

9. The Preferred Route

9.1 The Preferred Route Corridor

The preferred route was determined by the RTA after considering the following:

- ▶ Submissions received from the community on the public display of the route options;
- ▶ Outcomes of the Value Management Workshop; and
- ▶ Outcomes of the Project Team Route Selection Workshop.

The preferred route corridor for each section of the Woolgoolga to Wells Crossing Project is summarised in Table 9.1 and shown on Figure 9.1. The route was selected taking into account the public submissions received, the outcomes of the Value Management Workshop and the outcome of the Project Team Route Selection Workshop. A description of the preferred route in each section of the project is provided below. The preferred route is as follows:

The preferred route corridor for each section of the Woolgoolga to Wells Crossing Project is summarised in Table 9.1 and shown in Figure 9.1.

Table 9.1 Preferred Route Corridor

Section	Section Description	Preferred Option
A	Arrawarra Creek to Tasman St intersection	Orange option
B	Tasman St intersection to 500m south of Barcoongere Way	Combination of Orange and Refined Orange options
C	500m south of Barcoongere Way to 400m south of Falconers Lane	Combination of Orange and Refined Orange options
D	400m south of Falconers Lane to Lemon Tree Road intersection	Blue option
E	Lemon Tree Road intersection to Bald Knob Tick Gate Road	Combination of Blue, Refined Orange and Orange options

Interchange locations and service roads would depend on the location of the preferred route, and the interaction with the adjacent projects (Sapphire to Woolgoolga and Wells Crossing to Iluka Road) and will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase.

One possible location being investigated for a grade separated interchange is in the vicinity of Arrawarra Beach Road where there is sufficient width between the existing Highway and the old Pacific Highway (Eggin Drive) to accommodate an interchange.

New service roads would be required in a Class M scenario to provide access to proposed grade separated interchanges or to provide a continuous alternate route. In a Class A scenario, new service roads maybe provided to assist with the rationalisation of at grade intersections and private accesses.

The service road strategy would aim to improve safety by separating through and local traffic. This may involve use of existing local roads, sections of old highway or the existing highway. Where possible, the new service roads would be located within or immediately adjacent to the upgraded highway, but may also be located outside the preferred route corridor.

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9.2 Reasons why the Preferred Route was Selected

9.2.1 Reasons why the Preferred Route was Selected

The selection of the preferred route was based on:

- Technical investigations undertaken;
- Assessment of issues raised in submissions during community consultation;
- The outcomes of the Value Management Workshop;
- The outcomes of the Project Team Route Selection Workshop; and
- Refinement of options undertaken by the project team.

In summary, the preferred route has been selected for the upgrade of the Pacific Highway between Woolgoolga and Wells Crossing on the basis that it:

- Best meets the objectives of both the Pacific Highway Upgrade Program and the Woolgoolga to Wells Crossing project;
- It is the route generally agreed at both the Value Management Workshop and the Project Team Route Selection Workshop;
- Is consistent with community feedback;
- Provides the best balance between maximising the functional requirements of the highway upgrade whilst minimising environmental impacts and impacts on the community; and
- When compared with the other options, the preferred route represents the best overall value for money option.

Specifically, the preferred route has addressed a wide range of functional, ecological, heritage, social and economic considerations. Following is a summary of these considerations by project section.

9.2.2 Section A – Orange Option

In Section A, the Orange option was selected as it:

- Reuses the existing highway as a southbound carriageway in a Class A (Arterial) upgrade scenario;
- Maximises the use of the existing road reserve;
- Allows for the staged construction of the Highway upgrade over time to better suit traffic growth and demand;
- Would result in similar potential noise impact relative to the existing highway for those residential receivers located within a 500 metre radius of the existing highway; and
- On balance, represents the best overall value for money option.

9.2.3 Section B – Combination of Orange and Refined Orange Options

Whilst the Orange option was selected as the preferred direction from the VMW and the Refined Orange option from the project team Route Selection Workshop, a combination of the Refined Orange and Orange options has been selected by the project team for further investigations to minimise the impacts to flora and fauna, agricultural lands and rural residential properties. This combination of options has resulted in a localised wider route corridor in the vicinity of Hawthorn Close.

