

5.2.4 Issues and Constraints

The initial investigations and community involvement identified that the social, built environment and environmental issues associated with the construction and operation of the highway include impacts on:

- ▶ Visual and landscape domains;
- ▶ Native vegetation and flora;
- ▶ National parks and wetlands;
- ▶ Surface waters and flooding;
- ▶ Existing land uses;
- ▶ Existing infrastructure; and
- ▶ Indigenous and non-indigenous heritage areas.

The key constraints identified within the study area include:

- ▶ Access from private property, businesses and local roads;
- ▶ Stoney Park and Watersports Complex – it is a significant operation with considerable capital investment;
- ▶ Cooperabung Hill – the topography of this part of the study area presents some significant challenges in meeting the project design criteria;
- ▶ Hastings River and Wilson River floodplains – the floodplain will provide challenges in overcoming flooding and soft soil issues and will dictate the form of the upgrade in this area;
- ▶ Heritage sites – the various cultural heritage sites that have been identified should be avoided if possible;
- ▶ National parks / conservation areas – these reserves should be avoided if possible;
- ▶ SEPP designated areas – these reserves should be avoided if possible; and
- ▶ Project start and end points and the study area – these constrain the route options.

Analysis of these issues and constraints was initially undertaken using INCA.

5.3 Summary of Characteristics of Route Options

A broad summary of the key characteristics of each route option in each of the sections of the study area is contained in Tables 5.2 to 5.5.

The characteristics include:

- ▶ Engineering and Operational;
- ▶ Economic;
- ▶ Community; and
- ▶ Environmental.

Table 5.2 Route Option Characteristics – Section A

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Engineering and Operational				
Cross Section of New Highway	<p>The existing alignment north from the Hastings River, including the Dennis Bridge, does not comply with the design standards. There are two horizontal curves and six vertical curves that do not comply with the design standards. The Dennis Bridge does not meet the minimum carriageway width of 10.5 metres.</p> <p>Outside shoulder widths to be increased to 2.5 metres (with no barrier) and three metres with barrier. Existing width range between one metre and 2.5 metres.</p>			
Access Rationalisation	<p>There are currently a small number of private driveways, in addition to the seven public roads, that have direct access to the highway along Section A.</p> <p>In a Class A upgrade, provision has been made for a grade separated interchange between Hastings River Drive and Fernbank Creek.</p> <p>In a Class A upgrade, provision has been made for a grade separated interchange between Fernbank Creek Road and Fernbank Creek.</p> <p>It is likely that the number of access points to private roads and driveways would be rationalised, linked to intersections with left in / left out access via local access roads.</p> <p>In a Class M upgrade intersections would be linked by local access roads to either the Oxley Highway interchange or proposed interchange in the vicinity of Hastings River Drive. An underpass may be provided for the Sancrox Road / Fernbank Creek Road intersection with the highway.</p>			
Constructability	<p>The Hastings River floodplain includes alluvial materials and is known to contain soft soils in excess of 10 metres depth that will require specific detailed geotechnical investigations to enable design of soft soil embankment foundation treatments in this area. These soft soil treatments will have time, cost and staging implications during the construction phase. Bridging layers are likely for construction vehicles to cross soft soils and alluvial areas that contain waterlogged soils. Such areas are located near creeks and on the floodplain.</p>			

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	Crosses the Hastings River floodplain for approximately 3.1 km.	Crosses the Hastings River floodplain for approximately three kilometres.		Crosses the Hastings River floodplain for approximately 2.7 km.
Geotechnical	<p>Existing highway cuttings within Section A include numerous relatively small scale slumps and wedge style failures. Existing cuttings are generally excavated at slopes of 45°.</p> <p>Soft soils have been identified within the Hastings River floodplain alluvium to in excess of 10 metres depth.</p> <p>Potential acid sulphate soils have been identified along Partridge Creek. Potential acid sulphate soils have been identified across the width of the study area from Fernbank Creek to the Hastings River.</p>			
Public Utilities	<p>Telecommunications: Telstra and Visionstream Nextgen fibre optic networks are located within Section A. The Telstra optic fibre network crosses the existing highway at Sancrox Road and runs north, parallel to the eastern side of the existing alignment. The Telstra optic fibre also runs from the north side of Hastings River Drive to the Dennis Bridge.</p> <p>The Visionstream optic fibre is located adjacent to the existing highway from approximately 50 metres south of the Hastings River to 25 metres north of the causeway. This cable could be affected by interchange works.</p> <p>Electrical Infrastructure: Aerial power distribution (11kV and 33kV) traverses, and runs adjacent to, the existing highway at various locations within Section A. Pole mounted substations are also located in proximity to the existing highway at a number of locations.</p> <p>Underground low voltage power is located in the vicinity of Sancrox Road.</p> <p>Transgrid are proposing a zone substation off Sancrox Road. The planned distribution network from this facility proposed by Country Energy would involve approximately 10 to 15 cables under the highway to service Port Macquarie. Aerial grids running north and south would be preferably located within the road corridor.</p> <p>Water Services: Approximately 60 metres of water main passes under the highway at the intersection with Sancrox Road and Fernbank Creek Road.</p> <p>Sewerage Services: Port Macquarie – Hastings Council is currently undertaking a West Port Macquarie Effluent Strategy, which will connect Port Macquarie with Wauchope. This will involve the sewer crossing the highway at either Oxley Highway or Fernbank Creek Road.</p>			

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Road User Delay (Construction)	The majority of Section A will require construction under traffic. Therefore road user delay during construction may be considerable.			Construction would occur under traffic up to a point 400 metres south of Fernbank Creek. Therefore road user delay during construction in this area may be considerable.
	Road users may also experience delays associated with the construction of a grade separated interchange between Fernbank Creek and Hastings River Drive.	Road users may also experience delays associated with the construction of a grade separated interchange between Fernbank Creek and Hastings River Drive. However the alignment of the Green option to the west of the existing highway in this area may reduce the impact of delays.	Road users may also experience delays associated with the construction of a grade separated interchange between Fernbank Creek and Hastings River Drive.	Delays may be experienced during the possible construction of a grade separated interchange between Fernbank Creek Road and Hastings River Drive in the Class M situation.
Road User Delay (Operation)	<p>Currently through traffic north of Sancrox Road represents approximately 18% of all northbound vehicles and approximately 30% of all southbound vehicles. The proportion of through traffic is higher south of Sancrox Road. The proportion of heavy vehicles as part of the traffic stream at night is in excess of double that during the day.</p> <p>The highest traffic volumes between Oxley Highway and Maria River are in Section A between Hastings River Drive and Blackmans Point Road.</p> <p>Section A had a level of service (LoS) D in 2004. Assuming that no upgrading had occurred, LoS D will be experienced in 2016 throughout Section A and LoS E Hastings River Drive to Blackmans Point Road. LoS E will be experienced in 2036 throughout Section A. This would result in delays and queuing, as the highway will be operating over capacity.</p>			

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Level of Service (Intersections)	<p>Current traffic conditions for Sancrox Road and Blackmans Point Road indicate that the intersections operate satisfactorily. The level of service is B. Conditions in 2004 for Hastings River Drive / Glen Ewan Road indicate that the intersection operates satisfactorily with a level of service C.</p> <p>Projected traffic increases indicate that in 2016 the intersection of the highway with Sancrox Road will operate at LoS B, while the intersection of the highway with Blackmans Point Road will operate at LoS C and the intersection with Hastings River Drive / Glen Ewan Drive will operate at LoS F. In 2036 the three intersections assessed will all operate at LoS F (even if upgraded to a seagull type intersection).</p>			
Route Length	8.4 kilometres (similar to existing)	8.4 kilometres (30 metres shorter than existing)	8.4 kilometres (similar to existing)	8.2 kilometres (145 metres shorter than existing)
Hydrology (Flood Immunity)	<p>There is expected to be a minimal chance of flooding within Section A. The existing bridge is located above the probable maximum flood level of 3.04 metres when referenced to the Australian Height Datum (AHD).</p> <p>The new bridge(s) will maintain clearance for the passage of vessels beneath. Therefore the new bridge is also expected to have flood immunity.</p>			
Economic				
Vehicle Operating Cost (Heavy Vehicles)	<p>Section A does not contain any notable grades that will adversely impact on operating costs.</p> <p>Hastings River Drive intersection will cause delays to heavy vehicles to / from Hasting River Drive if no upgrade occurs.</p>			
Economic Development	<p>The <i>Hastings Urban Growth Strategy 2001</i> has identified a large area of land (referred to as Area 13) for urban, commercial and industrial investigation. Area 13 generally comprises lands east of the existing highway from south of the Oxley Highway interchange through to Fernbank Creek Road. The precise nature of the development is still uncertain as the area is subject to a series of environmental studies and investigations. The <i>Hastings Industrial Land Strategy 2003</i> has also identified large areas of land generally to the west of the existing highway and generally centred around Sancrox Road for future industrial development. These areas will require due consideration during development of the project.</p>			
Economic Impact	<p>Economic impacts to businesses and rural properties in the vicinity of Sancrox Road, Fernbank Creek Road and Hastings River Drive areas as a result of possible property acquisition and changed access arrangements.</p>			<p>Economic impacts to businesses and rural properties in the vicinity of Sancrox Road and along Glen Ewan Road.</p>

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	No expected impacts on the service centre (Oxley Highway interchange), Billabong Koala Park or Hastings River oyster leases.			
	Possible economic impacts through loss of productive lands within Cairncross State Forest.			Likely economic impacts through loss of productive lands within Cairncross State Forest.
	Impact on Birdons Dredging. While this business is planned for closure in the near future, the land is subject to a number of approved development applications for the establishment of a Marine Precinct. These plans would be significantly affected by this option.	Possible economic impacts through loss of productive lands within Cairncross State Forest. Impact on Birdons Dredging. While sand dredging was planned to cease in the near future, the land is subject to a number of approved development applications for the establishment of a Marine Precinct. These plans would be significantly affected by these options.		This option crosses the Hastings River to the west of the existing highway. Therefore impact on the proposed Marine Precinct at the present location of Birdons Dredging is expected to be minimal.
Cost to Construct				
Class A (\$M)	235	270	270	250
Class M (\$M)	280	260	280	260
Use of the Existing Reserve	Upgrade is mostly within the road reserve and will predominately use the existing highway as the southbound carriageway.			Upgrade is within the road reserve up to a point 400 metres south of Fernbank Creek Road. Where the new alignment deviates to the west, the existing highway including Dennis Bridge would become a local access road.

