2 Need and options considered

This chapter describes the need for the proposal in terms of its strategic setting and operational need. It presents the objectives of the proposal and assesses the alternatives to the proposal and route options in accordance with these objectives.

2.1 Strategic need for the proposal

2.1.1 Princes Highway upgrade

The Princes Highway is the main north-south transport corridor linking Sydney and Wollongong to the NSW South Coast and north-eastern Victoria. The highway is an important freight, bus and tourist route for the south coast, particularly beyond Bomaderry where the existing rail service terminates. Key tourist destinations accessed by the highway include Nowra and the south coast, with peak traffic experienced on weekends and during holiday periods. This section of the highway is also used as a local access route for areas such as Meroo Meadow and Jaspers Brush, and residences on rural properties along the highway.

The proposal would form part of the Princes Highway upgrade which aims to provide a four-lane divided highway between Waterfall and Jervis Bay Road, Falls Creek (refer to Figure 2-1 for the current status of these upgrades). The proposal, as part of the Princes Highway upgrade, is needed to improve road safety and traffic efficiency, including for freight, on the NSW South Coast.

2.1.2 NSW and Australian Government Plans and Strategies

National Road Safety Strategy 2011-2020

The National Road Safety Strategy 2011-2020 (Australian Transport Council, 2011) is firmly based on Safe System principles (discussed in Chapter 4 of the strategy) and is framed by the guiding vision that no person should be killed or seriously injured on Australia’s roads. The strategy sets out initiatives and options in four key areas, of which ‘safe roads’ and ‘safe speeds’ would apply to the proposal.

The intent of ‘safe roads’ is to ensure roads are designed and maintained to reduce the risk of crashes occurring and to lessen the severity of injury if a crash does occur. ‘Safe roads’ aims for all new and upgraded roads to be designed, constructed and operated in accordance with Safe System principles. It also aims to modify infrastructure funding guidelines and agreements to increase the safety benefits resulting from expenditure on roads.

The proposal has been designed in accordance with current Roads and Maritime road design guidelines, safety and traffic efficiency requirements. It would deliver immediate safety benefits by dividing the highway with a central median barrier and protected right turn bays at selected locations. As a result, the proposal would be consistent with the Safe System principles and the intent of ‘safe roads’ as it would reduce the risk of head on collisions and collisions resulting from traffic turning across the highway.

The intent of ‘safe speeds’ is to ensure that speed limits complement the road environment to manage the impact of crashes and to ensure road user compliance with speed limits. ‘Safe speeds’ aims to achieve speed limits that reflect a better balance between safety and mobility objectives. The posted speed limit on the upgraded highway would be consistent with current road safety design requirements (refer to Section 3.2.1) and is considered to be consistent with the intent of ‘safe speeds’.

The proposal would be consistent with ‘safe roads’ and ‘safe speeds’ and contribute towards achieving the aims of the National Road Safety Strategy 2011-2020. The detailed design of the proposal would continue to consider road safety requirements.
Figure 2-1  Princes Highway upgrades on the NSW South Coast including upgrades between Waterfall and Jervis Bay Road

NSW 2021

*NSW 2021 – A Plan to make NSW Number One* (Department of Premier and Cabinet, 2011) was released in September 2011.

*NSW 2021* is a 10 year plan to rebuild the state’s economy, provide quality services, renovate infrastructure, restore accountability to government and strengthen the state’s local environment and communities. The plan includes 38 goals and 180 targets as well as priority actions to support the achievement of each target.
The plan’s transport related goals include improving the safety and efficiency of the road network. The proposal would be consistent with NSW 2021 as it would upgrade one of the few remaining sections of two lane highway between Waterfall and Falls Creek. The proposal would see an upgrade of the Princes Highway to four lanes with median separation, improving safety and efficiency and reducing travel time between Sydney and the NSW South Coast.

**NSW State Infrastructure Strategy**

*The NSW Infrastructure Strategy* (NSW Department of Premier and Cabinet, December 2012) responds to the recommendations in the Infrastructure NSW 20-year State Infrastructure Strategy (October 2012).

The strategy is committed to completing the Princes Highway duplication to the Jervis Bay turnoff, which includes the Princes Highway from Berry to Bomaderry.

**NSW Long Term Transport Master Plan**

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) presents the NSW Government’s direction for transport planning for the next 20 years.

The upgrade of the Princes Highway is specifically mentioned as a key action to provide access for regional NSW. The Master Plan addresses the need for ongoing investment in road infrastructure in order to support regional growth and prosperity, connect regional communities and make regional roads safer. The Master Plan indicates that investment will focus on improving travel times and reducing the safety risks to road users, which would be consistent with the objectives of the proposal.

The Master Plan addresses the need for an upgrade of the Princes Highway in order to support the south coast’s growing popularity as a tourist destination and to enhance freight connectivity with Port Kembla.

