

6 Route option development and assessment

This chapter outlines the options considered for the Coffs Harbour Highway Planning Strategy including the Sapphire to Woolgoolga section (the Proposal) and the evaluation process, which resulted in the selection of the preferred route. It also provides details of the main distinguishing characteristics and impacts of the options considered. The options development process for the project is illustrated in Figure 6.1.

6.1 Coffs Harbour Highway Planning Strategy

The Coffs Harbour Highway Planning Strategy has been developed to address the need to upgrade the Pacific Highway between Sapphire and Woolgoolga while planning for future traffic needs within the Coffs Harbour area.

Since planning for the strategy began in September 2001, a wide range of potential highway corridors and route options has been investigated. These have included options developed by the project team and options put forward by Coffs Harbour City Council and the community.

The options investigated for the strategy fall within three broad strategic corridors:

- Far Western Bypass. A bypass of Coffs Harbour and Woolgoolga generally through the Orara Valley from Englands Road south of Coffs Harbour to Halfway Creek or Grafton.
- Coffs Harbour City Council Preferred Corridor. Options within a corridor adopted by council in late 2003 as its preferred option for a bypass of Coffs Harbour and Woolgoolga.
- Coastal Corridor. Options along the coastal plain between Englands Road south of Coffs Harbour and Arrawarra Creek north of Woolgoolga, with a future extension to Halfway Creek.

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Refer Figure 6.1

The assessment of the three broad strategic corridor options found that the Coastal Corridor was the most feasible corridor option because it would:

- Have good functional performance (provide substantial road safety improvements and travel time savings) while still providing opportunities to separate through and local traffic.
- Provide the best balance between functional, environmental, social and economic factors.
- Have moderate and manageable biophysical impacts.
- Have relatively minor and manageable heritage impacts.
- Be lower cost than the other corridor options.
- Give the best value for money and have fair economic performance (benefit to cost ratio (BCR) of 1.4 to 1.8).
- Provide good construction staging opportunities that could be provided with funding program limitations.

The proposed Sapphire to Woolgoolga project comprises the northern section of the Coastal Corridor. Detail relating to the assessment and selection of the preferred route for the Strategy is provided in the *Coffs Harbour Highway Planning Strategy Preferred Option Report* (Connell Wagner 2004).

The preferred route for the Strategy, including the Sapphire to Woolgoolga section, which was announced in December 2004, is shown in Figure 6.2.

6.2 Constraints analysis

A constraints analysis was carried out when developing options for the upgrade at both the corridor and route identification stages. These analyses drew on a wide range of data sources mainly from the NSW Roads and Traffic Authority (RTA), government agencies, Coffs Harbour City Council and local knowledge provided by the community. Using aerial photography and ground contour maps, a range of constraints was identified, including:

- Current and proposed urban and rural residential development.
- Existing agricultural land use including banana lands and forestry activities.
- Watercourses and wetland areas.
- Areas of ecological sensitivity.
- Items / locations of Aboriginal and non-Aboriginal heritage significance.
- Topographical / terrain aspects.
- Existing infrastructure such as schools, roads and railways.

Constraints mapping was developed to provide input to the ongoing engineering concept development of possible highway corridors and route options. The constraints were presented in the *Route Options Development Report* (Connell Wagner 2002) and the *Supplementary Options Report* (Connell Wagner 2004).

A composite constraints map that combines the key constraints is presented in Figure 6.3. This map shows the many, often severe, constraints to route planning (and ultimately to highway development) in the study area. All route options were influenced by substantial constraints of one form or another.

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6.2.1 Sapphire to Moonee Beach

In the southern section of the study area, from the existing dual carriageways near the old Pelican Beach Resort (now closed) at Sapphire to Moonee Beach, the existing highway corridor was identified as the only potentially feasible corridor option for upgrading the highway. The preliminary constraints analysis identified the land use pattern and steep terrain immediately to the west of the highway as significant constraints such that there were no realistic alternatives that warranted further consideration. This finding was examined and accepted by the community focus group representing the Sapphire to Moonee area.

As a consequence of this initial assessment, it was concluded that a broad corridor along the present highway would be the focus for subsequent route planning efforts. In effect, this meant that the overall highway upgrade from Sapphire to Woolgoolga would necessarily include upgrading along the four kilometres of existing highway from the southern limit of the study area to Moonee. The upgrade of the existing corridor would maximise usage of the existing highway infrastructure and minimise the need to acquire property for the Proposal.

6.2.2 Moonee to Woolgoolga

In the area north of Moonee, the preliminary constraints assessment showed there were still substantial constraints that would influence corridor planning. However, in contrast to the southern section, other potential corridor options to the west of the existing highway could be considered, due to the wider strip of coastal plain and less intensive existing development.

The existing highway alignment was identified as a realistic corridor option for this assessment.

A large number of indicative alignments were produced from a route location and optimisation computer package, known as *Quantm*. The project team then delineated the corridors where there was an obvious concentration of these alignments. The resultant corridor opportunities were as wide as 1.5 kilometres in some places. However, they were also very narrow in locations where one or more severe constraints restricted the alignments generated by *Quantm*.