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Ease of Upgrade	Construction to occur under traffic for majority of this section.			Approximately half of Section A would be constructed under traffic.
Staging	<p>Section A can be constructed independently to Section B.</p> <p>The proximity of the proposed alignment to the existing highway would permit staged construction within Section A.</p>			
Community				
Vehicular Access	<p>Possible access impacts, particularly for heavy vehicle movements, on Hanson Construction Materials, Expressway Spares, Cassegrain Wines, TNT Express depot, RTA depot and proposed mining equipment fabrication business (adjacent to Expressway Spares).</p> <p>Likely changes in general access arrangements during construction and operation for businesses and residences located in Sancrox Road, Fernbank Creek Road, Glen Ewan Road, Hastings River Drive and Blackmans Point Road.</p> <p>Improved access arrangements associated with the possible grade separated interchange for Hastings River Drive.</p> <p>Possible access impacts during construction on Cairncross State Forest and Rawdon Creek Nature Reserve.</p> <p>Improved safety of access provided at all intersection with upgraded highway.</p> <p>Possible access impacts for river users due to the construction of new bridges.</p>			
	Likely access impacts during construction for Birdon Marine.		Likely access impacts during construction for residences located in Wharf Road.	
	Likely access impacts during construction for Hastings River Drive.			
Community Severance/Consolidation	<p>There are no villages within this section of the study area. The community of Blackmans Point, rural dwellings located along Glen Ewan Road, and proposed residential / rural residential areas (Area 13 and off Sancrox Road to the west) would be provided with changed access to the upgraded highway.</p> <p>Possible amenity impacts to proposed urban release area (Area 13), although provision of suitable buffers by council should be considered in planning of this development.</p>			

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>Potential amenity impacts to rural properties on the Hastings River floodplain.</p> <p>Potential stress impacts to business owners and residents caused by changed access arrangements, reduced environmental amenity and property acquisition.</p>			
	<p>Potential amenity impacts for Birdon Marine and Birdon Dredging.</p>			<p>Potential severance of rural properties along Glen Ewan Road to the west of this option.</p>
				<p>Likely improved amenity for Birdon Marine, Birdons Dredging and properties located in close proximity to existing highway along Glen Ewan Road.</p>
Private Property Impact – Noise	<p>The total number of potential receivers in this section within 500 metres of the existing highway is 63.</p>			
	<p>The total number of potential receivers in this section within 500 metres of these options are 63.</p>			
	<p>Distances to potential receivers from the centreline of this option are <100 metres (11), 100 metres to 200 metres (10) and 200 metres to 500 metres (42). Relative to the existing highway this is similar with a slight increase (2) in the number of potential receivers within 200 metres.</p>	<p>Distances to potential receivers from the centreline of these options are <100 metres (15), 100 metres to 200 metres (9) and 200 metres to 500 metres (39). Relative to the existing highway this is similar with a slight increase (3) in the number of potential receivers within 200 metres.</p>		<p>Distances to potential receivers from the centreline of this option are <100 metres (11), 100 metres to 200 metres (16) and 200 metres to 500 metres (36). Relative to the existing highway this is similar with a slight increase (6) in the number of potential receivers within 200 metres.</p>

Section A				
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	All of the potential receivers are expected to be subject to the “Redeveloped Highway” criteria.	Potential receivers expected to be subject to the “Redeveloped Highway” criteria are 42. Potential receivers expected to be subject to the “New Highway” criteria are 21.		Potential receivers expected to be subject to the “Redeveloped Highway” criteria are 41. Potential receivers expected to be subject to the “New Highway” criteria are 22.
	The weighted noise impact (without mitigation) score for this option (79) is slightly higher than existing highway score (74), indicating an overall slightly higher potential noise impact.	The weighted noise impact (without mitigation) score for these options (82) are slightly higher than the existing highway score (74), indicating an overall slightly higher potential noise impact.		The weighted noise impact (without mitigation) score for this option (86) is slightly higher than the existing highway score (74), indicating an overall slightly higher potential noise impact.
Property Impact				
Number of Properties Affected	45	45	45	43
Approximate Area Affected (ha)	50.8	50.8	50.8	57.1
Description of Properties Affected	Land acquisition of varying degrees from a number of properties. This includes strip acquisition of rural land and land fronting Expressway Spares, however no impact to its land is expected.			Acquisition of rural land on both sides of the Hastings River. Acquisition and severance of land within Cairncross State Forest. Strip acquisition of land from Rawdon Creek Nature reserve at the northern extent of this section

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	Depending on the presence of any special values within Zone 8 of Cairncross State Forest that may qualify these areas for classification as a special management zone (Zone 1 or Zone 2) and subject to refined design, it is possible that any area required by these options would be less than 20 ha, and that revocation could be effected by a notice in the Gazette. Revocation of land within Rawdon Creek Nature Reserve, irrespective of the area involved, would require an Act of Parliament.			
Amenity – Bus Access	Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However the provision of improved clear zones and possibly designated bus bays should improve the current situation.			
	Under a Class M scenario, no bus stops would be provided on the upgraded highway. Access to alternative bus stops would be provided via local access roads.			
Amenity – Pedestrian and Cyclist Access	For safety reasons, pedestrian access across the upgraded highway would be discouraged and cyclists would be permitted to use the left hand shoulder on the upgraded highway. Pedestrian needs will be further assessed following selection of the preferred route.			
	Possible impacts on pedestrian movements along the existing underpass between Cassegrain Wines and Expressway Spares, particularly during construction.			
	While existing pedestrian usage is considered likely to be very low, there are possible impacts on pedestrian usage of Dennis Bridge during construction.	Possible impacts to cyclist amenity during construction.	Minimal impacts to cyclists during construction as the existing highway would be available where this option deviates from the existing alignment.	

Section A				
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Visual Amenity	<p>Other than the Hastings River floodplain, the gently undulating topography would largely result in a minimal requirement for cut and fill. Some areas of small cut and fill, and widening of the cleared vegetation corridor would result in some localised visual change, although the overall visual impact is likely to be limited.</p> <p>At the southernmost part of the upgrade, the possible development of a residential and commercial development (known as Area 13) would alter the visual character of this area so that any visual impacts of the widening of the highway may be reduced depending on the provision of suitable buffers in the development.</p> <p>All options would be elevated above the existing ground level as they approach the Hastings River, which is identified as one of the 16 key landmarks along the existing Pacific Highway. This elevation would increase the prominence of the highway, however specific landscape measures and fill batter design will greatly influence the overall impact of the embankment.</p> <p>The possible grade separated interchange in this section would be likely to be a highly prominent feature, however its visual impact will depend on its location, design, and landscape treatments.</p>			
	<p>To the north of the Hastings River these options would result in widening of the existing corridor through the forested landscape created by Cairncross State Forest and Rawdon Creek Nature Reserve, which surround the existing highway. This would create some local visual impact upon the landscape although there are few views from beyond the highway corridor that would appreciate these visual impacts due to the enclosure provided by the surrounding forest.</p>			<p>North of the Hastings River a new area of clearing would be created through the forested areas and be visually prominent. There are few views from beyond the highway corridor that would be subject to these visual impacts due to the enclosure provided by the surrounding forest, and moderate landform.</p>
	<p>The Hastings River crossing would include the addition of a new bridge (Blue option) or two new bridges (Green and Purple options) parallel to the existing Dennis Bridge. The visual effects would be in the loss of riverside vegetation, the visual prominence of the additional bridge structures, and the cumulative visual impact alongside the existing bridge creating a wider corridor visually. These impacts would also affect any viewpoints located to the east or west along the river and its banks.</p>			<p>This option creates a new river crossing at a location west of the existing highway bridge. The new bridges would be located to the west of a cluster of dwellings located on Glen Ewan Road.</p>

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
				<p>The visual effects of the addition of two bridges across the Hastings River would be in the loss of some riverside vegetation, as well as the increase in built structure in the vicinity. The bridges would be visually prominent, and there are likely to be cumulative visual impacts as it runs within view of the existing bridge. These impacts would also affect any viewpoints located to the east or west along the river and its banks.</p>
Indigenous Heritage	<p>No known listed indigenous heritage items within or in immediate proximity of these options.</p> <p>Several Aboriginal sites listed on the Department of Environment and Conservation (NSW) Aboriginal Heritage Information Management System are situated between approximately 200 and 300 metres from these options south of the Hastings River. These include artefact scatters (DEC #30-3-194, 30-3-195, 30-3-210, 30-3-211 and 30-3-212) and a scarred tree (#30-3-162).</p> <p>High potential for stone artefacts to occur, particularly in undisturbed ground and around water courses such as the Hastings River. Generally low potential for other types of Aboriginal sites.</p> <p>A ceremonial site is known to the local Aboriginal community west of these options, around the hard rock quarry north of Sancrox Road. The general area on the northern and southern banks of the Hastings River is also an area of cultural sensitivity where battles between the Dunghutti and Birpai people were fought. All options traverse this area.</p>			<p>An unconfirmed possible artefact scatter is located in the vicinity of this option just south of Cairncross State Forest.</p>

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Non-Indigenous Heritage	<p>No known listed non-indigenous heritage items within or in immediate proximity of any of the options.</p> <p>Potential historical relics include those relating to the themes of timber cutting, farming and transport.</p> <p>Dennis Bridge over the Hastings River was constructed in 1959 and would potentially be a heritage item after 2009.</p>			
Land Use – Statutory Planning	<p>Hastings LEP: All options pass through or immediately adjacent to land zoned 1(a1) Rural, 1(a3) Rural Agricultural Protection, 1(f) State Forests, 5A Special Uses Community Purposes – Classified Road, and 8(a) National Parks and Nature Reserves. The land (Lots 3, 4 and 5, DP 1000080) on the corner of Sancrox Road and the existing Pacific Highway is proposed to be rezoned from 1(a1) Rural to 4(a) General Industrial.</p> <p>Summary of Statutory Position: Pending clarification of the application of the new State planning reforms within this section these options would be:</p> <ul style="list-style-type: none"> ▶ Potentially prohibited within land zoned 8(a) National Parks and Nature Reserves; and ▶ Excepting the above, pursuant to SEPP 4 permitted without development consent. 			
Land Use – Residential	<p>Residential land use in this section is currently limited to scattered rural residential properties. The community of Blackmans Point is located to the east of the study area. Land immediately to the east between the Oxley Highway and Fernbank Creek Road has been identified for a mixture of future urban and commercial development (Area 13). Two rural residential developments are proposed to the west off Sancrox Road although these are yet to be subject to formal development applications to council.</p>			
Land Use – Productive Land	<p>Likely strip acquisition of rural lands fronting the existing highway, generally between the project start and Sancrox Road.</p>		<p>Likely strip acquisition of rural lands fronting the existing highway on the southern and northern banks of the Hastings River.</p>	
			<p>This option would involve acquisition of rural lands on both the south and north sides of Hastings River, with potential for severance of a number of rural properties on both the northern and southern banks of the Hastings River.</p>	