**South Coast Regional Strategy**

The *South Coast Regional Strategy 2006-2031* (Department of Planning (DoP), 2007) applies to the Shoalhaven, Eurobodalla and Bega Valley LGAs. The aim of the strategy is to ensure that the projected housing and employment needs of the region’s population are adequately accommodated.

The population of the NSW South Coast is currently about 166,000 people. The strategy predicts a 36 per cent growth in population with an additional 60,000 residents by 2031. The population of the Shoalhaven LGA is predicted to grow by around 34,000 people by 2031, mainly concentrated around the Nowra-Bomaderry area, which is a major centre within this LGA.

Settlement on the south coast is characterised by many small dispersed towns and villages. As a result of these settlement patterns, there are transport and accessibility limitations within the region. The strategy considers that the Princes Highway is an important transport corridor as it connects communities, supports economic development and links neighbouring regions.

The proposal is consistent with the *South Coast Regional Strategy* as it would improve the safety and efficiency of the highway. As a result the proposal would provide enhanced local and regional connectivity on the south coast and support economic development in the region.

**Shoalhaven – an Enterprising Alternative, an Economic Development Strategy 2005**

*Shoalhaven – an Enterprising Alternative, an Economic Development Strategy* (Shoalhaven City Council *et al*, 2005) was developed by Shoalhaven City Council, the NSW Department of State and Regional Development, the Commonwealth Department of Transport and Regional Services and the Shoalhaven Area Consultative Committee.
A key transport focus area identified in the strategy is to "significantly improve access between Shoalhaven, Sydney, Canberra and Wollongong with respect to movement of goods and people" (Shoalhaven City Council et al., 2005). The proposal would contribute towards improving access between Sydney and the Shoalhaven, and therefore between Wollongong city and regional centres within the Shoalhaven.

A key tourism focus area identified in the strategy is to “foster higher levels of visitation and increased visitor yield” (Shoalhaven City Council et al., 2005). The proposal would improve access to the Shoalhaven and reduce travel times to tourist destinations on the NSW South Coast. This is expected to encourage increased visitation rates.

2.1.3 Need for the proposal

Traffic volumes

The volume of traffic on the Princes Highway north of Bomaderry is around 11,870 vehicles per day with 9800 vehicles using the alternative ‘Sandtrack’ route, which is an alternative route to the winding, hilly section of Princes Highway between Gerringong and Bomaderry (via Fern Street, Crooked River Road, Gerroa Road and Bolong Road). Traffic volume has increased by an average of 400 vehicles per year between 1990 and 2012, which equates to an average growth rate of 3.2 per cent per annum over a 22 year period. There is currently around a 55 per cent to 45 per cent split of traffic using the Princes Highway and the ‘Sandtrack’ respectively.

Traffic flows are highest during major holiday periods, including the school holidays at Christmas, Easter and Labour Day in October. Traffic volumes peak to over 28,000 vehicles per day during the Christmas and New Year period, which equates to around 25 per cent more vehicles in comparison to the Annual Average Daily Traffic (AADT) at this location.

Heavy vehicles constitute 14.9 per cent of the AADT on the Princes Highway south of Abernethys Lane and represent 8.7 per cent of the AADT on the ‘Sandtrack’ north of Meroo Road due to the five tonne vehicle load limit on that road.

Level of service

Level of service (LoS) is a qualitative measure describing operational conditions within a traffic stream. The desirable maximum capacity of each road section is determined from the ‘Guide to Traffic Management, Part 3: Traffic Studies and Analysis’ (AUSTROADS, 2009). LoS has different criteria to assess the performance of a road and intersection, but is generally described in terms of service measures such as travel speed, travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and road safety. There are six LoS. LoS A is the optimum condition while LoS F indicates a break-down in traffic flow. Further information is provided in Section 6.1.

The Princes Highway currently operates at LoS D in both the morning and evening peak between Berry and Bomaderry. The ‘Sandtrack’ currently operates at LoS C during the morning and evening peak hours. During holiday peak periods the Princes Highway deteriorates to an unacceptable LoS E while the ‘Sandtrack’ operates at LoS D.

As detailed in Section 6.1, in the absence of the proposal, the Princes Highway would operate at an unacceptable LoS E or LoS F for all peak periods by 2039. The ‘Sandtrack’ would be expected to operate at LoS D during the morning and evening peak hours and would also be expected to deteriorate to LoS F during the holiday peak by 2039.

The provision of additional capacity on the Princes Highway between Berry and Bomaderry is considered necessary to provide acceptable highway performance.
Road safety
The section of highway between Berry and Bomaderry has a poor road safety record. Between 1 July 2008 and 30 June 2013 a total of 37 crashes were recorded on the Princes Highway between Schofields Lane, south of Berry and Cambewarra Road, Bomaderry. This included two fatalities and 17 injuries.