6.3 Description of corridor options

The four preliminary corridor options (refer Figure 6.4) presented in *Community Information Sheet No 2* (March 2002) were developed during the initial constraints analysis. They include three deviation options north of Moonee (Options A, B and C) that variously bypass urban areas including Woolgoolga and major rural residential precincts. The fourth corridor would accommodate a major upgrading of the existing highway along its full length from Sapphire to north of Woolgoolga (Option D).

6.4 Development of route options

For the southern section (Sapphire to Moonee), the option development task was based on the preparation of urban and engineering design concepts. This required a particular focus on the examination of access arrangements and alternatives in what is a highly constrained corridor. The activity included the development of a strategic access plan for the highway from Sapphire to Woolgoolga as well as various traffic analyses to determine the expected traffic volumes along this part of the Pacific Highway within the planning horizon for the project (nominally 30 years). Two design options were developed based around major interchanges at either Headlands Road or Gaudrons / Split Solitary roads in the more intensively developed southern section of the route.

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For the section north of Moonee, the process of option identification for each of the four corridors involved the integration of the concept designs with more detailed constraints analysis arising from the diverse site investigations of relevant socio-economic and biophysical factors, as well as from community feedback. The findings from these investigations were presented in the working papers accompanying the *Route Options Development Report* released in December 2002.

For the section north of Arrawarra Creek, where the bypass rejoins the highway, the concept design allows for a full grade-separated interchange that serves land use in the Arrawarra area and also provides access to and from Woolgoolga.

6.4.1 Highway access strategy plan

A vital input for the development of options was the preparation of a coordinated access strategy. As part of the project, it was necessary to provide for major junctions along the route to cater for both local and through trips, while also meeting high standards of safety and travel efficiency on the highway. The strategy was developed to provide for the planned land use changes expected in the study area over the next 20-30 years.

6.5 Description of route options

6.5.1 Introduction

Five route alignments (A, B1, B2, C and D) were originally identified for the project and publicly released as part of the route options development information in December 2002. These alignments are shown in Figure 6.5.

The five alignments were presented and examined at a value management workshop in early 2003. This forum included representative stakeholder input into the process of assessing and selecting the preferred route for the project. Following this workshop, Coffs Harbour City Council requested that the RTA investigate additional route options to minimise the potential impact on the south Woolgoolga urban investigation area and to facilitate the future expansion of the township. An additional influence was the realisation of the benefits that would be derived for the bypass options by relocating the northern access to Woolgoolga further north than Safety Beach Drive. This change meant that all trips between Safety Beach and Woolgoolga would be on the existing highway.

Two new route options (C1 and E) were subsequently developed in response to council's request. Option C1 was a modified version of Option C, while Options B and C were amalgamated to produce Option E. These two supplementary routes are depicted in Figure 6.6.

All seven route options are described below and the key distinguishing features provided are drawn from the comparative assessment of route options completed up to the time of the announcement of the preferred route in December 2004.

6.5.2 Option A

Option A is the westernmost option analysed in the route selection phase. This route deviates from the existing highway north of Moonee at a grade-separated interchange. It then traverses predominantly state forest land along steep ridges of the coastal range for most of its length, rejoining the existing highway via a grade-separated interchange at Arrawarra Creek.

The section south of Moonee would involve a major upgrade of the existing highway to dual carriageway standard.

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Refer Figure 6.6

The main features of Option A are:

- Total length of 25.6 km.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights, Emerald Heights, Sandy Beach and west Woolgoolga.
- Directly affects approximately eight rural residential properties in the Sapphire to Moonee section.
- Very little effect on agricultural property with only one property likely to be severely affected.
- Has a major impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Passes near and crosses a number of important Aboriginal sites including a gazetted Aboriginal Place.
- Passes through the Sherwood Nature Reserve.
- Requires overpasses or underpasses of three local roads and a number of state forest access roads.
- All accesses to the highway north of Sapphire are grade-separated interchanges or left-in / left-out only.

6.5.3 Option B

Option B has two variants: Option B1 and Option B2. Option B deviates from the existing highway near Lake Russell just north of Smiths Road with a grade-separated interchange. The route passes through foothills east of the state forest with a mix of cleared and forested land, for approximately 1.25 kilometres before separating into two sub-options between Johnsons and Greys roads.

Option B1 runs west to the high point in the ridge between Johnsons and Holloway roads. The total length of this option is 22.1 kilometres. Option B2 is slightly longer at 22.8 kilometres. It deviates from Option B1 to pass to the east of the ridge between Johnsons and Holloway roads.

Options B1 and B2 then follow the same alignment from a point just south of Woolgoolga Creek Road traversing to the west of the Country Club Estate and rejoining the existing highway at Arrawarra Creek.

The section south of Lake Russell would involve a major upgrade of the existing highway to dual carriageway standard.

Option B1

The main features of Option B1 are:

- Total length 22.1 kilometres.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights, Emerald Heights and Sandy Beach.
- Directly affects approximately 26 rural residential properties (including Sapphire to Moonee section and west Woolgoolga).
- Has a major impact on 22 agricultural properties.
- Passes close to a variety of migratory bird aquatic habitats.
- Has a medium impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Crosses state forest at its northern end.
- Requires overpasses or underpasses of nine local roads and a number of state forest access roads.
- All accesses to the highway north of Sapphire are grade-separated interchanges or left-in / left-out only.
- Rejoins the existing highway at Arrawarra Creek with a grade-separated interchange.