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>The possible grade separated interchange in this section could also alter existing access to and within rural properties, and potentially sever some properties depending on the final location and arrangement.</p> <p>Oyster leases within the Hastings River would not be directly impacted in terms of land use as a result of these options.</p>			
	Likely strip acquisition from Cairncross State Forest, including land zoned for limited forestry production.			This option would require acquisition and severance of Cairncross State Forest, including lands zoned for forestry production.
Environmental				
Wetlands	<p>There are no areas of SEPP 14 wetlands in this section.</p> <p>All options pass through floodplain wetland habitats.</p>			
Water Quality	<p>Waterway Crossings: Partridge Creek, Fernbank Creek and Hastings River.</p> <p>No adverse water quality impacts have been envisaged to occur provided the RTA standard water quality management measures are applied during both construction and operation.</p>			
Native Flora	<p>Key Vegetation Communities: Forest ecosystems (as mapped by CRA) identified as within the option corridor with high conservation value include: Swamp Oak and Dry Grassy Tallowood-Grey Gum.</p>		<p>Key Vegetation Communities: Forest ecosystems (as mapped by CRA) identified as within the option corridor with high conservation value include: Swamp Oak, Grassy Tallowood-Grey Gum and Escarpment Redgum.</p>	<p>Key Vegetation Communities: Forest ecosystems (as mapped by CRA) identified as within the option corridor with high conservation value include: Swamp Oak and Dry Grassy Tallowood-Grey Gum.</p>

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	NPWS Reserves: These options may require clearing within Rawdon Creek Nature Reserve to widen the existing corridor.			NPWS Reserves: This option requires clearance of a new two carriageway corridor within the eastern section of Rawdon Creek Nature Reserve.
	State Forests: These options may require clearing within Cairncross State Forest to widen the existing corridor.			State Forests: This option creates a new two carriageway corridor within Cairncross State Forest.
	Vegetation Clearing: These options generally require widening of the existing corridor by one carriageway.			Vegetation Clearing: In the vicinity of Fernbank Creek and north of the Hastings River this option requires the creation of a new two carriageway alignment.
	Confirmed Endangered Ecological Communities: Freshwater wetlands, subtropical coastal floodplain forest, swamp oak coastal floodplain forest and swamp sclerophyll forest, located in the vicinity of Fernbank Creek.			
	Potential Endangered Ecological Communities: None known.			
	Possible Threatened Species Present: The plant <i>Melaleuca biconvexa</i> may occur in the flood plains of the Hastings River.			
	Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): <i>Acronychia littoralis</i> (1).			

Section A				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	Approximate total area of vegetation clearing is 25 ha.			Approximate total area of vegetation clearing is 45 ha.
	Approximate area of confirmed endangered ecological community clearing is 8 ha.			Approximate area of confirmed endangered ecological community clearing is 10 ha.
	Approximate area of high conservation value vegetation, community clearing is 13 ha.			Approximate area of high conservation value vegetation, community clearing is 10 ha.
Native Fauna	<p>NPWS Designated Wildlife Corridors: All options pass through the “Lake Innes Cowarra Subregional Corridor” which is approximately 700 metres wide where it crosses the existing highway south of Sancrox Road and would require widening of the existing corridor through this wildlife corridor.</p>			
	<p>NPWS Designated Key Habitats: These options traverse the edges of designated key habitat areas to the west of the existing highway, mainly associated with the corridor identified above, and other areas associated with a tributary of Fernbank Creek to its south. All options may require some clearing on the edges of these areas.</p>			
	<p>Possible Threatened Species Present: Koala, glossy black cockatoo, black-necked stork, osprey, square-tailed kite, masked owl, black bittern, little bent-wing bat and green-thighed frog.</p>			
	<p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Koala (1) and masked owl (1).</p>			<p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Koala (1), masked owl (1) and black-necked stork (1).</p>

Table 5.3 Route Option Characteristics – Section B

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Engineering and Operational				
Cross Section of New Highway	<p>There are four horizontal curves and six vertical curves that do not comply with the minimum design standards.</p> <p>Shoulder widths to be increased to geometric 2.5 metres with no barrier and three metres with barrier. Existing width range between one metre and 2.5 metres.</p> <p>The Hastings River bridge and Cooperabung Creek bridge do not meet the minimum carriageway width of 10.5 metres.</p>		<p>The above applies for the duplication south from Moorside Drive and north from Haydons Wharf Road.</p>	<p>Two new carriageways will replace existing alignment.</p>
Access Rationalisation	<p>There are currently a number of private driveways, in addition to the 16 public intersections along Section B.</p> <p>There are numerous access points to the Pacific Highway through Telegraph Point, both north and south of the Wilson River. Initially, direct access to the highway would be limited and local access roads constructed as necessary to provide points of entry for local traffic.</p>		<p>There are currently a number of private driveways, in addition to the 16 public intersections along Section B.</p>	<p>For a Class A upgrade it is proposed to construct at-grade intersections at Blackmans Point Road where the alignment deviates from the existing and at Haydons Wharf Road where the alignment rejoins the existing highway.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>It is proposed that two access points would be provided on the south side of the Wilson River, at-grade intersections located at Bill Hill Road on the east side of the highway and off Mooney Street on the west side of the highway. The Mooney Street access would service a number of local accesses that would be closed and an overhead bridge would serve Moorside Drive</p>		<p>There are numerous access points to the Pacific Highway through Telegraph Point, both north and south of the Wilson River. Initially, direct access to the highway would be limited and local access roads constructed as necessary to provide points of entry for local traffic.</p> <p>It is proposed that two access points would be provided on the south side of the Wilson River, at-grade intersections located at Bill Hill Road on the east side of the highway and off Mooney Street on the west side of the highway. The Mooney Street access would service a number of local accesses that would be closed and an overhead bridge would serve Moorside Drive.</p>	<p>In a Class M upgrade there is no grade separated interchange in this section.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Constructability	Constructability of these options is poor as they would involve construction under traffic in addition to construction through the village of Telegraph Point. The alignment crosses numerous public intersections and private accesses and would also require the relocation of extensive lengths of optic fibre in Telegraph Point. It will also traverse the Wilson River floodplain for approximately one kilometre thereby requiring consideration of potential soft soil and trafficability issues.		Good as a large proportion of the new construction would be separate to the existing highway and avoid construction within Telegraph Point. The approximate 2.5 km crossing of the Wilson River floodplain and Dalhunny Island would present construction challenges due to the known presence of soft soils, SEPP 14 wetland and potential acid sulphate soils.	The majority of new construction would be separate to the existing highway, however potentially challenging construction issues are likely to result from the approximate three kilometre crossing of the Wilson River floodplain that is known to contain soft soils and may contain acid sulphate soils. This option also includes a new alignment to the north of the Wilson River that may present construction challenges due to public roads and private accesses.
Geotechnical	<p>The options in this section will traverse rolling hills with shallow cuts in fills within a residual soil profile as they approach the Wilson River Floodplain from the south. The Wilson River floodplain is expected to include soft soil and variable alluvial materials. The soft soils are expected to vary from two metres to eight metres depth and will require detailed geotechnical design of embankment foundation treatments. These treatments are likely to have an impact on construction timing, cost and staging. Potential acid sulphate soils will also be encountered within the Wilson River floodplain within the study area. Potential acid sulphate soils have also been identified on the eastern side of the corridor from Blackmans Point Road to Bill Hill Road.</p> <p>North of the Wilson River the geology includes jointed, steeply dipping sedimentary rock strata. Highway cuttings in this area will require careful consideration of cut batter design and maintenance.</p>			
	Embankment Design: The Wilson River floodplain contains deep alluvium that may contain soft soils. If present, soft soils would require consideration for embankment design and construction. Cooperabung Creek is expected to contain relatively shallow alluvium with a low potential for soft soils.		Embankment Design: The Purple option would traverse approximately 2.5 km of the Wilson River floodplain. This would require construction over deep alluvial material with the possibility of soft soils and acid sulphate soils likely over a substantial length. Cooperabung Creek is expected to contain relatively shallow alluvium with a low potential for soft soils.	

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>Rock Cuttings: The existing cutting north of the Wilson River, within Telegraph Point, contains instability hazards. Localised instability will require stabilisation treatment for the existing cutting and any future cutting. The widening of this existing cutting will encounter high strength rock with prominent geological structure.</p>		<p>Rock Cuttings: North of the Wilson River, the geometry of cuttings can be assumed to replicate the existing highway cuttings of approximately 65° or 1/2H:1V in the fresh / strong rock varying to 1H:1V or 2H:1V in the more deeply weathered, weaker rock units. More detailed geological assessment is required of stability in the steeper rock cuttings of the fresh / strong rock.</p>	
Public Utilities	<p>Telecommunications: Extensive Telstra assets are located through Telegraph Point. Approximately 1.75 km of optic fibre would require relocation.</p> <p>A total of five road crossings will also require protection.</p>		<p>Telecommunications: Approximately 2.4 km of optic fibre requires relocation at various locations. The Purple option would impact on underground assets that would require protection at six locations.</p>	<p>Telecommunications: This option would require the relocation of approximately 1.3 km of Telstra optic fibre.</p> <p>This option would also require the relocation of approximately 650 metres of Visionstream optic fibre south of the Wilson River.</p> <p>A total of ten road crossings would also require protection.</p>
	<p>Electrical Infrastructure: Aerial power distribution (mainly 11kV) would require relocation at numerous locations throughout Section B. This includes the relocation of a number of pole-mounted substations.</p> <p>Underground power supplies would require relocation from 6.7 km to 6.9 km north of Blackmans Point Road (approximately 80 metres to be relocated).</p>		<p>Electrical Infrastructure: Aerial power distribution (mainly 11kV) would require relocation up to Moorside Drive. North from Moorside Drive, this option diverts to the east, across the Wilson River floodplain.</p>	<p>Electrical Infrastructure: Powerlines / poles (mainly 11kV) would need to be relocated from three areas.</p> <p>Pole mounted substations would need to be relocated in two areas.</p>
	<p>Water Services: The relocation of underground water main would be required at four locations.</p>			

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Road User Delay (Construction)	<p>The majority of Section B would require construction under traffic. Therefore road user delay during construction may be considerable.</p> <p>Construction activities through Telegraph Point would cause significant delays to local and through traffic.</p> <p>The potential construction of grade separated interchanges located at Moorside Drive and on the northern side of the Wilson River within Telegraph Point would cause delays to motorists during construction.</p>		<p>The majority of this option would be constructed away from traffic in Section B and hence it is expected that road user delay during construction would be minimal.</p>	<p>This option would be constructed away from traffic. Therefore road user delay is expected to be minimal.</p>
Road User Delay (Operation)	<p>Currently, through traffic represents approximately a third of all vehicles within Section B. The proportion of local traffic is higher south from Telegraph Point.</p> <p>Section B had a level of service (LoS) D in 2004.</p> <p>Assuming that no upgrading had occurred, LoS E would be experienced in 2016 and 2036. LoS E means that the highway will experience queuing and delays, as it will be operating over capacity.</p>			
Level of Service (Intersections)	<p>Current traffic conditions for the Telegraph Point South (Mooney Street) access indicate that the intersection operates at LoS B. Projected traffic increases indicate that in 2016 the intersection will operate at LoS C and in 2036 will operate at LoS F.</p> <p>Current traffic conditions for the Telegraph Point access north of the Wilson River (Rollands Plains Road) indicate that the intersection operates at LoS B. Projected traffic increases indicate that in 2016 the intersection will operate at LoS F and in 2036 will operate at LoS F (even if upgraded to a seagull type intersection).</p>			
Route Length	12.0 km (similar to existing)	12.0 km (similar to existing)	11.8 km (200 metres shorter than existing)	11.0 km (970 metres shorter than existing)

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Hydrology (Flood Immunity)	The existing crossing of the Wilson River has flood immunity up to the probable maximum flood level. The Cooperabung Creek bridge is expected to have flood immunity up to the 1 in 100 year level.			
	The Blue option and Green options are expected to be immune from the majority of flood events.		The Purple option and Orange option would require the new bridges over the Wilson River and Cooperabung Creek to maintain the height of the existing bridges to ensure immunity from the majority of flood events. The embankments over the floodplains would require a height that would enable compliance with the upgrade standards for flood immunity. Provision of culverts within the embankments would be required to prevent upstream flooding.	
Economic				
Vehicle Operating Cost (Heavy Vehicles)	Section B does not contain any notable grades that adversely impact on operating costs.			
Economic Development	Based on discussions with Port Macquarie – Hastings Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.			
Economic Impact	Possible economic impacts to Cairncross Waste Management Facility, Stoney Holiday Park and Recreational Watersports facility, Sharky's Skirmish, Pear Tree Cottage, Telegraph Point service station and café, and other businesses as a result of potentially restricted access during construction and operation.		Possible economic impacts on the Telegraph Point service station and majority of businesses within Telegraph Point due to loss of passing trade following completion of the upgrade.	
	Possible economic impacts through loss of productive lands within Cairncross State Forest.		Economic impacts due to property acquisition and severance of Cairncross State Forest.	