Historically, the Princes Highway has a higher than average proportion of fatal and injury crashes in comparison to the rest of NSW. This includes over 40 per cent more fatalities per kilometre travelled than the NSW average for reported crashes on all roads open to the public.

Without the proposal, the frequency of crashes on the Princes Highway and the ‘Sandtrack’ would be expected to increase with the continued growth in traffic on an unchanged road network.

Flood immunity
The existing highway has inadequate drainage which contributes to localised flooding during high rainfall periods. During a 100 year Average Recurrence Interval (ARI) flood event, the existing highway is overtopped by floodwaters at 21 of the 28 waterway crossing locations. The depth of water which overtops the existing highway at these locations ranges from between 0.01 metres to 0.59 metres.

In times of flood, access between Berry, Gerroa and Shoalhaven Heads is generally via the ‘Sandtrack’. During a major flood, the Shoalhaven Heads to Bomaderry section of the ‘Sandtrack’ suffers long-term inundation from the Shoalhaven River which can last between two to three days. This restricts access between Berry and Bomaderry.

The proposal would achieve flood immunity in the 1 in 100 year ARI flood event. This would minimise the obstacles to traffic flow, improve road safety and provide more reliable access between Berry and Bomaderry during major flood events.

2.2 Existing road and infrastructure
The existing Princes Highway between Schofields Lane and Cambewarra Road is generally a two-lane undivided highway (one lane in each direction) with horizontal and vertical alignments resulting in lower speed limits than signposted and traffic inefficiencies. The posted speed limit is currently 100 kilometres per hour between Schofields Lane (south of Berry) and around 500 metres north of Cambewarra Road (north of Bomaderry), where it decreases to 70 kilometres per hour.

Generally the alignment follows the natural undulating landform with relatively shallow cuttings and embankments. A number of horizontal and some vertical curves are below the current standard for a road of this classification and these affect line of sight and present safety problems for overtaking and turning manoeuvres.

The single carriageway has no median or barrier to separate opposing flows. Lane widths are 3.5 metres with shoulders that differ along the alignment. Additional lanes have been incorporated to provide overtaking opportunities in some locations. Around 1.5 kilometres of the 11.6 kilometres of highway between Berry and Bomaderry has an overtaking lane northbound and there is a similar length southbound. The remainder of the highway allows limited opportunity to overtake due to the existing vertical and horizontal alignment.

Local road junctions are at-grade with right turn provisions at Croziers Road, Strongs Road, Boxsells Lane / Lamonds Lane, Meroo Road and Pestells Lane. As well as this, numerous local roads and rural properties have uncontrolled direct access to the highway. Many of these accesses have poor sight lines due to the current horizontal and vertical geometry. Right turn movements are currently permitted at property accesses.

Articulated vehicles such as milk tankers and cattle trucks can experience difficulty turning safely into rural properties. In some instances, trucks are required to move into the opposing traffic lane to make turns into and out of property accesses.
There are three existing bridges at Flying Fox Creek, Jaspers Brush Creek, and Abernethys Creek. There are existing culverts at all other waterways along the alignment.

2.3 Proposal objectives

The objectives of the proposal are consistent with the strategic need and incorporate environmental, social and economic considerations. The proposal objectives include:

- Improve road safety.
- Improve efficiency of the Princes Highway between Schofields Lane and Cambewarra Road.
- 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 the local social environment.

2.4 Statement of strategic need

The proposal would form part of the Princes Highway upgrade which aims to provide a four lane divided highway between Waterfall and Jervis Bay Road, Falls Creek. The proposal is one of the last remaining sections to be upgraded.

The proposal is needed to improve the vertical and horizontal alignment and to deliver a highway that meets current Roads and Maritime design standards. This would result in improved traffic efficiency and would address the existing poor crash history and safety record. The proposal would be designed to cater for projected traffic volumes in the design year (typically 20 years after the proposal becomes operational) without compromising efficiency and safety.

2.5 Alternatives and options considered

This section identifies and evaluates the alternatives to the proposal and the route options. It presents the preferred option and the design refinements made to the preferred option.

2.5.1 Alternatives considered

Strategic alternatives to the proposal were assessed as part of this review of environmental factors and were assessed against the proposal objectives.

Description of the alternatives

The following alternatives were considered:

- Base case (‘do nothing’).
- Upgrade of the Princes Highway.
- Upgrade of the ‘Sandtrack’.
- Upgrade of the South Coast railway.

These alternatives are described below.
The base case or ‘do-nothing’ option

Roads and Maritime considered a theoretical base case or ‘do nothing’ alternative. It was defined as the least possible upgrade to the existing alignment with only minor improvements and ongoing maintenance. These minor improvements might include widening of road shoulders, some work on unsafe bends or installing wire rope in medians to separate northbound and southbound traffic.