Option B2

The main features of Option B2 are:

- Total length of 22.8 km.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights, Emerald Heights and Sandy Beach.
- Directly affects approximately 26 rural residential properties (including Sapphire to Moonee section and west Woolgoolga).
- Has major impact on 28 agricultural properties.
- Passes close to a variety of migratory bird aquatic habitats.
- Has a medium impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Crosses state forest at its northern end.
- Requires overpasses or underpasses of nine local roads and a number of state forest access roads.
- All accesses to the highway north of Sapphire are grade-separated interchanges or left-in / left-out only.
- Rejoins existing highway at Arrawarra Creek with a grade-separated interchange.

6.5.4 Option C

Option C leaves the existing highway at a proposed grade-separated interchange located north of Graham Drive North on the southern approach to Woolgoolga. Hearnese Lake Road and Graham Drive North would be linked with the southern interchange for Option C. It then traverses the South Woolgoolga urban investigation area to the south west of Woolgoolga and passes along the eastern side of the dam near Woolgoolga Creek Road. The route then proceeds northwards, bisecting land included in the west Woolgoolga development control plan, which came into effect on 13 October 2004. It then crosses over the western end of the Woolgoolga reservoir and rejoins the highway at a proposed grade-separated interchange near the existing Safety Beach Drive intersection.

The section south of the proposed interchange near Hearnese Lake Road would involve a major upgrade of the existing highway to dual carriageway standard.

The main features of Option C are:

- Total length of 23.3 kilometres.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights and Emerald Heights.
- Directly affects approximately 23 rural residential properties (including Sapphire to Moonee section and west Woolgoolga).
- Has a major impact on nine agricultural properties.
- Traverses the south Woolgoolga urban investigation area and the west Woolgoolga development control plan area.
- Crosses the western end of the Woolgoolga reservoir.
- Has moderate to high adverse impacts on urban land use and property.
- Has a medium impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Requires overpasses or underpasses of five local roads.
- All accesses to the highway between Sapphire and Moonee Beach and between Graham Drive North and Safety Beach are grade-separated interchanges or left-in / left-out only.

6.5.5 Option C1 (supplementary option)

As with Option C, this option forms a close bypass around the main urban part of Woolgoolga. Option C1 leaves the existing highway at a proposed grade-separated interchange located north of

Graham Drive North on the southern approach to Woolgoolga. Hearnese Lake Road and Graham Drive North would be linked with the southern interchange for Option C1.

The southern section of the bypass runs further to the west than Option C crossing the very southwest corner of the South Woolgoolga urban investigation area. It then passes through rural residential properties and agricultural land on the western side of the reservoir immediately south of Woolgoolga Creek Road (known locally as Creek Road dam) to cross Woolgoolga Creek Road approximately 60 metres further west than Option C.

The route then rejoins the original Option C alignment north of Woolgoolga Creek Road. It then traverses the open land included in the West Woolgoolga Development Control Plan prepared by Coffs Harbour City Council.

After crossing the western end of the Woolgoolga reservoir, the route deviates further to the west of and also extends further north than Option C to rejoin the highway via a grade-separated interchange near Darkum Creek, north of Safety Beach Drive.

Main features of Option C1 are:

- Total length of 23.5 kilometres.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights and Emerald Heights.
- Directly affects approximately 16 rural residential properties (including Sapphire to Moonee section and west Woolgoolga).
- Has a major impact on 38 agricultural properties.
- Crosses the south-west corner of the south Woolgoolga urban investigation area and the west Woolgoolga development control plan area.
- Crosses the western end of the Woolgoolga reservoir.
- Has moderate to high adverse impacts on urban land use and property.
- Has a low impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Requires overpasses of two local roads.
- All accesses to the highway between Sapphire and Moonee Beach and between Graham Drive North and Safety Beach are grade-separated interchanges or left-in / left-out only.

6.5.6 Option D

Option D provides a major upgrade of the existing highway to dual carriageway standard over its full length, from Sapphire through to north of Woolgoolga. The existing access arrangements in the Woolgoolga area would be substantially modified with this option. These would include a combination of left-in / left-out intersections; grade-separated interchanges and new service roads for local traffic. Two sub-options were developed: the first comprises partial interchanges at River Street and at Safety Beach Drive with a two-way service road between Clarence Street and Safety Beach Drive. The second sub-option comprises partial interchanges at Pullen / Clarence streets and at Centenary Drive connected by two, one-way service roads.

The main features of Option D are:

- Total length of 22.9 kilometres.
- Requires a major upgrade of the existing highway through Woolgoolga.
- Severely affects one agricultural property and requires total or partial purchase of approximately 40 residential and commercial properties in Woolgoolga.
- Requires closure of local roads and provision of service roads causing substantial local access changes.
- All accesses to the highway between Sapphire and Moonee Beach are left-in / left-out only and grade-separated interchanges would provide access to Woolgoolga.