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
			<p>Possible economic impacts to Gean Custom Marine located at Haydons Wharf Road as a result of property acquisition.</p>	<p>Possible economic impacts on Pear Tree Cottage due to loss of passing trade following completion of the upgrade.</p> <p>Possible economic impacts to Gean Custom Marine located at Haydons Wharf Road as a result of property acquisition.</p>
			<p>Economic impacts to rural properties through acquisition and severance.</p>	
Cost to Construct				
Class A (\$M)	210	215	300	265
Class M (\$M)	280	285	340	265
Use of Existing Reserve	<p>This option is a duplication of the existing highway. This represents a high re-use of the existing road reserve.</p>		<p>This option retains the existing highway as a local access road from Moorside Drive to Haydons Wharf Road.</p>	<p>This option retains the existing highway as a local access road from Blackmans Point Road to Haydons Wharf Road.</p>
Ease of Upgrade	<p>Construction to occur under traffic. Significant construction challenges as a result of highway duplication through Telegraph Point.</p>		<p>The majority of this option will be constructed away from traffic.</p>	
Staging	<p>Section B can be constructed independently to the other sections.</p>			
	<p>Construction of this option within Section B could be staged.</p>		<p>It would be possible to stage the construction of the deviated section separately from the duplicated sections.</p>	<p>There is limited opportunity for staging of this option within Section B.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Community				
Vehicular Access	<p>Potential changed access arrangements at Hacks Ferry Road during construction.</p> <p>Improved safety of access provided at all intersections with upgraded highway.</p> <p>Possible access impacts for river users due to bridge construction over the Wilson River.</p> <p>Improved access arrangements associated with the possible grade separated interchange in this section.</p>		<p>The existing highway through Telegraph Point would become a local access road following completion of the upgrade. This would improve local access and safety.</p>	
	<p>Possible access impacts into Cairncross State Forest and Rawdon Creek Nature Reserve during construction.</p>		<p>Possible access impacts within Cairncross State Forest during construction and operation.</p>	
	<p>Likely changed general access arrangements during construction and operation, in particular Bill Hill Road, Moorside Drive, Pembroke Road, Mooney Street, Watt Road, Cooperabung Drive (south and north intersections) and numerous accesses within Telegraph Point.</p> <p>Likely accessibility impacts to Log Wharf Reserve, particularly during construction.</p> <p>Possible access impacts, particularly for heavy vehicle movements, on Cairncross Waste Management Facility, Gean Custom Marine, Pear Tree Cottage, Stoney Holiday Park and Recreational Watersports facility, KC Cooper & Sons Sawmill, Bowds-Schmutters Quarry, Telegraph Point service station and Catman Earthmover Repairs.</p>		<p>Possible access impacts, particularly for heavy vehicle movements, on businesses and properties south, and inclusive of, Moorside Drive. Likely changed general access arrangements during construction and operation, in particular at Bill Hill Road, Moorside Drive and Wilmaria Road.</p> <p>Access impacts to Cairncross Waste Management Facility and Sharky's Skirmish.</p>	

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Community Severance/Consolidation	<p>Possible amenity impacts to occupants of existing residences near Moorside Drive and Mooney Street, Telegraph Point (particularly the northern side of Wilson River), Cooperabung Drive and Cooperabung Close.</p> <p>Possible amenity impacts to Gean Custom Marine, Pear Tree Cottage and Telegraph Point Service Station.</p> <p>These options would traverse Log Wharf Reserve, the recreational area located on the southern bank of the Wilson River. The extent of any impact at this location would ultimately depend on the design and configuration of the new river crossing, but is expected to reflect the existing situation, with the most likely result being an elevated bridge. During operation, it is considered likely that public access to this reserve would be retained and as such there are no expected significant impacts on this reserve.</p>		<p>Severance of a number of rural properties to the south of the Wilson River. Potential for perceived isolation of rural properties at the end of Wilmaria Road.</p> <p>Possible amenity impacts to occupants of existing residences near Moorside Drive and Pear Tree Cottage.</p> <p>Likely amenity impacts to rural properties the east of the existing highway between the south bank of the Wilson River and Haydons Wharf Road, including a number not previously exposed to the highway.</p>	<p>Potential isolation of rural properties along Haydons Wharf Road.</p> <p>Severance of a number of rural properties to the south of the Wilson River.</p> <p>Possible amenity impacts to occupants of existing residences on the southern bank of the Wilson River at the point of crossing and to the east of the existing highway on the northern bank of the river in the vicinity of Wilmaria Road and Haydons Wharf Road.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>Potential increased severance for communities either side of the highway at Telegraph Point.</p> <p>Potential for severance of residences in Moorside Drive from those in Pembroke Road and Mooney Street.</p>		<p>Likely improved community cohesion within Telegraph Point, both north and south of the Wilson River.</p> <p>Possible perceived loss of character of area caused by potential impacts to SEPP 14 wetlands.</p> <p>Potential for stress caused by reduced business activity due to loss of passing trade.</p> <p>Potential positive benefits through removal of severance of the community of Telegraph Point.</p> <p>Likely improved amenity for those properties in the vicinity of the existing highway generally between Mooney Street and Haydons Wharf Road.</p>	
			<p>Possible perceived loss of character of area due to severance rural lands on the floodplain.</p>	<p>Possible perceived loss of character of area due to severance of Cairncross State Forest and rural lands on the floodplain.</p>
	<p>Potential stress impacts to business owners and residents caused by changed access arrangements, potential economic impacts, reduced environmental amenity and property acquisition.</p>			
Private Property Impact – Noise	<p>The total number of potential receivers in this section within 500 metres of the existing highway is 204.</p>			
	<p>The total number of potential receivers in this section within 500 metres of the centreline of these options is 204.</p>		<p>The total number of potential receivers in this section within 500 metres of the centreline of this option is 93.</p>	<p>The total number of potential receivers in this section within 500 metres of the centreline of this option is 49.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	Distances to potential receivers from the centreline of these options are <100 metres (88), 100 metres to 200 metres (51) and 200 metres to 500 metres (65). Relative to the existing highway this is similar with a slight decrease (1) in the number of potential receivers within 200 metres.		Distances to potential receivers from the centreline of this option are <100 metres (18), 100 metres to 200 metres (27) and 200 metres to 500 metres (48). Relative to the existing highway this is a significant reduction.	Distances to potential receivers from the centreline of this option are <100 metres (11), 100 metres to 200 metres (8) and 200 metres to 500 metres (30). Relative to the existing highway this is a significant reduction.
	All of the potential receivers are expected to be subject to the “Redeveloped Highway” criteria.		Potential receivers expected to be subject to the “Redeveloped Highway” criteria are 18. Potential receivers expected to be subject to the “New Highway” criteria are 75.	All of the potential receivers are expected to be subject to the “New Highway” criteria.
	The weighted noise impact (without mitigation) score for these options (290) is slightly higher than the existing highway score (292), indicating an overall similar potential noise impact.		The weighted noise impact (without mitigation) score for this option (129) is significantly lower than the existing highway score (292), indicating an overall significantly lower potential noise impact.	The weighted noise impact (without mitigation) score for this option (55) is significantly lower than the existing highway score (292), indicating an overall significantly lower potential noise impact.

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Property Impact				
Number of Properties Affected	79	79	55	28
Approximate Area Affected (ha)	46.4	46.4	90.4	136.5
Description of Properties Affected	<p>Strip acquisition from Rawdon Creek Nature Reserve at the southern end of the section, along with strip acquisition from Cairncross State Forest. Depending on the presence of any special values within Zone 8 of Cairncross State Forest that may qualify these areas for classification as a special management zone (Zone 1 or Zone 2) and subject to refined design, it is possible that any area required by these options would be less than 20 ha, and that revocation could be effected by a notice in the Gazette. Revocation of land within Rawdon Creek Nature Reserve, irrespective of the area involved, would require an Act of Parliament.</p>			<p>Acquisition and severance of land within Cairncross State Forest. The affected land is zoned by Forests NSW for conservation (Zone 2 Special Management). Revocation of this land, irrespective of the area involved may require an Act of Parliament. Acquisition of agricultural land across the Wilson River floodplain and rural properties on the north bank of the Wilson River. Acquisition of rural residential properties in the vicinity of Haydons Wharf Road and acquisition of rural land used for forestry and grazing north from Haydons Wharf Road.</p>
	<p>Residential property acquisition through Telegraph Point including direct impact on a number of dwellings.</p>		<p>Acquisition of rural residential properties north of Moorside Drive. Acquisition of privately owned property across the Wilson River floodplain that is used for agriculture. Also involves property acquisition on Dalhenty Island and acquisition of rural residential properties on the north bank of the Wilson River and in the vicinity of Haydons Wharf Road.</p>	

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Amenity – Bus Access	Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However the provision of improved clear zones and possibly designated bus bays should improve the current situation.		Under a Class A scenario, where this option is a duplication of the existing highway, the provision of bus stops and access arrangements for buses would generally remain the same as existing. Where this option takes a new alignment, no bus stops would be provided on the new highway, however existing bus stops would still be in use on the existing highway, as it would become a local access road.	This option involves a completely new alignment to the east of the existing highway. Existing bus stops would still be in use on the existing highway, as it would become a local access road.
	Under a Class M scenario, no bus stops would be provided on the upgraded highway. Access to alternative bus stops would be provided via local access roads.			
Amenity – Pedestrian and Cyclist Access	For safety reasons, pedestrian access across the upgraded highway would be discouraged and cyclists would be permitted to use the left hand shoulder on the upgraded highway. Pedestrian needs will be further assessed following selection of the preferred route.			
	Possible impacts on pedestrian movements across the existing Wilson River bridge during construction.		No impact to pedestrians or cyclist in Telegraph Point as existing highway would remain as a local access road.	
	Possible impacts on cyclist usage of the highway during construction.			
Visual Amenity	Generally in the southern and northern parts of this section, these options would result in some local visual impact associated with widening of the cleared corridor and cut and fill. However, there are few views from beyond the highway corridor that would appreciate these impacts due to the enclosure provided by the surrounding forest, and moderate landform.			