This alternative did not meet the proposal objectives as it did not satisfy the fundamental proposal requirements, including the provision of a safe and efficient highway alignment. The ‘do nothing’ alternative would not provide a satisfactory solution from a strategic, regional, local planning or transport context.

Under a ‘do-nothing’ alternative, travel times on the Princes Highway and adjoining local roads would increase as the level of traffic and congestion grows on the existing road network. At Bomaderry, intersection delays at the Cambewarra Road roundabout would increase especially during the peak periods. This would be caused by local traffic conflicting with the major through movements entering and exiting the town to/from the north and would result in increased delays for vehicles approaching the roundabout from the minor local roads.

The forecast growth in traffic on the existing road network would result in a considerable increase in the total number and cost of crashes occurring. Assuming current crash rates and costs remain constant, the total number and cost of crashes would be expected to increase by 78 per cent by 2039.

The proposal is one of a series of upgrades to the Princes Highway between Gerringong and Bomaderry, comprising the Gerringong upgrade, the Foxground and Berry bypass and the proposal. The Gerringong upgrade is currently under construction and the Foxground and Berry bypass has project approval from the Minister for Planning and Infrastructure. Without the proposal, the overall objectives for the upgrade between Gerringong and Bomaderry would not be met as the section between Berry and Bomaderry would fail to meet the safety and efficiency requirements.

Upgrade of the Princes Highway

An upgrade of the Princes Highway would consist of an upgrade, including widening, of existing sections of the highway between Schofields Lane, south of Berry and Cambewarra Road in Bomaderry (refer to Figure 2-2). Environmental and socio-economic impacts, such as changed access arrangements, noise, terrestrial ecology, flooding and heritage impacts, may occur as a result of upgrading the highway. However, an upgrade to the Princes Highway would meet the proposal objectives as:

- It would improve the road safety and efficiency of the Princes Highway between Schofields Lane and Cambewarra Road, improving access to the NSW South Coast and supporting local and regional economic development.
- It would provide beneficial environmental outcomes by incorporating an operational water quality treatment system in the design of the proposal, which would considerably improve the quality of surface water runoff that is discharged into local waterways. The proposal would also improve flood immunity along the proposal.
- It would provide the opportunity to upgrade the existing alignment and provide value for money. An upgrade to the existing alignment would maximise the use of an existing asset, reducing construction and operational costs. It would also minimise the area of land that would need to be acquired.
- It would utilise the existing highway alignment to minimise the and environmental, social and economic impacts of the proposal.
Upgrade of the ‘Sandtrack’

As described in Section 2.1.3, the ‘Sandtrack’ provides an alternative route for regional traffic travelling between Gerringong and Bomaderry. An upgrade of this route would be an alternative option to an upgrade of the Princes Highway between Gerringong and Bomaderry / Nowra. This option would require the widening and upgrade of the local roads that make up the ‘Sandtrack’.

The upgrade of the ‘Sandtrack’ would be constrained by the Seven Mile Beach National Park, and the close proximity of Coomonderry Swamp (a wetland protected by ‘State Environmental Planning Policy No.14 (Coastal Wetlands)’). Other constraints include the topography closer to Gerringong and Gerroa, the floodplain areas close to the Shoalhaven River, existing industrial areas at Bomaderry and the need to cross an existing freight rail line. These constraints would mean that an upgrade of the ‘Sandtrack’ would need to be constructed along the existing ‘Sandtrack route, limiting staging opportunities during construction.

An upgrade to the ‘Sandtrack’ would achieve the proposal objective of improving the road safety of the ‘Sandtrack’. However, it would not satisfy the remainder of the proposal objectives as:

- It may have negative economic impacts for businesses within towns that rely on highway generated trade.
- It would result in adverse amenity impacts to the communities located along the ‘Sandtrack’ that are currently not impacted by highway traffic and heavy vehicles, such as Gerringong and Gerroa. The ‘Sandtrack’ is accessed via Fern Street which runs through the centre of Gerringong and unless a bypass is provided for Gerringong, an upgrade to Fern Street would have severance impacts on the town resulting in adverse socio-economic impacts.
- It would provide limited improvement of the safety of the overall road network. The full length of the highway between Schofields Lane and Cambewarra Road would continue to have road safety issues albeit with lower traffic volumes.
- The extent of land acquisition would be greater than that required for upgrading the Princes Highway. Strip acquisition along the entire length of the route, including along the edge of the Seven Mile Beach National Park and through the industrial and commercial area of Bomaderry, would be required to cater for the full four lane design and interchanges.

Upgrade of the South Coast railway

The South Coast railway extends from Waterfall in southern Sydney to Bomaderry. From Kiama, the line is non-electrified and consists of a single line. There are no direct services from Bomaderry to Sydney, with passengers required to change trains at Wollongong, Dapto or Kiama. Rail passengers currently represent around one per cent of average weekday travel mode share in the region (Bureau of Transport Statistics, 2010/2011).

