b>	<b>F</b>	<b>F</b>	F	F	F	F	
	1	P	P	P	P	P	P	P	P	P	P	P	P	
Sub-total		<b>56</b>	<b>56</b>	<b>48</b>	<b>27</b>	<b>26</b>	<b>26</b>	<b>12</b>	<b>1</b>	<b>21</b>	<b>12</b>	<b>21</b>	<b>2</b>	<b>308</b>

### Key observations on 'relativity' discussions

For impact on threatened species:

- Brown Route is worst (poor).
- Pink/modified Orange Route is good because it reduces habitat for threatened species compared to Brown Route.
- Green/modified Orange Route is best because tunnel avoids impacts.

For impact on endangered ecological communities:

- Pink/modified Orange and Green/modified Orange Routes avoid endangered ecological communities.
- Brown Route requires clearing of EECs, therefore worst route.

For impact on habitats and wildlife corridors:

- Brown Route has greater impact because the route cuts a wildlife corridor which is being restored and is more significant than Pink/modified Orange Route.
- Green/modified Orange Route is best because tunnel promotes connectivity.

For impact on Indigenous heritage:

- Pink/modified Orange Route remains poor based on previous evaluation.
- Brown Route rates 'good' because no sites are present.

For impact on non-Indigenous heritage

- Pink/modified Orange Route rates poorly because 'Sedgeford' property impacts, and Brookside context is changed, refer to previous ratings.
- Brown Route directly impacts on Broughton Mill and Pulman Street Heritage Precinct.

For impacts on surface water quality:

- Brown Route rates poorly due to length of exposure to wetlands.
- Pink/modified Orange Route is slightly better than the Green/modified Orange Route in terms of exposure to risk of spills, but both are rated the same.

For assessment of carbon footprint size:

- Options are not currently differentiated on carbon footprint but the height of the Brown Route may have to be increased to meet climate change flood levels.
- Therefore Brown Route rates lower than Pink/modified Orange and Green/modified Orange routes.

For noise impacts:

- Brown Route rates worse because it uses North Street alignment, impacting the greatest number of houses and also David Berry Hospital.
- Options that include the modified Orange Route reduce impacts and provide more opportunities for noise mitigation.

For potential to change flooding characteristics:

- Brown Route rates poorly because it crosses a floodplain.
- Pink/modified Orange and Green/modified Orange routes are on higher ground and therefore rate better and equally.

For impacts on ground water:

- Brown Route rates poorly because it crosses wetlands area and soft soils meaning pre loading is required.
- Pink/modified Orange and Green/modified Orange routes rate equally.

For climate change vulnerability/impacts:

- Brown Route is more exposed to combined flooding risks from extreme rainfall and sea level rise over most of its length and rates poorly.
- Pink/modified Orange and Green/modified Orange routes are on higher ground and therefore much less exposed to climate change risk.

## Summary of complete option assessment rankings

Below is a summary of findings of the three focus groups and their rankings for the various options. This information was combined with strategic cost information and benefit cost ratios supplied by the project team for the construction of the highway along these route options.

It was noted that the costs were strategic in nature including approximately 40% for contingency and 20% for planning and management costs. The costs included construction, land acquisition and some mitigation measures but not necessarily all environmental remediation costs.

SECTIONS B and C					
	Functional	Socio-economic	Natural and cultural environment	Strategic estimate \$M	Benefit cost ratio
Complete route options	Rank	Rank	Rank		
Pink/modified Orange	2	2	2	~ 390	1.2
Green/modified Orange	1	1	1	~ 495	1.1
Brown	2	3	3	435	1.2

## Recommendations for the way forward

When the three criteria-assessment focus groups reported back the schedule above was filled in with their individual rankings of the complete options for Sections B and C. To this was added the strategic estimate and benefit cost ratio calculated for each.

Then, the three sub-groups were each asked to make recommendations on which option or options which should be considered further and taken forward into the next phase of planning. There was strong unanimity in their recommendations and observations.

The sub-groups recorded the following:

### Sub-group one:

We recommend the following options move forward to the next stage of development:

- Green/modified Orange Route **and** Pink/modified Orange Route.

Because:

- Green/modified Orange Route meets the project objectives best, however it comes at a cost.
- Pink/modified Orange Route, next best meets the project objectives and has lesser cost.

Subject to:

- Confirmation that the modified Orange Route is feasible.
- Revisiting the grade around Belinda Street for the Pink and Green sections of the routes.
- Review cost estimates to confirm the differential between the Green/modified Orange and Pink/modified Orange routes.

### Sub-group two:

We recommend the following options move forward to the next stage of development:

- Green/modified Orange Route **and** Pink/modified Orange Route.

Because:

- Green/modified Orange Route is the best performing on the values evaluated.
- Pink/modified Orange Route is the lower cost, next ranked option, has performed relatively well and deserves further investigation.

Subject to:

- Confirmation of costs of both routes.
- Identification of further savings on both routes.
- Refinement to avoid dwellings where possible.
- Clarification of the modified Orange feasibility and impacts of the modified Orange Route.
- High quality urban design for North Street/Kangaroo Valley Road.
- Consideration of severance issues.
- Peer review determination of: (i) the process and (ii) the need to display and assess a southern option.
- Further exploration of the routes to lessen impacts on the North Street residents by moving alignment away from the residents.