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>The upgraded highway would be a prominent visual feature at Telegraph Point, as it crosses the Wilson River. These options continue to parallel the existing highway to the east, with the bridge to be duplicated. These options encroach further into the northern edge of the settlement, increasing the visual barrier between the areas on either side of the existing highway. Other than highway users, most views would be from nearby residences and from Log Wharf Reserve. Noise mounds or walls may be required adjacent to settled areas north and south of the Wilson River and would also be prominent.</p> <p>Generally north of Moorside Drive, the landscape returns to flat pastureland and more open views, and the new carriageway would be elevated above the floodplain to reflect the existing highway. It would be expected that in this open landscape, there would not be a significant amount of clearing required to accommodate this upgrade, and this would reduce the amount of visual change to the landscape in this area.</p> <p>North of the river these options run to the east of the existing highway and the existing cut embankments would likely be more visually prominent due to the opening up of views as the highway corridor is broadened.</p>		<p>At the Wilson River there would be a new visual disturbance associated with the bridge and approaches, as well as potential loss of riparian vegetation. The river crossing would be subject to few close views, however it is likely to be visible from some higher locations in Telegraph Point.</p> <p>Across the Wilson River floodplain this option would create a new corridor through the mosaic of pastureland, woodland blocks, and rural residential properties that characterise this area. This landscape is undulating and this option would result in a moderate amount of fill as the bridge connects with the northern bank of the river, and cut as the option reconnects with the existing highway alignment. This cut and fill, as well as the loss of vegetation sporadically through this area, would result in this alignment being visually prominent for a short length.</p>	<p>At the Wilson River there would be a new visual disturbance associated with the bridge and approaches, as well as potential loss of riparian vegetation. Some glimpses of the river crossing would potentially occur from Telegraph Point, however it is not likely to be prominent from the village due to its distance and screening by vegetation in the foreground.</p> <p>Across the Wilson River floodplain this option would result in a new visual disturbance in the landscape through which it passes, increasing the potential magnitude of its visual impact. However, the avoidance of bushland on the floodplain is likely to reduce this impact somewhat.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
				Beyond the Wilson River, the alignment continues almost due north, creating a new corridor through the mosaic of pastureland, woodland blocks, and rural residential properties. The moderate amount of cut and fill, and loss of vegetation sporadically through this area, would result in this alignment being visually prominent. There would however be few viewers in this area.
Indigenous Heritage	There are no indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of these options.			One Aboriginal site (DEC #30-3-101, an artefact scatter) listed on the Department of Environment and Conservation (NSW) Aboriginal Heritage Information Management System is situated approximately 200 metres east of this option.
	High potential for stone artefacts to occur, particularly in undisturbed ground and around water courses such as the Wilson River. Generally low potential for other types of Aboriginal sites.			

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Non-Indigenous Heritage	There are no non-indigenous heritage items listed on any Commonwealth or State heritage registers that occur within or in the immediate proximity of these options.			
	<p>There are seven non-indigenous heritage items listed on local heritage registers that occur within or in the immediate proximity of these options:</p> <ul style="list-style-type: none"> ▶ Shop, 50 Rollands Plains Road; ▶ Shop, 54 Rollands Plains Road; ▶ St Bernard's Roman Catholic Church; ▶ Road bridge, off old Pacific Highway; ▶ Butter factory, Old Butter Factory Road; ▶ Railway station; and ▶ Railway station water tower, River Street. 		<p>There are no non-indigenous heritage items listed on any local heritage registers that occur within or in the immediate proximity of these options.</p>	
	<p>Potential historical relics include those relating to the themes of timber cutting, farming, transport and social / communal.</p>		<p>Potential historical relics include those relating to the themes of timber cutting, farming and transport.</p>	
	<p>Unidentified or unlisted heritage items may be present within or in close proximity of these options, including wharfs, and relics relating to the original settlement of Telegraph Point on the southern side of the Wilson River and the North Coast Railway.</p>		<p>Unidentified or unlisted heritage items may be present within or in close proximity of these options, including wharfs and relics relating to the North Coast Railway.</p>	

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Land Use – Statutory Planning	<p>Hastings LEP: These options passes through or immediately adjacent to land zoned 1(a1) Rural, 1(f) State Forests, 2(v) Village and 8(a) National Parks and Nature Reserves.</p>		<p>Hastings LEP: These options passes through or immediately adjacent to land zoned 1(a1) Rural, 1(a3) Rural – Agricultural Protection, 1(f) State Forests, 7(a) Environmental Protection - Wetlands and 8(a) National Parks and Nature Reserves.</p> <p>SEPP 14 – Coastal Wetlands: Mapped SEPP 14 wetlands occur on the southern parts of Dalhenty Island and on the adjacent northern bank of the Wilson River.</p>	
	<p>Summary of Statutory Position: Pending clarification of the application of the new State planning reforms within this section these options would be:</p> <p>Potentially prohibited within land zoned 8(a) National Parks and Nature Reserves; and</p> <p>Excepting the above, and subject to refined design regarding potential impacts on listed non-indigenous heritage matters in and around Telegraph Point, possibly permitted without development consent pursuant to SEPP 4.</p>		<p>Summary of Statutory Position: Pending clarification of the application of the new State planning reforms within this section these options would be:</p> <p>Potentially prohibited within land zoned 8(a) National Parks and Nature Reserves;</p> <p>Permissible only with development consent where they impact on a SEPP 14 wetland.</p> <p>Excepting the above, permitted without development consent pursuant to SEPP 4.</p>	
Land Use – Residential	<p>These options largely follow the existing highway throughout this section and would require some strip acquisition from rural residential properties.</p> <p>Where these options cross the Wilson River at Telegraph Point, a small number of properties located on the eastern side of the existing highway and on the northern side of the river, would be subject to acquisition to create sufficient width for the duplicated highway.</p> <p>Depending on the final location and arrangement of the possible grade separated interchange for Telegraph Point, it is possible that residential land associated with this community would need to be acquired.</p>		<p>This option would have no direct land use impacts on the village of Telegraph Point. However, it may result in some acquisition of rural residential properties, which are associated with this community, to the north of Moorside Drive and north of Telegraph Point.</p>	<p>As a result of the easterly deviation this option would only result in land use impacts to those rural residential properties located on the southern bank of the Wilson River (at its point of crossing) and those to the east of the existing highway near Haydons Wharf Road.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Land Use – Productive Land	There is likely to be strip acquisition of rural land fronting the existing highway associated with these options.		Where these options deviate to the east of the existing highway, they would result in acquisition of a number of rural properties generally throughout the rest of this section. As a result of the proposed alignment a number of properties would also be severed and subject to changed access arrangements.	
			This option would pass through the middle of an orchard, which is located east of Telegraph Point on the northern bank of the Wilson River.	This option would impact on the aquaculture farm in Cooperabung Close, and the western edge of the tea tree plantation off Bill Hill Road.
	These options would traverse a small area of land containing soils of reasonably high quality that could yield high agricultural potential. However, this land appears to be entirely contained within Log Wharf Reserve, and thus not subject to agricultural production.		Those affected properties immediately adjacent to the banks of the Wilson River, are amongst those believed to contain potentially highly productive agricultural land in terms of unimproved value within the study area.	
	Those affected properties immediately adjacent to the banks of the Wilson River, are amongst those believed to contain potentially highly productive agricultural land in terms of unimproved value within the study area. Otherwise many of the affected properties are currently heavily vegetated or subject to poorer quality soils and other constraints, and as a result are likely to comprise lands less likely to be developed for agricultural production.			This option would require acquisition and severance of Cairncross State Forest, including land zoned for forestry production.

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Environmental				
Wetlands	These options follow the existing Pacific Highway. A small area of estuarine wetland is located on the southern bank of the Wilson River.		Part of Dalhenty Island within Wilson River is identified as a SEPP 14 wetland, through or over which this option would pass. These options also pass through floodplain wetland habitats.	Part of the northern bank of the Wilson River is identified as a SEPP 14 wetland through or over which this option would pass.
Water Quality	<p>Waterway Crossings: Wilson River and unnamed tributaries, and Cooperabung Creek.</p> <p>No adverse water quality impacts have been envisaged to occur provided the RTA standard water quality management measures are applied during both construction and operation.</p> <p>The proximity of SEPP 14 wetlands would require the application of specific management measures.</p>			
Native Flora	<p>Key Vegetation Communities: Forest ecosystems (as mapped by CRA) identified as within the option corridor with high conservation value include: Dry Grassy Tallowood-Grey Gum.</p> <p>NPWS Reserves: These options may require clearing within Rawdon Creek Nature Reserve to widen the existing corridor.</p>		<p>Key Vegetation Communities: Forest ecosystems (as mapped by CRA) identified as within the option corridor with high conservation value include: Swamp Oak and Escarpment Redgum.</p>	<p>Key Vegetation Communities: This option does not impact upon forest ecosystems (as mapped by CRA) with high conservation value.</p> <p>NPWS Reserves: This option creates a new, two carriageway corridor within a small area of Rawdon Creek Nature Reserve.</p>

Section B				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	State Forests: These options may require clearing within Cairncross State Forest to widen the existing corridor.			State Forests: This option creates a new two carriageway corridor within Cairncross State Forest.
	Confirmed Endangered Ecological Communities: Freshwater wetlands, subtropical coastal floodplain forest, swamp oak coastal floodplain forest and swamp schlerophyll forest.		Confirmed Endangered Ecological Communities: Freshwater wetlands, swamp oak coastal floodplain forest and swamp schlerophyll forest.	Confirmed Endangered Ecological Communities: swamp oak coastal floodplain forest and swamp schlerophyll forest.
	Potential Endangered Ecological Communities: None known.			
	Possible Threatened Species Present: Nil.		Possible Threatened Species Present: The plant, <i>Melaleuca biconvexa</i> may also occur in the floodplains.	
	Confirmed Threatened Species Sighted Within Option Corridors (250 metres wide): Nil.			
	The approximate total area of vegetation clearing is 15 ha.		The approximate total area of vegetation clearing is 33 ha.	The approximate total area of vegetation clearing is 43 ha.
	The approximate area of confirmed endangered ecological community clearing is nil.		The approximate area of confirmed endangered ecological community clearing is 19 ha.	The approximate area of confirmed endangered ecological community clearing is 4 ha.
	The approximate area of high conservation value vegetation, community clearing is 11 ha.		The approximate area of high conservation value vegetation, community clearing is 20 ha.	The approximate area of high conservation value vegetation, community clearing is 10 ha.