An upgrade to the South Coast railway line south of Berry would involve the duplication of the railway between Kiama and Bomaderry. Removal of level crossings and other improvements may be necessary to accommodate the widened corridor and the increase in train movements.
In the absence of an upgrade to the highway, a significant shift from road to rail would be required to improve the efficiency of the highway and to deliver environmental benefits to the region. An upgrade to the rail network in the region is not likely to achieve this shift as:

- The railway line currently terminates at Bomaderry. Any freight or passengers travelling further south would be required to change transport modes at Bomaderry. The railway line would need to be extended further south for it to provide any comparable alternative service to the highway for the region.
- The low volume of freight movements along the south coast would not make rail financially competitive compared with road transport.
- There are current and future competing needs of passenger and freight movements on the railway network between Sydney and Wollongong. This would have implications on the number of additional services that the South Coast railway line could accommodate in the absence of other rail network upgrades.

Road safety issues would also remain in the absence of any major improvement to the highway, particularly for local rural communities that would still rely on the highway as the main transport corridor. Regional and local economic development would also suffer, as the road safety and efficiency challenges of the highway would remain. The proposal would not limit the potential for the upgrade of the South Coast railway in the future.

**Evaluation of the alternatives**

A ‘do nothing’ alternative would not satisfy any of the proposal objectives. The highway would continue to have safety, efficiency and capacity problems. This would have flow on effects to the regional and local economy, as well as to the communities located along the existing highway. For these reasons, the ‘do nothing’ alternative was not considered further.

An upgrade to the ‘Sandtrack’ would not provide any distinct benefits to the environment, the economy or communities in the region when compared to an upgrade of the Princes Highway. It would generate adverse impacts on a number of communities located along the ‘Sandtrack’ that are not currently exposed to highway traffic. Communities along the ‘Sandtrack’ are currently not exposed to heavy vehicles as there are weight limitations restricting its use. Any upgrade to the ‘Sandtrack’ would require access for heavy vehicles. The Princes Highway would continue to present road safety issues for traffic travelling to local destinations between Gerringong and Bomaderry, and regional destinations that cannot be accessed via the ‘Sandtrack’.

An upgrade to the South Coast railway would not meet the proposal objectives as traffic efficiency and safety issues would remain. Given the current limitations of the South Coast railway line and the low volume of freight movements, it is unlikely that an upgrade of the rail network would see a large change in the number of vehicles that utilise the Princes Highway.

**Preferred alternative**

An upgrade to the Princes Highway would best meet the project objectives and is the preferred alternative as:

- It would improve the road safety and efficiency of the Princes Highway.
- It would support regional and local economic development.
- It would provide the opportunity to upgrade the existing alignment which would minimise impacts on the environment, communities and the local economy and provide value for money.
- It would improve the quality of surface water runoff that is discharged into local waterways and would improve the flood immunity of the highway.
- It would result in the least change to community connectivity.
2.5.2 Identified route options

**Options for the Princes Highway upgrade**

Route options for the proposal were developed as part of the broader Princes Highway upgrade program. This program includes upgrades to three sections of the Princes Highway between Gerringong and Bomaderry. The Berry to Bomaderry proposal forms part of the overall upgrade shown in Figure 2-2.

![Figure 2-2 Preferred proposal route within the context of the Princes Highway upgrade program between Gerringong and Bomaderry](image)

To assist in the development of options, the broader study area including Gerringong, Berry and Bomaderry was divided into four geographical areas referred to as ‘sections’ (sections A, B, C and D). The southern portion of section C and the whole of section D represent the proposal area (refer to Table 2-1 and Figure 2-3).

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Relevant project/proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A</td>
<td>Commences at Mount Pleasant and extends to Belinda Street, Gerringong.</td>
<td>The Gerringong upgrade.</td>
</tr>
<tr>
<td>Section B</td>
<td>Commences at Belinda Street, Gerringong and extends just north of Berry.</td>
<td>The Gerringong upgrade and the Foxground and Berry bypass.</td>
</tr>
<tr>
<td>Section C</td>
<td>Commences just north of Berry and extends to Croziers Road, south of Berry.</td>
<td>The Foxground and Berry bypass and the proposal.</td>
</tr>
<tr>
<td>Section D</td>
<td>Commences at Croziers Road, south of Berry and extends to Cambewarra Road, Bomaderry.</td>
<td>The proposal.</td>
</tr>
</tbody>
</table>
Roads and Maritime considered and evaluated the route options for all three highway upgrade projects at the same time across the broader study area. The following sections of this chapter focus on how the options relevant to this proposal (sections C and D) were assessed and refined from a long list of options to a short list and the outcomes that ultimately determined the preferred route option for the proposal.