This wider route corridor was selected as the preferred route because of the following key advantages:

- ▶ It provides the opportunity to select a preferred road alignment that provides the shortest travel time for both light and heavy vehicles up the ascent of Dirty Creek Range;
- ▶ It presents the lowest engineering risk in that it is the shortest length option across the Corindi floodplain and requires the shortest length of bridging for floodwater mitigation. This route also minimised the length across potential areas containing soft soils;
- ▶ It has some ecological impacts, for which mitigation can be provided;
- ▶ It has the least overall noise impact on communities;
- ▶ It would have the least impact in terms of severance through the townships of Corindi and Corindi Beach (i.e. has the greatest separation between the proposed road corridor and these residential areas);
- ▶ It avoids key areas of known cultural sensitivity;
- ▶ It potentially better satisfies overall community expectations through this section;
- ▶ It would allow the existing highway to be used as a local access road and would minimise the need to build new local roads; and
- ▶ On balance, represents the best overall value for money option in which a preferred route alignment can be developed.

9.2.4 Section C – Combination of Orange and Refined Orange Options

For the same reason described in Section B above, the RTA has selected a wider route corridor in the vicinity of Hawthorn Close comprising the Refined Orange option and the Orange option for further investigations in order to minimise the impacts to flora and fauna, agricultural lands and rural residential properties.

This wider route corridor was selected as the preferred route because of the following key advantages:

- ▶ It provides the opportunity to select a preferred road alignment that provides the shortest travel time for both light and heavy vehicles up the ascent of Dirty Creek Range;
- ▶ It presents the lowest engineering risk in that the extent of areas involving the widening of existing cuttings under traffic is minimised;
- ▶ It has the least overall noise impact;
- ▶ It does not impact on Newfoundland State Forest;
- ▶ When combined with the preferred route within Section B, the preferred route corridor in this section would result in the lowest overall capital cost; and
- ▶ On balance, represents the best overall value for money option in which a preferred route alignment can be developed.

9.2.5 Section D – Blue Option

In Section D, the Blue option was selected as it:

- ▶ Maximises the use of existing assets (particularly the recently constructed section of the existing highway through Halfway Creek) and those sections of the existing highway that comply with the design standards for the Pacific Highway Upgrade; and
- ▶ On balance, represents the best overall value for money option.

9.2.6 Section E – Combination of Blue, Refined Orange and Orange Options

Due to a number of constraints in this section the preferred route corridor is generally a combination of the Blue, Refined Orange and Orange options. Generally the preferred route corridor would follow the Blue option from Lemon Tree Road until a point approximately 600 metres south of Kungala Road, and the Orange option from approximately 1.5 kilometres north of Kungala Road through to Bald Knob Tick Gate Road.

Between these two locations, from approximately 600 metres south of Kungala Road to approximately 1.5 kilometres north of Kungala Road, a widened corridor has been shown that generally encompasses the Refined Orange option and the Blue option. There are significant constraints in this vicinity that have prevented the clear determination of a preferred route alignment. These constraints include:

- ▶ The poor geometry and condition of the existing highway;
- ▶ The presence of established businesses (service station and general store, Benefields Rose Farm and shopfront and Big Garden Furniture);
- ▶ Rural residences;
- ▶ Riparian vegetation in the vicinity of Halfway Creek with potentially high habitat and other values;
- ▶ The presence of two parcels of land vested in Grafton-Ngerrie LALC under the *Aboriginal Land Rights Act 1983* that have been identified as being of cultural significance; and
- ▶ The presence of an Aboriginal ceremonial site in the vicinity of Halfway Creek.

The widened corridor will be subject to further detailed investigations, including ecological and Aboriginal heritage, engineering design and consultation with potentially affected parties, to determine the final alignment of the preferred route for concept design.

9.3 Description of the Preferred Route

A description of the preferred route in each section of the project is provided below. An overall plan of the preferred route is shown in Figure 9.1, while plans of each section are shown in Figures 9.2 to 9.6.

9.3.1 Section A – Orange Option

The Orange option would start at the northern end of the Sapphire to Woolgoolga project, at Arrawarra Creek. In a Class A (Arterial) upgrade scenario the preferred route would generally involve the construction of one new carriageway to the west of the existing highway, retaining the existing highway as southbound carriageway thereby minimising impact on the old Pacific Highway and the caravan parks on the eastern side of the existing highway. Furthermore, the existing road reserve is wider on the western side of the existing highway and therefore the impact to the Wedding Bells State Forest would be minimised. There are also no private property accesses on the western side of the existing highway. Where feasible, existing local roads would be connected to the highway via a grade separated interchange using the local road network.