Section B					
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option	
Native Fauna	NPWS Designated Wildlife Corridors: All options pass immediately to the east of the “Rawdon Creek Nature Reserve Regional Corridor” and may require clearing of the edge of this				
	NPWS Designated Key Habitats: Areas of designated key habitat have been identified immediately east of the existing highway north of the Wilson River and in the north of this section. These options may require clearing of the edge of these key habitats.				
	Possible Threatened Species Present: Koala, glossy black cockatoo, black-necked stork, osprey, square-tailed kite, powerful owl, common planigale, brush-tailed phascogale, spotted-tailed quoll, grey-headed flying-fox, little bent-wing bat, green and golden bell frog and green-thighed frog. Most records are from within Rawdon Creek Nature Reserve and Cairncross State Forest at the southern end of the section. The black-necked stork, osprey and green and golden bell frog are associated with the Wilson River floodplain.			Possible Threatened Species Present: Aquatic species, such as the black-necked stork, bitterns, comb-crested jacana and brolga may also be present in the wetland areas around the Wilson River and Dalhenty Island.	
	Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Koala (2) and black-necked stork (3).			Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Koala (2).	

Table 5.4 Route Options Characteristics – Section C

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Engineering and Operational				
Cross Section of New Highway	<p>There is one vertical curve that does not comply with the minimum design standards.</p> <p>It appears that lane widths, shoulder widths and crossfall meet the minimum design standards.</p>			<p>Two new carriageways will replace existing alignment.</p>
Access Rationalisation	<p>There are currently a number of private driveways and forest roads, in addition to the three public intersections along Section C.</p> <p>In a Class A upgrade direct access to the highway would be limited and local access roads constructed as necessary to provide points of entry for local traffic and access to the state forest.</p> <p>For a Class A upgrade it is proposed that an at-grade intersection be provided where the old Pacific Highway joins the alignment. This would serve both local property and the Yarrabee Quarry.</p> <p>In a Class M upgrade, a left in deceleration / left out acceleration arrangement would be provided at the Yarrabee Road intersection.</p>			<p>Existing highway can be used as a local access road, possibly permitting a Class M upgrade initially.</p>
Constructability	<p>Constructability of these options is poor as they involve construction under traffic. The construction would also impact on a number of public intersections (including Yarrabee Road), private accesses and forest accesses.</p>			<p>This option would be constructed away from the existing highway in Section C, however construction challenges may result due to deep cuts and high fills required through Cooperabung Hill.</p>

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Geotechnical	<p>Rock Cuttings: Section C contains cuttings through Cooperabung Range with the maximum cutting depth in excess of 15 metres however the typical depth is from five to 10 metres.</p> <p>The geology includes jointed, steeply dipping sedimentary rock strata. Future highway cuttings in this area will require careful consideration of cut batter design and maintenance to cater for this structural geology.</p>			<p>Rock Cuttings: This option would include deep cuts through the Cooperabung Range requiring careful consideration of cut batter design and maintenance to cater for the jointed, steeply dipping sedimentary rock strata in this area.</p>
	<p>Localised instability will require stabilisation treatment where existing cuttings are retained and also for any future cuttings.</p>			<p>For the purpose of route development, rock cutting geometry can be assumed to replicate the existing cuttings angles. That is approximately 65° or 1/2V:1H in the fresh / strong rock varying to 1H:1V or 2H:1V in the more deeply weathered, weaker rock units.</p> <p>More detailed geotechnical investigation is required.</p>
	<p>Embankment Design: The removal of some areas of colluvium may be required prior to the construction of embankments across gullies within the steeper terrain. Such material could be subject to instability and soil creep.</p>			<p>Embankment Design: This option would include high fills that would require detailed geotechnical design.</p>
	<p>Acid Sulphate Soils: Possible acid sulfate soils in the Cooperabung Creek area have been identified adjacent to the existing creek alignment.</p>			

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Public Utilities	<p>Telstra optic fibre exists on the eastern side of the highway north to Cooperabung Drive (northern intersection). Approximately 100 metres would require relocation.</p> <p>Several 11kV power poles and pole mounted substations require relocation.</p> <p>No impact on water and sewerage services.</p>			<p>One Telstra optic fibre crossing requires protection. Other services are not impacted.</p>
Road User Delay (Construction)	<p>Construction will occur under traffic as the existing alignment is to be duplicated. Hence road users may experience delays during construction.</p>			<p>Construction is to occur away from traffic. Therefore road user delay would be minimal.</p>
Road User Delay (Operation)	<p>The majority of vehicles are travelling through Section C.</p> <p>Section C had a level of service (LoS) D in 2004. Assuming that no upgrading were to occur, LoS E would be experienced in 2016 and in 2036. LoS E means that the highway will experience queuing and delays, as it will be operating over capacity.</p>			<p>Local traffic would be separated from through traffic as the existing highway would become a local access road over the length of Section C.</p> <p>Shorter alignment would reduce travel times.</p>
Level of Service (Intersections)	<p>No intersections within Section C were the subject of traffic surveys and subsequent analysis. This was due to the low usage of the intersections within this section.</p>			<p>All existing intersections to remain in their existing format due to proposed new highway alignment.</p>
Route Length	5.4 km (40 metres shorter than existing)	5.4 km (40 metres shorter than existing)	5.4 km (40 metres shorter than existing)	5.1 km (320 metres shorter than existing)
Hydrology (Flood Immunity)	<p>Section C does not include any major waterways.</p> <p>This option would involve the upgrade of the existing alignment. From previous observations and predictive assessment, the existing alignment and bridge structures have flood immunity.</p>			<p>Section C does not contain any major watercourses.</p> <p>This option would require appropriate design of new culverts and bridges to ensure flood immunity.</p>

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Economic				
Vehicle Operating Cost (Heavy Vehicles)	Section C contains Cooperabung Range which contains the steepest grade in the project. Grades contribute to increases in heavy vehicle operating costs. Orange option provides best heavy vehicle performance.			
Economic Development	Based on discussions with Port Macquarie – Hastings Council and Kempsey Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.			
Economic Impact	Possible economic impacts to the operators of the aquaculture farm and quarry as a result of changed access arrangements.		Possible economic impacts to the operators of the quarry in Yarrabee Road as a result of changed access arrangements.	
	Possible economic benefits to the quarry in Yarrabee Road as a result of highway construction.			
Cost to Construct Class A (\$M)	50	50	50	75
Class M (\$M)	75	75	75	75
Use of Existing Reserve	Re-use of existing highway as one carriageway in duplication.			The existing highway would be retained as a local access road within Section C.
Ease of Upgrade	The duplication of the highway would require construction under traffic. This section would also require the existing grade up Cooperabung Range to be reduced.			Construction of this alignment would occur away from traffic. Construction of this option would require extensive rock cutting through Cooperabung Range in addition to smaller cuts and fills north to Mingaletta Road.

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Staging				<p>Section C can be constructed independently to the other options. Due to the requirement to reduce the existing grade up Cooperabung Range, staging the construction within this section may be difficult to implement.</p> <p>Section C can be constructed independently to the other sections.</p> <p>Construction of the highway within Section C cannot be staged.</p>
Community				
Vehicular Access				<p>Likely changed general access arrangements during construction and operation, in particular Cooperabung Range Road, Yarrabee Road and Mingaletta Road.</p> <p>Possible access impacts during construction on Ballengarra State Forest.</p> <p>Possible access impacts, particularly for heavy vehicle movements, on Yarrabee Quarry.</p> <p>Likely changed general arrangements during construction and operation, in particular Yarrabee Road and Mingaletta Road.</p> <p>The existing highway will be retained as a local access road. This will improve local access and safety.</p> <p>Improved safety of access provided at all intersections with upgraded highway.</p>
Community Severance/Consolidation				<p>Potential for perceived isolation of rural properties on the eastern side of the existing highway, with respect to accessibility to Kempsey and from Port Macquarie and Telegraph Point due to changed access arrangements.</p> <p>Potential amenity impacts for those properties located in Cooperabung Range Road and the old Pacific Highway.</p> <p>Potential stress impacts to business owners and residents caused by changed access arrangements, reduced environmental amenity and property acquisition.</p> <p>Reduced environmental amenity and severance to rural residential properties on the eastern side of the existing highway at the southern end of this section opposite Cooperabung Drive.</p>

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
				<p>Likely improved amenity for properties adjacent to the existing Pacific Highway.</p> <p>Potential stress impacts to business owners and residents caused by changed access arrangements reduced environmental amenity (including a number not previously located in proximity to the highway) and property acquisition.</p>
Private Property Impact – Noise	The total number of potential receivers in this section within 500 metres of the existing highway is 9.			
	The total number of potential receivers in this section within 500 metres of the centreline of these options is 51.		The total number of potential receivers in this section within 500 metres of the centreline of this option is 7.	
	Distances to potential receivers from the centreline of this option are <100 metres (2), 100 metres to 200 metres (6) and 200 metres to 500 metres (1). Relative to the existing highway this is similar with no increase in the number of potential receivers within 200 metres.		Distances to potential receivers from the centreline of this option are <100 metres (nil), 100 metres to 200 metres (1) and 200 metres to 500 metres (6). Relative to the existing highway this represents a significant decrease (7) in the number of potential receivers within 200 metres.	
	All of the potential receivers are expected to be subject to the “Redeveloped Highway” criteria.		All of the potential receivers are expected to be subject to the “New Highway” criteria.	
	The weighted noise impact (without mitigation) score for these options (13) is slightly higher than the existing highway score (12), indicating an overall slightly higher potential noise impact.		The weighted noise impact (without mitigation) score for this option (6) is lower than the existing highway score (12), indicating an overall reduced potential noise impact.	

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Property Impact –				
Number of Properties Affected	12	12	12	8
Approximate Area Affected (ha)	13.4	13.4	13.4	78.7
Description of Properties Affected	Strip acquisition from Ballengarra State Forest would be required throughout this section.			Acquisition of privately owned forested land towards the south of the section. Acquisition and severance of land within the Ballengarra State Forest.
	Depending on the presence of any special values within Zone 8 of Ballengarra State Forest that may qualify these areas for classification as a special management zone (Zone 1 or Zone 2) and subject to refined design, it is possible that any area required by these options would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.			
Amenity – Bus Access	<p>There are a number of formal and informal bus stops along the highway within the study area.</p> <p>Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However, the provision of improved clear zones and possibly designated bus bays should improve the current situation.</p> <p>Under a Class M scenario, no bus stops would be provided on the upgraded highway. Access to alternative bus stops would be provided via local access roads.</p>			This option involves a completely new alignment to the east of the existing highway. Existing bus stops would still be in use on the existing highway, as it would become a local access road.
Amenity – Pedestrian and Cyclist Access	For safety reasons, pedestrian access across the upgraded highway would be discouraged and cyclists would be permitted to use the left hand shoulder on the upgraded highway. Pedestrian needs will be further assessed following selection of the preferred route.			
	Possible impacts on cyclist usage of the highway during construction.			No expected impacts to pedestrians and cyclists during construction as existing highway would remain in use.