A discussion on the methodology to assess and evaluate the route options is provided in detail in the following reports:


Figure 2-3 Geographical sections within the context of the three upgrade projects between Gerringong and Bomaderry
Long list of options

Feasible route options were identified by Roads and Maritime and the project team and a long list of route options was developed. These were based on the output of the Quantm computer software package, desktop studies and the application of route selection principles that include consideration of engineering and functionality constraints, avoidance of known environmental and social constraints and minimisation of environmental and social impacts.

Preparatory assessments were undertaken by the project team and technical specialists to assess the physical, environmental and social constraints associated with the long list options. These assessments fed into the route options development workshop attended by the project team and technical specialists and undertaken to short-list potential options for further assessment (refer to Chapter 5 for further details).

The assessment of the long list of options considered the proposal objectives and specialist investigations and compared each route option against a base case scenario to determine short-listed route options. Specialist investigations considered the biophysical environment, social and cultural environment, land use and property, landscape and potential amenity impacts. Engineering functionality and economic factors were also considered. The short list of options was carried forward for further consideration in the next phase of route options development.

Description of options

Figure 2-4 presents the long list of options which were assessed as part of the route options development process. These options consisted of a number of nodes which were joined to form the individual routes.

Long list options considered south of Berry in section C were continuations of the different options for the bypass of Berry and were largely influenced by the preferred option selected for the Berry bypass, which would be constructed as part of the Foxground and Berry bypass project (subject to a separate approvals process under Part 3A of the EP&A Act). All the different options for the bypass of Berry, including options located to the north and south of Berry, re-joined the existing highway alignment in the region of Schofields Lane or Croziers Road.

There were three long list options considered in section D. These options all largely followed the existing highway, with two offering deviations to the south of the existing alignment for a short section in the vicinity of Meroo Meadow. The deviations are between nodes EE and FF, as shown on Figure 2-4.
Figure 2-4 Long list of options
Short-listed route options

Roads and Maritime held a route options value management workshop to develop key assessment criteria and evaluate the short listed options. The workshop attendees included the project team, technical specialists and members of the community from across the study area. Workshop attendees considered specialist assessments of each option and community and stakeholder feedback. The options were assessed and weighted against the proposal objectives (Section 2.3) and the following key assessment criteria:

- **Functional** – focused on the design objectives and included constructability, maintenance, safety and efficiency considerations.
- **Socio-economic** – included business and agricultural impacts, property severance, connectivity, road traveller experience, views and impacts on community facilities/amenity.
- **Environmental (natural and cultural)** – included ecological, Aboriginal heritage, flooding, noise, groundwater and climate change impacts.

The value management workshop process and the key findings are documented in the *Gerringong to Bomaderry Princes Highway Upgrade, Value Management Workshop Report* (RTA, May 2008a).

Following the value management workshop, a preferred option was announced by the then Minister for Roads in 2009.

**Description of route options**

As shown in Figure 2-5, a total of three options were shortlisted for section C, the orange, blue and brown options. All of these options re-joined the existing highway alignment at Kangaroo Valley Road and followed this alignment for the remaining length of section C. In section D, there was only one shortlisted option, the purple option, which also followed the existing highway alignment (refer to Section 2.5.3 for further details). The upgrade following the existing highway alignment was therefore the only short listed option between Schofields Lane, south of Berry and Cambewarra Road, Bomaderry.
Figure 2-5 Short listed route options

LEGEND

- Existing Princes Highway
- Local roads
- Indicative study area
- Section divider
- South Coast Railway
- Waterways
- Wetland
- National parks/reserves

Aerial photography is dated 2007
2.5.3 Analysis of options

Long list of route options

In section C, options that bypassed Berry to the north, including options following the North Street corridor, generally performed well against the proposal objective of improving road safety and efficiency and had varied performances against the remaining proposal objectives. Options that bypassed Berry to the south, including options along the railway line, generally performed well against the proposal objectives of improving road safety and efficiency but performed poorly against the remaining objectives, particularly providing value for money and supporting economic development.

Overall, three options were carried forward as short-listed options in section C. All of these three options rejoined the existing highway alignment just south of Kangaroo Valley Road. Therefore only one option, an upgrade of the existing highway, was carried through as a short-listed option in section C for the proposal.

In section D, between nodes EE and FF, the two options south of the existing highway in the vicinity of Meroo Meadow performed marginally better than upgrading the existing alignment against the proposal objective of improving the efficiency of the Princes Highway as they provided a straighter alignment in that section. However, when considered against the objectives of providing value for money, supporting regional and local economic development and minimising adverse impacts on the local social environment these options performed poorly compared to upgrading the existing alignment. This is because they required higher construction costs, more land acquisition and had higher property severance impacts than the option to upgrade the existing alignment.