In a Class M (Motorway) upgrade scenario the preferred route would generally involve the construction of two new carriageways to the west of the existing highway north of Eggins Close thereby retaining the existing highway as continuous alternative route. The location of the grade separated interchange would be determined as part of detailed investigations to be undertaken during the concept design phase. One possible location being investigated for a grade separated interchange is in the vicinity of Arrawarra Beach Road where there is sufficient width between the existing Highway and the old Pacific Highway (Eggins Drive) to accommodate an interchange. Consideration would also be given to constructing a new truck stop / rest area between Arrawarra Creek and Corindi Beach.

9.3.2 Section B – Combination of Orange and Refined Orange Options

Within Section B a proposed realignment of the existing highway is proposed. However, to enable further environmental investigations and assessment to be undertaken before a preferred road alignment is determined a wider preferred route corridor has been adopted through Section B. This wider corridor is defined by the Refined Orange option to the west and the Orange option to the east.

Travelling north, the preferred route corridor would begin to deviate to the west of the existing highway just south of Tasman Street, cross Kangaroo Trail Road in cutting, pass to the west of Post Office Lane and bypass the Corindi community.

Depending on the preferred road alignment adopted within this wider route corridor, the majority of the existing highway through this section would be reused as a local access road. If a road alignment to the west of the dis-used quarry is adopted then access to the existing highway for residents living on the western side of the existing highway just south of Barcoongere Way would not be affected. If however, a road alignment to the east of the dis-used quarry is adopted then access to residences living on the western side of the existing highway just south of Barcoongere Way would be affected as the new highway would rejoin the existing highway near the intersection of Hawthorn Close.

In a Class A (Arterial) upgrade scenario, access to the proposed highway upgrade from the existing highway would be via a grade separated interchange in Section A and an at grade intersection in Section C of the project.

In a Class M (Motorway) upgrade scenario, access to the proposed highway upgrade would be via a grade separated interchange located within Section A of the project.

9.3.3 Section C – Combination of Orange and Refined Orange Options

For the same reasons described in Section B above, a wider route corridor within the southern portion of Section C is also proposed. This wider route corridor is a continuation of the route corridor in Section B. Travelling north (from Hawthorn Close), the wide corridor provides the RTA with the flexibility to develop a road alignment that would minimise the grade (ascent) up Dirty Creek Range.

The preferred route corridor would pass to the west of Flinty Road before reconnecting with the existing highway near Range Road. North of Range Road the Refined Orange option would generally involve a duplication of the existing highway to a point 500m south of Falconers Lane. This option would not impact on the packing shed associated with the Blueberry Farm.

In a Class A (Arterial) upgrade scenario, access to the proposed highway upgrade (depending on the final road alignment adopted) would be either via:

- ▶ A new intersection connecting the existing highway with the proposed highway upgrade in the vicinity of Flinty Road as well as an at-grade intersection at Range Road permitting all turning movements; or
- ▶ A new intersection connecting Hawthorn Close and a new length of service road with the proposed highway upgrade in the vicinity of Hawthorn Close as well as an at-grade intersection at Range Road permitting all turning movements.

In a Class M (Motorway) upgrade scenario, access to the proposed highway upgrade would be via a grade separated interchange located within Section A of the project.

9.3.4 Section D – Blue Option

The existing highway in Section D has been identified as generally suitable for the 110 km/h design speed and includes the recently completed Halfway Creek duplication. A new carriageway would be constructed on the western side of the existing highway from a point 500m south of Falconers Lane to the southern end of the Halfway Creek duplication. The Halfway Creek duplication would remain as is with little or no work required to this section of the highway. The northern end of the Halfway Creek duplication ends near Lemon Tree Road.

A local access road in the Class M (Motorway) upgrade scenario would switch from one side of the highway to the other via a bridge over (or an underpass under) the proposed highway upgrade at or near Grays Road in order to avoid the elbow of Halfway Creek watercourse next to the highway and the Yuraygir State Conservation Area.