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Visual Amenity	<p>These options pass through the relatively steep forested landscape around Cooperabung Hill. This area includes Ballengarra State Forest and Cooperabung Creek Nature Reserve. There would be clearing required along this length, and there would be a number of areas of cut created. This cut and fill would be a prominent feature on the landscape. It would also increase the width of clearing required. In particular, at the summit, this would increase the existing visual break in the ridgeline. This is likely to be visible from some distance, although it is not a major part of any distant, panoramic view to the range. There are low numbers of long-term viewers in this area, which would lessen the overall visual impact. The main source of views in this area would be road users.</p>			<p>The surrounding landscape is predominantly vegetated along the length of this realignment.</p> <p>The landform rises steeply to Cooperabung Hill, and across the range. This option passes to the west of Cooperabung Hill itself, and then through the range.</p> <p>There would be views available at some distance from the alignment, to the gap created by the removal of vegetation to accommodate a new highway corridor.</p> <p>This would be particularly prominent to views from the south, where the alignment breaks the wooded ridgeline adjacent to the summit of Cooperabung Hill.</p> <p>From views to the east, the option would be located within the range, and therefore not visible, due to the enclosure of the surrounding bushland.</p> <p>From the upgraded highway itself, the cutting through the ridgelines would result in large cut embankments, widening the cleared corridor.</p>

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Indigenous Heritage	<p>There are no indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of these options.</p> <p>High potential for stone artefacts to occur, particularly in undisturbed ground and around watercourses such as Barrys Creek and Cooperabung Creek.</p>			<p>A possible ceremonial place in the vicinity of Cooperabung Hill may be located in the vicinity of this option.</p>
Non-Indigenous Heritage	<p>There are no non-indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of these options.</p> <p>Potential historical relics include those relating to the themes of timber cutting, farming and transport.</p>			<p>Potential historical relics include those relating to the themes of timber cutting, farming, mining and transport.</p>
Land Use – Statutory Planning	<p>Hastings LEP: These options pass through or immediately adjacent to land zoned 1(a1) Rural, 1(f) State Forests and 8(a) National Parks and Nature Reserves.</p> <p>Kempsey LEP: These options pass through or immediately adjacent to land zoned 1(a1) Rural “A1” Zone.</p> <p>Summary of Statutory Position: Pending clarification of the application of the new State planning reforms within this section these options would be:</p> <ul style="list-style-type: none"> ▶ Within the Port Macquarie – Hastings LGA: ▶ Potentially prohibited within land zoned 8(a) National Parks and Nature Reserves; ▶ Otherwise permitted without development consent pursuant to SEPP 4; and ▶ Within the Kempsey LGA, permitted without development consent pursuant to SEPP 4. 			

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Land Use – Residential	There are no expected requirements for acquisition of rural residential properties, with the potential for land use impacts expected to be limited to some changed access arrangements at Yarrabee Road and Mingaletta Road.			This option potentially impacts on rural residential properties at the start of this section, and would sever these properties.
Land Use – Productive Land	There are no expected requirements for acquisition of productive rural lands.			This option potentially impacts on rural residential properties at the start of this section, and would sever these properties. Otherwise until this option enters Ballengarra State Forest to the north of Yarrabee Road, it traverses heavily vegetated rural lands not known to be subject to intensive agricultural production.
	Potential acquisition from Ballengarra State Forest, including land zoned for limited forestry production.			This option would involve acquisition and severance of Ballengarra State Forest, including land zoned for forestry production.

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Environmental				
Wetlands	This option crosses several creeks but does not impact on known significant aquatic ecological habitats.			
Water Quality	<p>Waterway Crossings: Unnamed tributary to Pipers Creek and Barrys Creek.</p> <p>No adverse water quality impacts have been envisaged to occur provided the RTA standard management measures are applied during both construction and operation.</p>			
Native Flora	<p>Key Vegetation Communities: These options do not impact on forest ecosystems (as mapped by CRA) with high conservation value.</p>			
	<p>NPWS Reserves: These options pass adjacent to the eastern boundary of Cooperabung Creek Nature Reserve on the western side of the existing highway. None of these options, subject to refined design, are expected to require any clearing within this nature reserve.</p>		<p>NPWS Reserves: None affected.</p>	
	<p>State Forests: Ballengarra State Forest adjoins both sides of the existing highway reserve. These options may require some clearing within the state forest for the widening of the existing corridor.</p>		<p>State Forests: This option creates a new two carriageway corridor within Ballengarra State Forest.</p>	
	<p>Vegetation Clearance: These options would require clearance for one carriageway throughout this section.</p>		<p>Vegetation Clearance: This option requires the creation of a new two-carriageway alignment.</p>	
	<p>Confirmed Endangered Ecological Communities: Nil.</p>			
	<p>Potential Endangered Ecological Communities: None known.</p>			
	<p>Possible Threatened Species Present: None known.</p>			
	<p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Nil.</p>			

Section C				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>The approximate total area of vegetation clearing is 51 ha.</p> <p>The approximate area of confirmed endangered ecological community clearing is nil.</p> <p>The approximate area of high conservation value vegetation, community clearing is 36 ha.</p>			<p>The approximate total area of vegetation clearing is 52 ha.</p> <p>The approximate area of confirmed endangered ecological community clearing is nil.</p> <p>The approximate area of high conservation value vegetation, community clearing is 2 ha.</p>
Native Fauna	<p>NPWS Designated Wildlife Corridors: These options pass immediately to the east of the Cooperabung Creek Nature Reserve Regional Corridor in the southern section of this section. Immediately west of these options in the same area is the Ballengarra State Forest Regional Corridor. These options may require clearing within this corridor.</p>			<p>NPWS Designated Wildlife Corridors: This option requires the creation of a new two-carriageway alignment through the Ballengarra State Forest Regional Corridor.</p>
	<p>NPWS Designated Key Habitats: These options are located immediately west of a designated key habitat area in the south of this section. These options may require clearing within this key habitat area.</p>			<p>NPWS Designated Key Habitats: This option requires the creation of a new two-carriageway alignment through the centre of a number of designated key habitat areas in the south of this section.</p>
	<p>Possible Threatened Species: The moist and riparian forest along Barrys Creek Gully with rainforest elements provides likely habitat for the koala and other threatened fauna habitat, particularly forest owls, arboreal mammals and bats. Fauna species recorded in the vicinity of the existing highway are the glossy black cockatoo, osprey, square-tailed kite, sooty owl, brush-tailed phascogale, spotted-tailed quoll, grey-headed flying-fox, little bent-wing bat, greater broad-nosed bat and golden-tipped bat.</p>			
	<p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Koala (3), osprey (1) and square-tailed kite (1).</p>			<p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Nil.</p>

Table 5.5 Route Option Characteristics – Section D

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Engineering and Operational				
Cross Section of New Highway	It appears that lane widths, shoulder widths and crossfall meet the minimum design standards with the exception of the bridges over Smiths Creek, Piper’s Creek and both bridges over the Maria River that do not meet the minimum width of 10.5 metres.			
	The realignment of the four kilometres preceding the Maria River is essential given the poor existing geometry. Two new carriageways would be constructed in this area.	These options follow a new alignment to the east of the existing highway. It is envisaged that the existing highway would remain largely in its present condition for use as a local access road.		
Access Rationalisation	There are a total of 31 accesses along Section D, including 13 public intersections. As part of the initial upgrade, direct access to the highway may be limited and local access roads constructed as necessary to provide points of entry for local traffic and access to the state forest. Over / underpasses may be constructed at three locations (Mingaletta Road, Wharf Road and Kundabung Road). Local access roads would be constructed to direct local traffic to an at-grade intersection at Smiths Creek Road on the western side of the alignment. Ultimately, a grade separated interchange may be provided at Kundabung Road with further provision of local access roads both east and west of the alignment.			
	Modification to accesses within the four kilometres preceding the Maria River may be required to ensure safety.	All existing accesses within the four kilometres preceding the Maria River would be retained in these options with the existing highway retained as a local access road.		