An upgrade of the existing highway was the only option considered for the remaining sections of section D (between nodes DD and EE and nodes FF and GG) during the assessment of long list route options. The horizontal alignment through these sections would generally require some correction. However, it is relatively straight and flat and building along the existing highway corridor would minimise property acquisition and overall impacts compared to a completely new route for the highway. Therefore, utilising the existing alignment would best meet the proposal objective of providing value for money. An upgrade of the existing alignment was carried forward as the only shortlisted option for section D.

Short-listed route options

The route options development process determined that an upgrade following the existing highway most appropriately met the proposal objectives and this option was carried forward as the preferred option.

Upgrading the existing highway would involve widening one or both sides of the highway. This would make the best use of the existing road reserve and would therefore be in accordance with the proposal objective of providing value for money.

An upgrade of the existing highway would also meet the proposal objectives of minimising potential adverse social and environmental impacts. The preferred option would require some clearing of roadside vegetation. However, it is unlikely to result in the disturbance of vegetation with conservation significance or impact significant habitat. The preferred option would also have little or no impact on aquatic ecology as waterway crossings would involve reconstruction and upgrade of existing structures.

Utilising the existing road reserve would minimise the impact on adjoining properties. This would minimise the social impact of the proposal. It would also be in accordance with the proposal objective of enhancing local and regional economic development as it would minimise severance and land acquisition impacts on rural agricultural properties within the region.
The potential adverse impacts of the preferred option would generally be related to the construction of the proposal and as such would be temporary in nature. Given that an upgrade of the existing highway would require online construction, traffic impacts during the construction phase would be unavoidable. This would potentially involve reduced travel speeds and efficiency throughout the construction of the proposal. The other main construction impact arising from the preferred option would be increased noise levels. These impacts would be mitigated as detailed in Chapter 6.

2.6 Preferred option

The proposal (as shown in Figure 1-1) would best meet the proposal objectives as follows:

- **Improve road safety:**
  - The proposal would improve the current vertical and horizontal alignments and site distances of the existing highway.
  - The proposal would limit uncontrolled access to the highway by limiting property accesses to left-in left-out access and providing controlled right hand turn bays and u-turn facilities.
  - The proposal would be designed in accordance with Austroads Design Guides and as a result would meet current safety standards.

- **Improve efficiency of the Princes Highway between Schofields Lane and Cambewarra Road:**
  - The proposal would provide a consistent speed limit of 100 kilometres per hour between Schofields Lane and just north of Cambewarra Road, where it would reduce to 70 kilometres per hour near Bomaderry. It is expected that traffic would generally be able to maintain these speeds across the proposal.

- **Support regional and local economic development:**
  - Upgrading the highway following the existing alignment as much as possible would minimise severance and acquisition of productive agricultural properties.
  - The proposal would improve the ease and efficiency of access to tourist destinations on the NSW South Coast.

- **Provide value for money:**
  - The proposal would utilise the existing road reserve where possible and therefore minimise the construction footprint and the amount of property acquisition required.

- **Enhance potential beneficial environmental effects and manage potential adverse environmental impacts:**
  - Upgrading the highway following the existing alignment would minimise the extent of vegetation removal required for construction of the proposal.
  - Incorporation of an operational water quality treatment system into the design of the proposal would improve the quality of surface water runoff that is discharged into local waterways.
  - Improvement to the flood immunity of the highway.
  - The proposal would minimise impacts on waterways and aquatic ecology as new crossing locations would not be required.
  - The limited alteration required to the existing alignment would minimise the visual impact of the proposal. The proposal would respond to the natural landscape of the region and a visual connection to the surrounding landscape would be maintained for highway users.
• Optimise the benefits and minimise adverse impacts on the local social environment:
  - The proposal would provide improvements to road safety and traffic efficiency along the length of the proposal, access to the existing tourism industry on the NSW South Coast and access to raw materials in Sydney and the Wollongong-Kiama area for industries in the Nowra area due to reduced travel times and improved road safety.
  - Adverse impacts of the proposal would be managed through the implementation of appropriate safeguards and management measures as detailed in Chapter 6 and Section 7.2.
  - Inclusion of as much of the existing highway corridor as possible within the proposal and a minimal construction footprint limits the potential for cultural impacts and impacts to items of Aboriginal and historic heritage significance.
  - Upgrading the highway following the existing alignment would limit the extent of property acquisition required and would minimise connectivity impacts between and within communities.

2.7 Design refinements

Refinement of the preferred option has occurred throughout the development of the concept design for the proposal. Community and stakeholder consultation and feedback have informed this process. Refinements considered during the design of the proposal include:

• Local road and property accesses along the alignment.
• Heavy vehicle facilities including a rest area and an inspection bay.