9.3.5 Section E – Combination of Blue, Refined Orange and Orange Options

Due to a number of constraints in this section the preferred route corridor is generally a combination of the Blue, Refined Orange and Orange options. Generally the preferred route corridor would follow the Blue option from Lemon Tree Road until a point approximately 600 metres south of Kungala Road, and the Orange option from approximately 1.5 kilometres north of Kungala Road through to Bald Knob Tick Gate Road.

Between these two locations, from approximately 600 metres south of Kungala Road to approximately 1.5 kilometres north of Kungala Road, a widened corridor has been shown that generally encompasses the Refined Orange option and the Blue option. There are significant constraints in this vicinity that have prevented the clear determination of a preferred route alignment. These constraints include:

- ▶ The poor geometry and condition of the existing highway;
- ▶ The presence of established businesses (service station and general store, Benefields Rose Farm and shopfront and Big Garden Furniture);
- ▶ Rural residences;
- ▶ Riparian vegetation in the vicinity of Halfway Creek with potentially high habitat and other values;
- ▶ The presence of two parcels of land vested in Grafton-Ngerrie LALC under the *Aboriginal Land Rights Act 1983* that have been identified as being of cultural significance; and
- ▶ The presence of an Aboriginal ceremonial site in the vicinity of Halfway Creek.

The widened corridor will be subject to further detailed investigations, including ecological and Aboriginal heritage, engineering design and consultation with potentially affected parties, to determine the final alignment of the preferred route for concept design. Once the route is finalised, the project team would continue to consult with directly affected residents and businesses in the area.

The preferred route for the proposed upgrade would tie in with the existing highway near Bald Knob Tick Gate Road and would be compatible with the connection to the proposed Highway upgrade between Wells Crossing and Iluka Road.

The decision on a preferred corridor through this section will be advertised as soon as a route is determined.

9.4 Summary of Characteristics of the Preferred Route

The characteristics of the preferred route for the Class M (Motorway) upgrade scenario are included in Table 9.2.

It should be noted that the data presented in Table 9.2 was updated following the Value Management Workshop as a result of additional investigations being undertaken. As a result some of the data / statistics may differ.

Table 9.2 Characteristics of Preferred Route – All Sections

Characteristics	Section A	Section B ⁽¹⁾	Section C ⁽¹⁾	Section D	Section E ⁽¹⁾
	Orange option	Combination of Orange and Refined Orange options	Combination of Orange and Refined Orange options	Blue option	Combination of Blue, Refined Orange and Orange options
Engineering and Operational					
Total length (km)	3.5km	5.2km – 5.3km	4.2km – 4.6km	5.8km	7.8km – 7.9km
Maximum depth of cuttings (m)	4m	9m	22m - 40m	6m	3m
Length of route to be constructed on floodplain	N/A	2.2km – 2.3km	N/A	N/A	N/A
Number of Interchanges	1	0	0	0	0
Significant public utility constraints	Relocation of an additional 19 x 11kV poles.	The option would require some protection or minor relocation of Telstra Optic Fibre and electrical infrastructure.	The option would require some protection or minor relocation of Telstra Optic Fibre and electrical infrastructure.	The option would require some protection or minor relocation of Telstra Optic Fibre and electrical infrastructure.	920m of Telstra Optic Fibre to be relocated Minor relocation / protection of electrical infrastructure would be required
Preliminary Cost Estimate (\$M) – Class A (Arterial)	\$35	\$85	\$55	\$30	\$75
Preliminary Cost Estimate (\$M) – Class M (Motorway)	\$35	\$85	\$65	\$40	\$100