6.5.7 Option E (supplementary option)

Option E combines the southern section of Option C1 and the northern section of Option B.

As with Option C1, Option E leaves the existing highway at a proposed grade-separated interchange located north of Graham Drive North on the southern approach to Woolgoolga. Hearnese Lake Road and Graham Drive North would also be linked with the southern interchange for Option E.

North of the interchange, Option E heads in a north-west direction over the south-west corner of the South Woolgoolga urban investigation area where it diverges from Option C1. It then traverses rural and rural residential properties and a section of Wedding Bells State Forest crossing Woolgoolga Creek Road approximately 900 metres further west than Option C1. It then continues in a generally northerly direction to join with the original alignment of Option B west of Newmans Road.

North of Bark Hut Road the alignment deviates slightly to the west of Option B over about one kilometre to avoid a protected forestry management area. At its northern end, Option E rejoins the Pacific Highway at Arrawarra Creek with a similar grade-separated interchange to that proposed for Option B.

The main features of Option E are:

- Total length of 25.2 kilometres.
- Avoids rural residential land at Forest Glen, Heritage Park, Avocado Heights, Emerald Heights and Sandy Beach.
- Crosses the south-western corner of the south Woolgoolga urban investigation area.
- Directly affects approximately nine rural residential properties (including Sapphire to Moonee section and west Woolgoolga).
- Has a major impact on 35 agricultural properties.
- Passes close to a variety of migratory bird habitats.
- Has a medium impact on key habitats and fauna movement corridors identified by the then National Parks and Wildlife Service.
- Crosses state forest north of Woolgoolga Creek Road and at its northern end.
- Requires overpasses or underpasses of six local roads and a number of state forest access roads.
- All accesses to the highway north of Sapphire are grade-separated interchanges or left-in / left-out only.
- Rejoins the existing highway at Arrawarra Creek with a grade-separated interchange.

6.6 Selection of preferred route

6.6.1 First value management workshop

The first value management workshop was held over two days on 31 March and 1 April 2003 to provide input into the process of assessing and selecting the preferred route for the project. The workshop was attended by project team members and a range of government, council and community stakeholders. Following the comparative assessment of options, the workshop participants agreed that Options C and D performed better than the other options. Overall, Option C was preferred over Option D as the option to be further progressed – subject to additional investigations regarding biodiversity impacts, noise management and review of council's strategic plan.

Those investigations led to the conclusion that Option C was the only option that warranted further consideration if a coastal corridor was adopted for the overall Coffs Harbour Highway Planning Strategy.

6.6.2 Second value management workshop

A second value management workshop was held on 4 August 2004. This workshop evaluated the favoured route option from the first value management workshop (Option C) and the two options developed in response to the request from council (Options C1 and E) to minimise the impact on the South Woolgoolga urban investigation area and to facilitate the future expansion of the township.

The same assessment criteria and importance weightings developed at the April 2003 workshop were adopted by agreement for the evaluation of Options C, C1 and E in the second workshop.

The majority of workshop participants identified Option E as the preferred option as it was considered to:

- Deliver the best overall socio-economic outcome.
- Better provide for future urban growth and provide greater flexibility for future land use planning decisions.
- Result in less severance of existing and future communities.
- Provide safety and noise improvements for Mullaway and Safety Beach.
- Be likely to have a higher degree of community acceptance.

6.6.3 Selection of preferred route

Following the second value management workshop, senior RTA representatives, regional Department of Planning representatives and the project team reviewed all the route development work undertaken up to August 2004 and recommended a preferred route for the project. The review was based on the technical investigations undertaken, the outcomes of the value management workshops and the results of the community consultation activities.

The review recommended Option E as the preferred route for the Sapphire to Woolgoolga section of the *Coffs Harbour Highway Planning Strategy*. It comprised an upgrade of the existing highway to dual carriageway between Korora and south Woolgoolga, and the Option E bypass of Woolgoolga. This recommendation was accepted by the Minister for Roads and on 7 December 2004 it was announced as part of the overall information release and display for the preferred route.

6.7 Extension of Proposal to include the Arrawarra interchange

In May 2006, the RTA included an additional northern section in the preferred route to incorporate a grade-separated interchange at Arrawarra. The interchange would be adjacent to Arrawarra Beach Road and would provide for traffic movement in all directions.

The Arrawarra extension begins where the original project ended, just north of Embankment Road. It follows the existing highway alignment, ending at Upper Corindi Road, where it joins the adjacent Woolgoolga to Wells Crossing upgrade project. This additional section of highway is bordered to the west by the Wedding Bells State Forest and to the east by forestry land and rural-residential development.

This section of the highway was previously part of the Woolgoolga to Wells Crossing project. During the route selection phase for that project, the existing highway corridor was identified as the only suitable corridor for the upgrade in that area and three route options were developed, all based on duplication to provide a high standard, dual carriageway highway.

The decision to add the subject section of highway to the Sapphire to Woolgoolga project was mainly influenced by the opportunity to rationalise interchange arrangements to serve access to

and from Woolgoolga as well as the requirements for the communities in the vicinity of Arrawarra / Corindi / Red Rock. Until that time, both projects had examined separate interchange options that were closely spaced which would not be cost effective given the relatively low traffic generated in the area. As the functional requirements for both projects could be readily integrated with a single interchange, and with Sapphire to Woolgoolga having higher priority for construction, this was concluded to be a prudent change to the project development.