2.7.1 Local road and property access

Local road and property access arrangements were determined through consideration of engineering and functional constraints and feedback from property owners along the alignment and adjoining local roads. The aim was to provide balanced access along the alignment and minimise additional travel time.

Potential access arrangements were determined by looking at the alignment in its entirety and by assessing the engineering and functional constraints, such as topography. This determined the most appropriate locations for grade-separated facilities and half-interchanges, whereby height differences between the road and the surrounding topography would minimise the extent of earthworks and number of structures required for grade separation. Following this, the locations of right turn bays and u-turn facilities were considered carefully between intersections, in order to minimise inconvenience and travel time and meet the safety objectives of the proposal by eliminating unsafe right hand turns.

The accesses that were developed provide access to and from all local roads and properties along the length of the proposal and minimise additional travel time as much as feasible and reasonable whilst improving road safety.

The proposed accesses have been developed with consideration to community feedback, which included interviews with local residents whose properties and/or their businesses could potentially be directly or indirectly impacted by the proposal. The proposed accesses are considered to most appropriately meet the proposal objectives whilst satisfying the functional requirements of the upgraded highway. The proposed accesses meet the objective of road safety by providing safe and controlled access to all local roads and properties whilst minimising the number of right turns and also present good value for money.
The proposed local road and property accesses include:

- Two grade separated facilities at Jaspers Brush Road / Strongs Road and Morschels Lane / Devitts Lane.
- A grade-separated half-interchange at Pestells Lane / Meroo Road.
- Seven protected right turn bays at Mullers Lane (northbound), Croziers Road (southbound), between Strongs Road and Turners Lane at about chainage 23200 (northbound), between Strongs Road and Turners Lane adjacent to Silos Winery (southbound), Lamonds Lane (northbound), Boxsells Lane (southbound) and south of Abernethys Lane at about chainage 28590 (northbound).
- Five u-turn facilities at Croziers Road (to travel northbound), between Strongs Road and Turners Lane at about chainage 23200 (to travel southbound), between Strongs Road and Turners Lane adjacent to Silos Winery (to travel northbound), Lamonds Lane (to travel southbound) and south of Abernethys Lane at about chainage 28590 (to travel southbound).

2.7.2 Heavy vehicle facility

A combined heavy vehicle rest area and Roads and Maritime inspection bay located at Meroo Meadow was considered for inclusion in the proposal. The community was strongly opposed to the location of this facility and in response Roads and Maritime investigated alternate locations along as well as outside the proposal alignment. The investigations considered community feedback and social and environmental impacts associated with locating a heavy vehicle facility at each alternative location. Roads and Maritime also considered alternatives for the form and function of the facility including a split facility, with the rest area component in one location and the inspection bay component in another location.

**Description of options**

Three heavy vehicle facility options were considered. These were:

- A combined heavy vehicle rest area and inspection bay located at Meroo Meadow, that would be staffed as needed and closed with locked gates when not operational.
- A split facility, with the rest area component located outside of the proposal and the inspection bay component (staffed as needed and locked when not in use) at Meroo Meadow.
- A split facility, with the rest area component located outside of the proposal and the inspection bay component (staffed as needed and locked when not in use) at an alternate location within the study area.

**Evaluation of options**

A combined facility with a heavy vehicle rest area and inspection bay located at Meroo Meadow would have the potential to create adverse amenity impacts for the local community. Specifically, potential impacts associated with the rest area component of the facility would include increased noise levels, visual impacts including increased light spill and decreased air quality. A heavy vehicle rest area would also increase the area of property acquisition required for the proposal.

Locating the heavy vehicle rest area component of the facility at Meroo Meadow would not meet the proposal objective of minimising adverse impacts on the local environment. Rather, consideration of a location for the heavy vehicle rest area outside of the proposal area is considered to adequately address the proposal objectives and give due consideration to the community feedback received during the assessment of possible options.

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1 The u-turn facility within the proposal area at Mullers Lane (northbound) has been approved under Part 3A of the EP&A Act as part of the Foxground and Berry bypass project.
The inspection bay component of the heavy vehicle facility is likely to have a lesser impact on the surrounding environment as it would not be operational full time but would be staffed as needed and locked when not in use. However the community perceive that this component would still have negative noise and visual amenity impacts on the local area.

An alternate option for the inspection bay at Jasper’s Brush was assessed and discussed with relevant landowners in the area. The affected landowners were more receptive to the Jaspers Brush inspection bay option and the location appropriately met the functional requirements for such a facility.

**Preferred heavy vehicle facility option**

A heavy vehicle rest area located at Meroo Meadow is not proposed as part of the proposal. An alternative rest area located outside of the proposal would better meet the proposal objectives (this would not form part of the proposal and would be subject to a separate assessment process). A heavy vehicle inspection bay (staffed when needed and locked when not in use) at Jaspers Brush is the preferred heavy vehicle facility option.