Characteristics	Section A	Section B ⁽¹⁾	Section C ⁽¹⁾	Section D	Section E ⁽¹⁾
	Orange option	Combination of Orange and Refined Orange options	Combination of Orange and Refined Orange options	Blue option	Combination of Blue, Refined Orange and Orange options
Community					
Private property noise impact (measured by weighted noise impact)	129	68 – 69	6 – 16	27	38 - 50
Approximate area of potential property acquisition (ha)	16ha	48ha – 54ha	26ha – 30ha	32ha	40ha
Number of properties potentially affected by acquisition	18	15 – 21	31 – 33	61	18 - 28
Impact to state forest, national park or nature reserve	Yes (strip acquisition of Wedding Bells State Forest)	No	No	Yes (strip acquisition from Newfoundland State Forest)	Yes (strip acquisition from Wells Crossing Flora Reserve)
Impacts on known Aboriginal Heritage	No impacts to listed heritage. Corridor traverses areas of cultural sensitivity.	No (corridor passes to east of area of high sensitivity).	No	One indigenous heritage item listed on the State register occurs within or in close proximity. Corridor traverses areas of cultural sensitivity.	Corridor encompasses two parcels of vested land and a ceremonial site. Final alignment to be selected to minimise impacts. Traverses two unlisted areas of historical campsites / movement corridors
Impacts on known Non-Aboriginal Heritage	No	No	No	No	No

Characteristics	Section A	Section B ⁽¹⁾	Section C ⁽¹⁾	Section D	Section E ⁽¹⁾
	Orange option	Combination of Orange and Refined Orange options	Combination of Orange and Refined Orange options	Blue option	Combination of Blue, Refined Orange and Orange options
Environmental					
Impact to SEPP 14 wetlands	No	No	No	No	No
Extent of vegetation clearing (ha)	30	26ha – 41ha	29ha – 47ha	20ha	73ha – 92ha
Extent of endangered ecological community clearing (ha)	30ha (potential)	21ha – 22ha	1ha	None known. Subject to further detailed investigations during concept design.	None known. Subject to further detailed investigations during concept design.
Impact to NPWS designated wildlife corridors	Nil	Creation of new cleared corridor through one sub-regional wildlife corridor, and possible creation of new cleared corridor through one sub-regional wildlife corridor.	Possible creation of new cleared corridor through one sub-regional wildlife corridor. Widening of existing cleared corridor through one sub-regional and one regional wildlife corridor.	Widening of existing cleared corridor through two regional wildlife corridors.	Possible widening of existing cleared corridor, or creation of new cleared corridor through one regional wildlife corridor. Clearing on the edge of one sub-regional wildlife corridor.

Note: (1) Characteristics within Sections B, C & E are indicative only and may change depending upon the final alignment of the preferred route within each of these sections.

9.5 Potential Impacts of the Preferred Route

9.5.1 Local Community

Section A

Community Severance / Consolidation

The possible use of the existing highway and Eggins Drive as a local access road between Arrawarra and Corindi Beach in the Class M (Motorway) scenario would improve community cohesion in this area. Furthermore, the provision of a grade separated interchange in a Class M (Motorway) upgrade scenario would improve safety and efficiency of access to the upgraded highway including connection to the Sapphire to Woolgoolga Project.

Amenity

The general amenity for residents in the vicinity of the preferred route would be affected during construction, and would marginally improve during operation as the majority of traffic would be located further from the greatest concentration of residents within the caravan parks to the east of the existing highway.

Local Vehicular Access

There are a number of public and private accesses to the existing highway in this section, including Arrawarra Beach Road, Eggins Drive, Upper Corindi Road and a number of forestry access trails.

The preferred route follows the existing highway in this section. In a Class A scenario all existing local road intersections would be connected where feasible to the highway via a grade separated interchange using the local road network. Access to forestry trails would be consolidated where possible to minimise the number of direct access points onto the highway.

In a Class M scenario access to the upgraded highway would only be provided via a grade separated interchange. Access to the grade separated interchange would be provided via the existing highway, which would be converted to a local access road and / or new service roads.

In both the Class A and Class M scenario improved safety of access would be provided at all intersections with the upgraded highway.

Bus Access

Under a Class A (Arterial) upgrade 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 (Motorway) scenario, no bus stops would be provided on the upgraded highway, however local bus routes and bus stops would be provided via local access roads.

Pedestrian and Cyclist Access

For safety reasons, pedestrian access across the upgraded highway would be limited under a Class A (Arterial) scenario and banned under a Class M (Motorway) scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway only in the Class A (Arterial) scenario. Pedestrian and cyclist needs will be further assessed during concept design of the preferred route, including possible integration with any proposed local and regional cycleway strategies.

Potential Economic Impacts

Based on discussions with Coffs Harbour City Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.

Potential to increase road user awareness of Corindi Beach and Red Rock through improved signage where appropriate and access provided by a grade separated interchange.