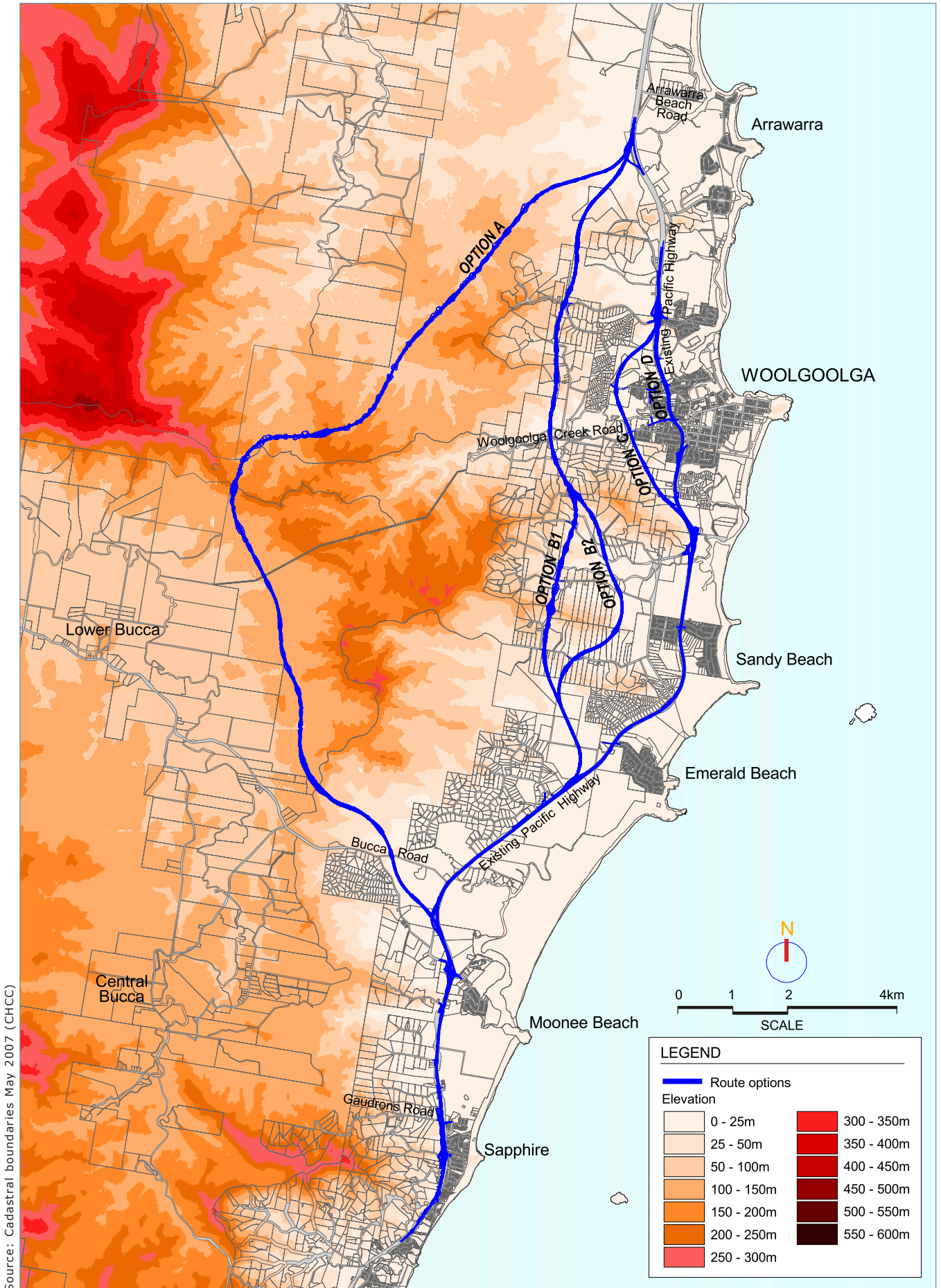