**Sub-group three:**

We recommend that:

- Green/modified Orange Route moves forward to the next stage of development.
- The Brown Route should be dropped on high environmental impacts and socio-economic grounds.

Because:

- The Green/modified Orange Route rates highest in terms of environmental/socio-economic and functionality values.

Subject to:

- Mitigation of impacts to unlisted heritage items 'Sedgeford' and 'Brookside'.

Our fallback option:

- Our fallback position would be Pink/modified Orange Route subject to mitigation for the deep cutting, habitat connectivity and indigenous heritage impacts.

## Conclusions drawn from the workshop

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### Value management workshop group conclusions

As a result of completing and presenting the assessments using the agreed criteria and the discussions over the three days of the workshop, the group was able to draw and agree on the following conclusions:

- **The Pink/modified Orange AND Green/modified Orange Routes were unanimously recommended by the workshop members to move forward to the next stage of development subject to the issues raised and documented in the workshop being addressed.**
- **The Red and Purple Routes in Section A and D appear appropriate with no fatal flaws identified, however there are still a number of issues to be addressed on both routes in the next stage of development.**
- **The modified Orange Route in Section C provides heritage and socio-economic benefits and should be further pursued subject to proving its feasibility.**
- **The Blue Route in Section C should not be further pursued on socio-economic and environmental impact grounds, particularly the impacts on agricultural land.**
- **The Yellow Route in Section B should not be further pursued as the other routes in Section B were seen to be more superior socio-economically and on cost benefit grounds.**
- **The Brown Route was seen to be deficient on environmental protection, constructability, functionality, socio-economic grounds and left a considerable residue of existing highway which will continue to have safety problems.**
- **Further work is required to address the access arrangements on the project (ie, access to properties, Berry, Gerringong, etc).**

### Where to from here?

In closing, the next steps in the planning process were presented by Richard Merrett, Project Manager, Maunsell. These were recorded as:

- Make recommendation that the Red Route in Section A and the Purple Route in Section D form part of the preferred route option.
- Acknowledge the agreement/acceptance of assessment criteria.
- Have the findings communicated to community participant nominees and produce a community update.
- Review the findings of the route option selection peer review and determine follow-up actions (if any).
- Carry out further actions identified at this VMW including:
  - Confirm the feasibility of the modified Orange Route.
  - Review the grade on the Pink and Green Routes south of Belinda Street.
  - Refine the cost data for Pink and Green Routes.
- Acknowledge acceptance of the findings and conclusions of the value management workshop.
- Develop list of design refinements/value engineering aspects including:
  - Minimising severance/avoiding dwellings.
  - Careful consideration of North Street/Kangaroo Valley Road impact, solution and mitigation (eg. residents, urban design).
- Immediately notify the potentially directly affected landowners on the modified Orange Route.
- The workshop included discussion of consideration of minor realignment with a view to improve the grade on the Pink/Green Route south of Belinda Street.

***Post-value management workshop note: The project team has since reviewed this proposal and discounted it from further development based on considerable impact on dwellings and severance of several farms.***

## Appendix 1. List of participants

# PRINCES HIGHWAY UPGRADE: GERRINGONG to BOMADERRY ROUTE OPTION EVALUATION WORKSHOP PARTICIPANTS LIST

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## **Project stakeholders**

George Curtis	Environmental Planning Officer, Department of Planning
Miles Boak	Conservation Planning Officer, Department of Environment and Climate Change
Jackie Taylor	Heritage Officer, Department of Environment and Climate Change
Wendy Goodburn	Resource Management Officer, South East Region, Department of Primary Industries

John Gould	General Manager, Shoalhaven City Council
Bryan Whittaker	Director of Engineering and Works, Kiama Municipal Council
Ray (Dootch) Kennedy	Chairperson, Illawarra Aboriginal Land Council

Barry Russell	Chairman, PHOCUS
John Allan	Work Supervisor, TOLL (heavy transport industry)
Ian McManus ( <i>Part only</i> )	Sergeant, NSW Police Service

Brian Jackson	Community Participant
Steve Carr	Community participant
Stuart Coughlan	Community participant
Greg Pullen	Community participant
Robyn Simond	Community participant

## **Roads and Traffic Authority**

Jay Stricker	Southern Region Manager
Graham Brisbane	Project Director
Ron de Rooy	Senior Project Manager
Dennis Clark	Property Services

Mark Keech	Senior Project Designer
Phil Mahoney	Major Infrastructure
Matthew Callander	Manager, Tunnel Technology
Val Brizga	Geotechnical Investigations

# PRINCES HIGHWAY UPGRADE: GERRINGONG to BOMADERRY ROUTE OPTION EVALUATION WORKSHOP PARTICIPANTS LIST (cont)

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## **Maunsell Study Team**

Louisa Rebec	Project Director
Richard Merrett	Project Manager
Jon Williamson	Assistant Project Manager
Steve Andrew	Engineering Workstream Leader
Leigh O'Dwyer	Community and Social Workstream Leader
Craig Niles	Statutory Planning
Lindsay Shepherd	Social and Economic

Matthew Pettersson	Bassett Ecologically Sustainable Development and Noise
Kelvin Officer	Navin Officer Heritage Consultants
Stephen Callaghan	EDAW Urban Design and Visual

## **Workshop Facilitation Team**

Ross Prestipino	Facilitator, Australian Centre for Value Management
Alan Butler	Co-facilitator and Reporter, Australian Centre for Value Management
Christine Marsden	Public Participation Facilitator