Potential economic benefits to tourist resources including increased patronage at Arrawarra Beach Holiday Park, Darlington Beach Resort and Lorikeet Tourist Park and Home Village through provision of improved safety of access.

Potential limited economic impacts to Wedding Bells State Forest due to property acquisition.

Section B

Community Severance / Consolidation

The preferred route would improve community consolidation both within and between Corindi Beach and Corindi and surrounding areas.

Amenity

The general amenity for residents in the vicinity of the preferred route would be affected during construction. During operation the amenity for the majority of residents within this section (located within Corindi Beach and Corindi) is expected to substantially improve however, for those rural residents who would be located closer to the new alignment there would be varying degrees of reduction in amenity, both visual and noise.

Local Vehicular Access

There are numerous public and private accesses to the existing highway in this section, including Tasman Street, Kangaroo Trail Road, Coral Street, Blackadder Road and Post Office Lane.

The preferred route deviates to the west of Corindi Beach and Corindi, resulting in the existing highway being retained as a local access road in both the Class A and Class M scenarios. All existing accesses with the existing highway would be retained.

In a Class A (Arterial) upgrade scenario, access to the proposed highway upgrade from the existing highway would be via a grade separated interchange in Section A and an at grade intersection in Section C of the project.

In a Class M (Motorway) upgrade scenario, access to the proposed highway upgrade would be via a grade separated interchange located within Section A of the project.

Bus Access

The existing bus stops would be retained on the existing highway, as it would become a local access road.

Pedestrian and Cyclist Access

For safety reasons, pedestrian access across the upgraded highway would be limited under a Class A (Arterial) scenario and banned under a Class M (Motorway) scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway under a Class A (Arterial) scenario. Pedestrian and cyclist amenity within the village of Corindi will be improved. Pedestrian and cyclist needs will be further assessed during concept design of the preferred route, including possible integration with any proposed local and regional cycleway strategies.

Potential Economic Impacts

Based on discussions with Coffs Harbour City Council and a review of relevant planning instruments, there are no plans for significant economic development in this section. Land identified on the corner of Tasman Street and the existing highway by Coffs Harbour City Council for commercial development would not be affected by the preferred route.

Possible loss of potential agricultural productivity from rural properties located to the west of Corindi due to property acquisition and severance. Depending on the final alignment of the preferred route it may also impact on a horticultural operation located adjacent to the existing highway near the end of this section.

Section C

Community Severance / Consolidation

No substantial community severance impacts are considered likely. The preferred route would improve general access to Corindi and Corindi Beach for rural residents around Dirty Creek Range.

Amenity

The general amenity for residents in the vicinity of the preferred route would be affected during construction. During operation the amenity for those scattered rural residents in the vicinity of the existing highway would substantially improve however, for those rural residents who would be located closer to the new alignment there would be varying degrees of reduction in amenity, both visual and noise.

Local Vehicular Access

There are a number of public and private accesses to the existing highway in this section, including Hawthorn Close, Barcoongere Way, Flinty Road, Dirty Creek Road and Range Road.

The preferred route corridor generally deviates to the west of the existing highway for the southern part of this section, potentially resulting in some of the existing highway being retained as a local access road in both the Class A and Class M scenarios. All existing accesses with the existing highway in this area, including Barcoongere Way, Dirty Creek Road, Flinty Road and Range Road would be retained. There may be adjustments to Hawthorn Close depending on the final alignment chosen.

In a Class A (Arterial) upgrade scenario, access to the proposed highway upgrade would be via a new intersection connecting the existing highway with the proposed highway upgrade in the vicinity of Flinty Road as well as an at-grade intersection at Range Road permitting all turning movements.

In a Class M (Motorway) upgrade scenario, access to the proposed highway upgrade would be via a grade separated interchange located within Section A of the project.

In both the Class A and Class M scenario improved safety of access would be provided at all intersections with the upgraded highway.

Bus Access

The preferred route would reuse some of the existing highway and under a Class A (Arterial) 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 (Motorway) scenario, no bus stops would be provided on the upgraded highway, however local bus routes and bus stops would be provided via local access roads.