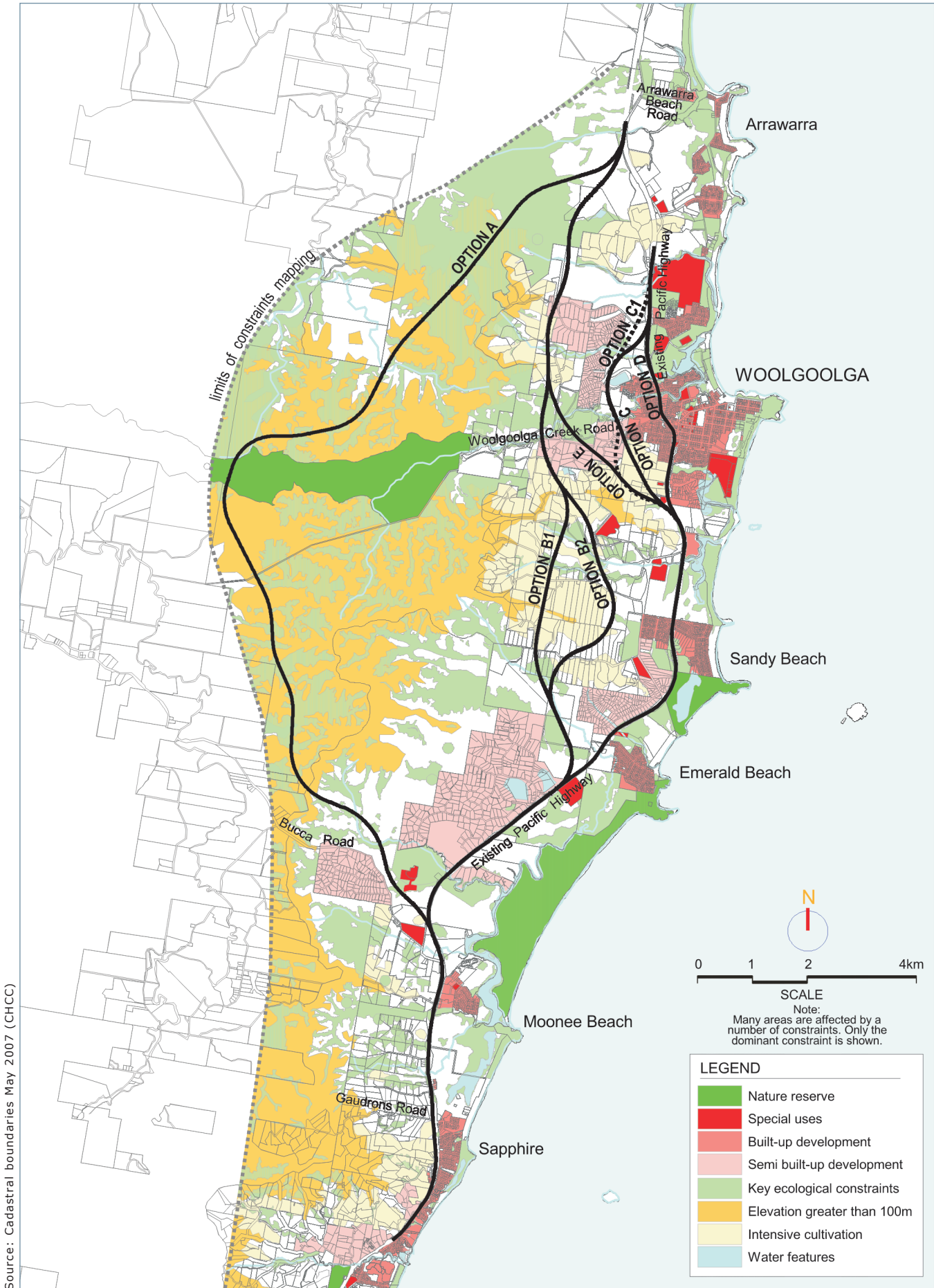