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Constructability	Poor with reconstruction within the village of Kundabung. High potential for impact on public utility plant.			
	Poor within the four kilometres preceding the Maria River due to reconstruction of lengths of existing alignment and construction in close proximity to existing alignment elsewhere.	Good within the four kilometres preceding the Maria River as the majority of new construction would be away from the existing highway.		
Geotechnical	<p>The existing highway cuttings appear to be performing satisfactorily at a slope of 1H:1V with only minor occurrence of localised instability. Flattening cut batter slopes to 2H:1V would reduce future maintenance associated with localised instability.</p> <p>Section D contains alluvial valleys at Smiths Creek, Pipers Creek and Maria River and residual soils over the remainder of the route. An embankment slope angle of no steeper than 2H:1V should be considered.</p> <p>Bridging layers are likely to cross the elevated alluvial plains of Smiths Creek, Pipers Creek and Maria River in addition to the localised drainage depression within the flatter low lying areas. This has been deemed necessary due to the prominence of grassed swampy ground that indicates that the area is waterlogged.</p> <p>Sediments with a high probability of acid sulphate soils have been identified along the eastern boundary of the study area in the vicinity of Smiths Creek downstream of the current highway crossing. However there is no known occurrence of acid sulphate soil further upstream.</p> <p>Similarly, acid sulphate soils have been identified in the downstream area of Pipers Creek at the eastern boundary of the study area.</p>			
	<p>Additional geotechnical assessment required due to additional rock cuttings and embankments as part of the new alignment south of the Maria River.</p> <p>The cuttings as part of the new alignment would be 10 to 15 metres deep with embankment fills of up to eight metres high. The elevated alluvium at Smiths Creek, Pipers Creek and Maria River are not expected to contain soft soils, hence conventional embankment construction should be applicable to these areas.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Public Utilities	High potential impact on public utility plant through the village of Kundabung as telecommunications and electrical services are located within or adjacent to the road reserve.			
Road User Delay (Construction)	Section D would require construction under traffic through Kundabung straight, including the village of Kundabung. Combined with some locally generated traffic, road user delay during construction may be considerable.			
	Minimal road user delay is expected between Kundabung straight and the Maria River as these options would be constructed away from the existing highway.			
Road User Delay (Operation)	The majority of vehicles are travelling through Section D. Section D had a level of service (LoS) D in 2004. Assuming that no upgrading had occurred, LoS E would be experienced in 2016 and 2036. LoS E means that the highway would experience queuing and delays, as it would be operating over capacity.			
Level of Service (Intersections)	No intersections within Section D were subject of traffic surveys and subsequent analysis. This was due to the low usage of the intersections within this section.			
Route Length	11.8 km (60 metres shorter than existing)	11.7 km (132 metres shorter than existing)	11.7 km (132 metres shorter than existing)	11.7 km (132 metres shorter than existing)
Hydrology (Flood Immunity)	<p>All existing waterway crossings in Section D are expected to satisfy the design requirements of flood immunity up to the flood event that occurs, on average, once every 20 years. Smiths Creek bridge is expected to satisfy the criteria, however a larger waterway in cross section may be required at this location following the construction of a second bridge structure.</p> <p>The Pipers Creek and Maria River crossings have been predicted to be immune from flooding up the flood event that occurs, on average, once every 100 years. However a flood event approximately one metre above this level has been observed at the Maria River crossing. This discrepancy would be clarified during the design phase.</p> <p>It is envisaged that a considerable portion of the Maria River to Smiths Creek Road section of the highway would need to be raised, particularly the northbound carriageway, to meet the flood immunity criteria.</p> <p>Impacts of this minor deviation and raising of the embankment are expected to be small, provided adequate drainage structures are provided.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Economic				
Vehicle Operating Cost (Heavy Vehicles)	Section D does not contain any notable grades that would adversely impact on operating costs.			
Economic Development	Based on discussions with Kempsey Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.			
Economic Impact	Possible economic impacts to Kundabung Motor Inn and Kundabung Service Station as a result of changed access arrangements.			
	Possible economic impacts to Kundabung Sawmill and Northcoast Hardwood as a result of changed access arrangements during construction.			
	Possible economic impacts through loss of productive lands within Maria River State Forest.	Any potential economic impacts through loss of productive lands within Maria River State Forest would be greater in these options due to realignment to the east of the existing highway.		
Cost to Construct				
Class A (\$M)	115	115	120	120
Class M (\$M)	175	190	195	190
Use of Existing Reserve	Reuse of the existing highway as one carriageway where duplication occurs.	These options make good use of the existing highway either as a carriageway in the duplication or as a local access road where realignment is to occur.		
Ease of Upgrade	Duplication of the existing highway would require construction under traffic. Duplication occurs up to the end of the Kundabung straight for the Green, Purple and Orange options.			
	Realignment between end of Kundabung Straight and the Maria River would require cutting of 10 to 15 metres deep with embankment fills of up to eight metres high. However soft soils are not expected in the vicinity of watercourses.			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Staging	<p>Section D can be constructed independently of the other sections.</p> <p>Construction within Section D may be staged. One section may be from the start of Section D, through the village of Kundabung to the end of the Kundabung Straight with the next stage the remainder of the section through to the Maria River.</p>			
Community				
Vehicular Access	<p>Likely changed general access arrangements during construction and operation at the majority of private accesses and public intersections within this section.</p> <p>Possible access impacts on Kundabung Motor Inn and Kundabung Service Station. The latter also serves the community as a general store.</p> <p>Likely impacts on cross highway movements of pedestrians and cyclists.</p> <p>Likely impacts during construction on Maria River State Forest and possibly Kumbatine National Park.</p> <p>Improved safety of access provided at all intersections with upgraded highway.</p>			
Community Severance/Consolidation	<p>Potential increased severance of the community of Kundabung, that is already present as a result of the existing highway. However, the existing situation may be improved through the possible provision of an underpass or overpass.</p> <p>Potential reduced environmental amenity for those properties along the existing highway.</p> <p>Potential stress impacts to business owners and residents caused by community severance, changed access arrangements, and reduced environmental amenity and property acquisition.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Private Property Impact – Noise	The total number of potential receivers in this section within 500 metres of the existing highway is 83.			
	The total number of potential receivers in this section within 500 metres of the centreline of all options is 83.			
	Distances to potential receivers from the centreline of this option are <100 metres (12), 100 metres to 200 metres (25) and 200 metres to 500 metres (45). Relative to the existing highway this is similar with a slight increase (2) in the number of potential receivers within 200 metres.	Distances to potential receivers from the centreline of these options are <100 metres (12), 100 metres to 200 metres (25) and 200 metres to 500 metres (46). Relative to the existing highway this is similar with a slight increase (1) in the number of potential receivers within 200 metres.		Distances to potential receivers from the centreline of this option are <100 metres (10), 100 metres to 200 metres (29) and 200 metres to 500 metres (44). Relative to the existing highway this is similar with a slight increase (4) in the number of potential receivers within 200 metres.
	Number of potential receivers expected to be subject to the “Redeveloped Highway” criteria is 64.		Number of potential receivers expected to be subject to the “New Highway” criteria is 19.	
	The weighted noise impact (without mitigation) score for this option (101) is similar to the existing highway score (100), indicating a similar potential noise impact.		The weighted noise impact (without mitigation) score for this option (99) is slightly lower than the existing highway score (100), indicating an overall slightly lower potential noise impact.	

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Property Impact				
Number of Properties Affected	56	56	56	56
Approximate Area Affected (ha)	56.4	54.1	54.1	54.1
Description of Properties Affected	<p>Minor acquisition of rural residential property through Kundabung Straight.</p> <p>Acquisition of land from Maria River State Forest. Depending on the presence of any special values within Zone 8 of Maria River State Forest that may qualify these areas for classification as a special management zone (Zone 1 or Zone 2) and subject to refined design, it is possible that any area required by these options would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.</p>			
Amenity – Bus Access	<p>Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However, the provision of improved clear zones and possibly designated bus bays should improve the current situation.</p> <p>Under a Class M scenario, no bus stops would be provided on the upgraded highway. Access to alternative bus stops would be provided via local access roads.</p>			
Amenity – Pedestrian and Cyclist Access	<p>For safety reasons, pedestrian access across the upgraded highway would be discouraged and cyclists would be permitted to use the left hand shoulder on the upgraded highway. Pedestrian needs will be further assessed following selection of the preferred route.</p> <p>Possible impacts on cyclist usage of the highway during construction. Likely improved safety for cyclist usage of the highway during operation.</p>			
Visual Amenity	<p>Although these options run to the east of the highway adjacent to Kundabung, intervening vegetation, distance, and the falling landform result in there being a very limited likelihood of any visual impact upon this settlement.</p> <p>The landscape is forested as these options pass through Maria River State Forest. This alignment creates a new corridor of clearing through the state forest. This widening would create some local visual impact upon the landscape of the road corridor. Potential viewers would be limited mainly to highway users in this area.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Indigenous Heritage	<p>There are no indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of these options.</p> <p>High potential for stone artefacts to occur, particularly in undisturbed ground and around water courses such as Maria River, Pipers Creek, Smiths Creek and Barrys Creek.</p> <p>The general area surrounding the Maria River has been identified as having possible cultural sensitivity. All route options would traverse this area.</p>			
Non-Indigenous Heritage	<p>There are no non-indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of these options.</p> <p>Potential historical relics include those relating to the themes of timber cutting, farming and transport.</p> <p>One known, but not currently listed heritage item related to the theme of transport, is the Maria River bridge, which is located on the northbound carriageway of the existing highway. This item is potentially of State significance and is under evaluation for listing on the RTA Section 170 Heritage and Conservation Register.</p>			
Land Use – Statutory Planning	<p>Kempsey LEP: These options pass through or immediately adjacent to land zoned 1(a1) Rural A1, 1(f) Rural (Forests) “F” Zone and 1(g) Rural (Small Agricultural Enterprises) “G” Zone.</p> <p>Summary of Statutory Position: Pending clarification of the application of the new State planning reforms within this section these options would be permitted without development consent pursuant to SEPP 4.</p>			
Land Use – Residential	<p>Within this section where these options run through the community around the village of Kundabung, the option is expected to be predominantly contained within the existing highway reserve, with potential land use impacts expected to be limited to minor strip acquisitions mainly on the eastern side and changed access arrangements. This option would continue to sever the community, as per the existing highway.</p>			
Land Use – Productive Land	<p>Likely minor strip acquisition of rural properties generally fronting the existing highway. Land immediately adjacent to the banks of Pipers Creek and the Maria River are amongst those believed to have the potential for high agricultural productivity based on the soil types. However, the majority of this land that is traversed by this option is currently contained within the highway reserve, and therefore no significant impacts on land of high agricultural value is expected.</p> <p>These options would require acquisition from Maria River State Forest on the western side of the existing highway. Lands affected include those zoned for production by Forests NSW.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
Environmental				
Wetlands	This option crosses several creeks but does not impact on known significant aquatic ecological habitats.			
Water Quality	<p>Waterway Crossings: Barrys Creek, unnamed tributary to Pipers Creek, Smiths Creek, Pipers Creek and Maria River.</p> <p>No adverse water quality impacts have been envisaged to occur provided the RTA standard management measures are applied during both construction and operation.</p>			
Native Flora	<p>Key Vegetation Communities: These options do not impact upon forest ecosystems (as mapped by CRA) with high conservation value.</p> <hr/> <p>NPWS Reserves: This option adjoins the eastern boundary of Kumbatine National Park.</p> <p>NPWS Reserves: These options deviate to the east away from the boundary of Kumbatine National Park.</p> <hr/> <p>None of the options are expected to require any clearing within Kumbatine National Park.</p> <hr/> <p>State Forests: These options require the creation of a new two-carriageway alignment within Maria River State Forest.</p> <hr/> <p>Vegetation Clearance: These options require the creation of a new two carriageway alignment within the Maria River State Forest, as well as clearance for one carriageway within the existing highway reserve to the south of the state forest.</p> <hr/> <p>Confirmed Endangered Ecological Communities: Nil.</p> <hr/> <p>Potential Endangered Ecological Communities: None known.</p> <hr/> <p>Possible Threatened Species Present: None known.</p> <hr/> <p>Confirmed Threatened Species Sighted Within Option Corridor (250 metres wide): Nil.</p>			

Section D				
Assessment Criteria / Performance Measures	Blue Option	Green Option	Purple Option	Orange Option
	<p>Approximate total area of vegetation clearing is 61 ha.</p> <p>Approximate area of confirmed endangered ecological community clearing is nil.</p> <p>Approximate area of high conservation value vegetation, community clearing is 20 ha.</p>	<p>Approximate total area of vegetation clearing is 68 ha.</p> <p>Approximate area of confirmed endangered ecological community clearing is nil.</p> <p>Approximate area of high conservation value vegetation, community clearing is 20 ha.</p>		
Native Fauna	<p>NPWS Designated Wildlife Corridors: Three designated corridors would be affected along this section – the “Kundabung Subregional Corridor” (approximately 700 metres wide) that crosses the existing highway at Smiths Creek, the “Ballengarra – Maria River Regional Corridor” (approximately one kilometre wide) that crosses the highway at Pipers Creek, and the Maria River State Forest Regional Corridor that is located on both sides of this section north of Pipers Creek. The impacts would be limited to widening of the existing alignment that already passes through these corridors.</p> <p>NPWS Designated Key Habitats: These options passes through the middle of a medium-sized key habitat area between the northern boundary of Ballengarra State Forest and Smiths Creek. Since the proposed alignment closely follows the alignment of the existing highway in this part of the section, the designated habitat area is not likely to be significantly affected.</p> <p>Smaller key habitat areas associated with Pipers Creek and its tributaries would be affected towards the northern end of the section, where the Ballengarra – Maria River Regional Corridor connects with Maria River State Forest. The impacts would be limited to widening of the existing alignment that already passes through the key habitats.</p> <p>Other Key Habitats: This option crosses several creeks but does not impact on known significant aquatic ecological habitats.</p> <p>Possible Threatened Species: Koala, glossy black cockatoo, painted honeyeater, square-tailed kite, masked owl, sooty owl, powerful owl, brush-tailed phascogale, spotted-tailed quoll, grey-headed flying-fox, little bent-wing bat, eastern bent-wing bat and green-thighed frog.</p>			
	<p>Confirmed Threatened Species Within Option Corridor (250 metres wide): Koala (11).</p>	<p>Confirmed threatened species within option corridor (250 metres wide): koala (10).</p>		