FIGURE 6.5 ROUTE OPTIONS (DECEMBER 2002)



Source: Aerial photography August 2000 (LPI NSW) Cadastral boundaries May 2007 (CHCC)

FIGURE 6.4 PRELIMINARY CORRIDOR OPTIONS



Source: Cadastral boundaries May 2007 (CHCC)

FIGURE 6.3 COMPOSITE CONSTRAINTS MAP

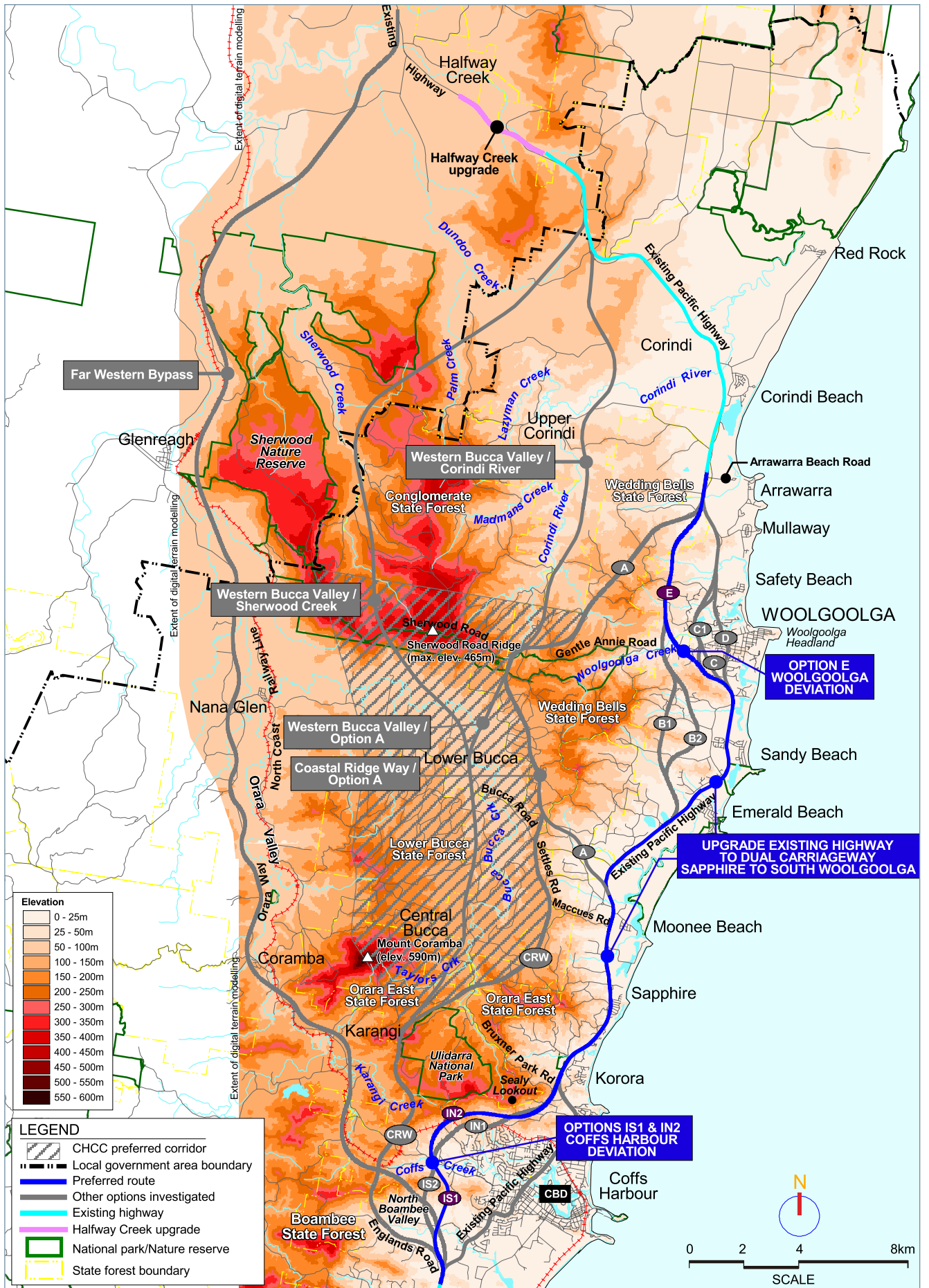


FIGURE 6.2 COFFS HARBOUR HIGHWAY PLANNING STRATEGY PREFERRED ROUTE

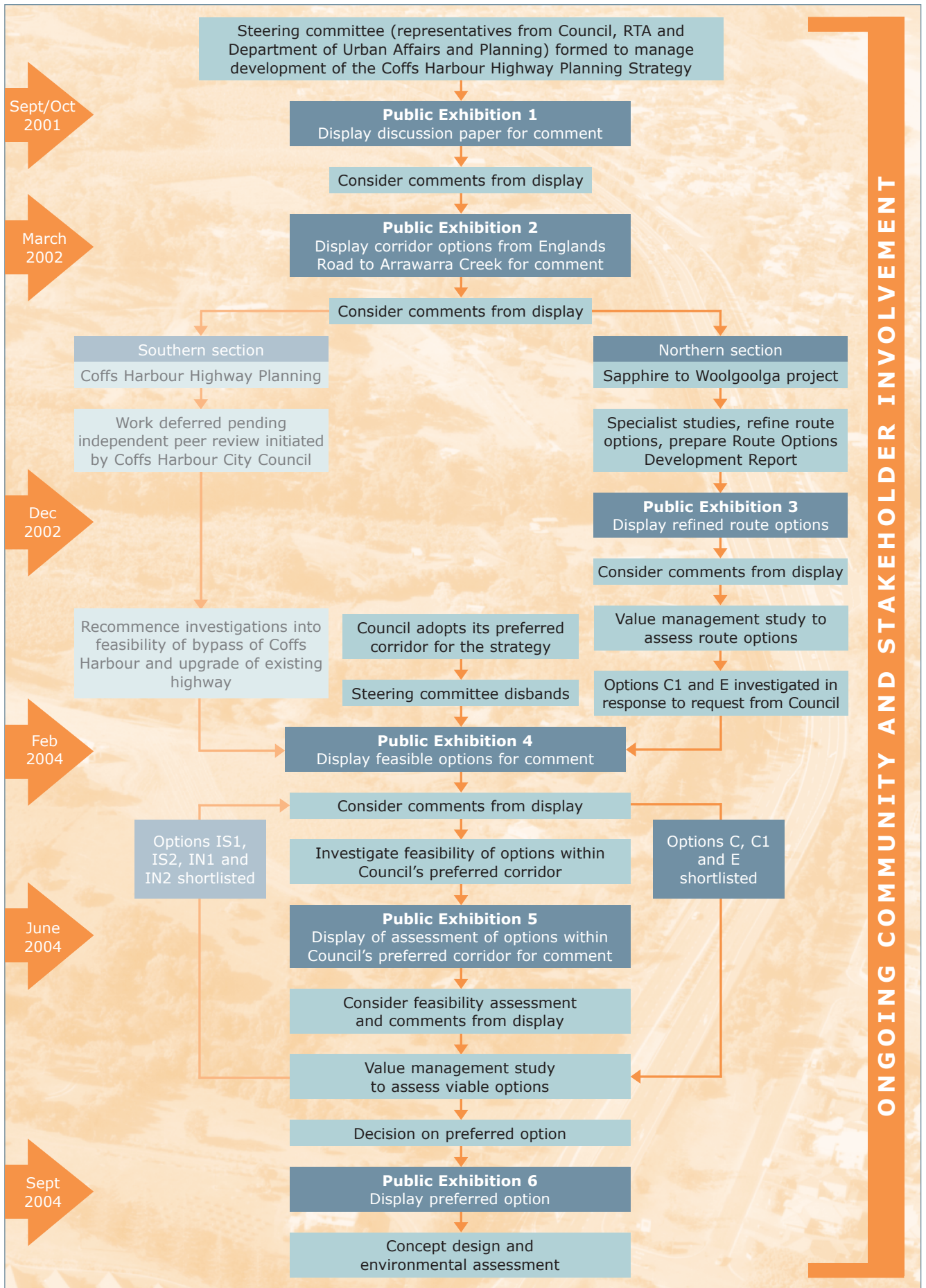


FIGURE 6.1 SAPPHIRE TO WOOLGOOLGA OPTIONS DEVELOPMENT PROCESS

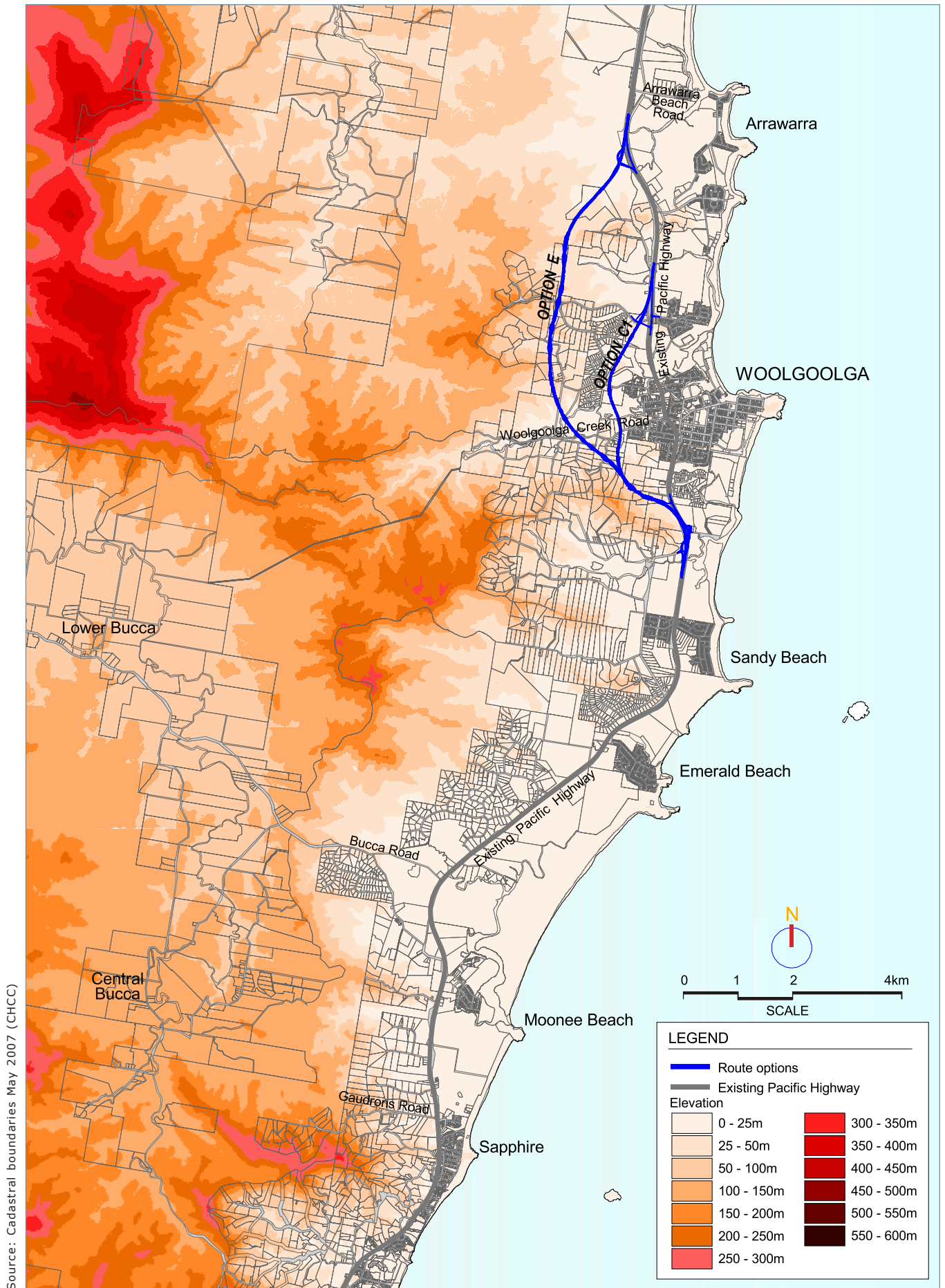


FIGURE 6.6 SUPPLEMENTARY ROUTE OPTIONS