Pedestrian and Cyclist Access

For safety reasons, pedestrian access across the upgraded highway would be limited under a Class A (Arterial) scenario and banned under a Class M (Motorway) scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway under a Class A (Arterial) scenario. Pedestrian and cyclist needs will be further assessed during concept design of the preferred route, including possible integration with any proposed local and regional cycleway strategies.

Potential Economic Impacts

Based on discussions with Coffs Harbour City Council and Clarence Valley Council, and a review of relevant planning instruments, there are no plans for significant economic development in this section. The preferred route would result in some loss of potentially productive agricultural lands but would not impact on any horticultural lands that are part of the large blueberry farm operated by Blueberry Farms Australia. The preferred route, depending on the final alignment chosen, may impact on the currently non-operational quarry at the base of Dirty Creek Range.

Section D

Community Severance / Consolidation

The preferred route follows the existing highway alignment in this section and as a result there are no expected substantial changes to the existing community in terms of severance or consolidation. The provision of a possible local access road in the Class M (Motorway) scenario would improve general community access arrangements.

Amenity

The general amenity for residents in the vicinity of the preferred route would be affected during construction. During operation there is expected to be minimal change in general environmental amenity as the preferred route generally follows the existing highway alignment.

Local Vehicular Access

There are a number of public and private accesses to the existing highway in this section, including Falconers Lane, Grays Road, McPhillips Road and Lemon Tree Road.

The preferred route follows the existing highway in this section. In a Class A scenario existing accesses would be improved, rationalised and/or converted to left in / left out only. In a Class M scenario a local access road would provide controlled access to the upgraded highway. A local access road in the Class M (Motorway) upgrade scenario would switch from one side of the highway to the other via a bridge over (or an underpass under) the proposed highway upgrade at or near Grays Road in order to avoid the elbow of Halfway Creek watercourse next to the highway and the Yuraygir State Conservation Area.

In both the Class A and Class M scenario improved safety of access would be provided at all intersections with upgraded highway.

Bus Access

Under a Class A (Arterial) upgrade 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 would improve the current situation. Under a Class M (Motorway) upgrade scenario, no bus stops would be provided on the upgraded highway, however local bus routes and bus stops would be provided via local access roads.

Pedestrian and Cyclist Access

For safety reasons, pedestrian access across the upgraded highway would be limited under a Class A (Arterial) scenario and banned under a Class M (Motorway) scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway under a Class A (Arterial) scenario. Pedestrian and cyclist needs will be further assessed during concept design of the preferred route, including possible integration with any proposed local and regional cycleway strategies.

Potential Economic Impacts

Based on discussions with Clarence Valley Council, and a review of relevant planning instruments, there are no plans for significant economic development in this section.

Possible economic impacts for Halfway Creek truck stop and motel due to changed access and potential land acquisition. Possible minor impacts to Newfoundland State Forest due to property acquisition. Potential minor economic impacts caused by changed access arrangements for Rainbow's End Holiday Farm (Grays Road) and Archery Supplies (McPhillips Road).

Section E

Community Severance / Consolidation

There are no substantial changes to the existing community in terms of severance or consolidation as a result of the preferred route. Access across the upgraded highway would be restricted however, the provision of a possible local access road network in the Class M (Motorway) scenario would improve general community access arrangements.

Amenity

The general amenity for residents in the vicinity of the preferred route would be affected during construction. During operation there is expected to be minimal change in general environmental amenity for the majority of this section as the preferred route generally follows the existing highway alignment. At Halfway Creek the final alignment of the preferred route is subject to further investigations, and could result in changed environmental amenity in this vicinity.

Local Vehicular Access

There are a number of public and private accesses to the existing highway in this section, including Kungala Road, Luthers Road and Parker Road.

The preferred route largely follows the existing highway in this section with a possible short deviation in the vicinity of Kungala Road. In a Class A scenario existing accesses would be improved, rationalised and/or converted to left in / left out only. In a Class M scenario a local access road would provide controlled access to the upgraded highway, and would include an overpass in the vicinity of Kungala Road / Luthers Road depending on the design of the connection with the Wells Crossing to Iluka Road Pacific Highway upgrade project to the north.

In both the Class A and Class M scenario improved safety of access would be provided at all intersections with upgraded highway.

Bus Access

Under a Class A (Arterial) 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 (Motorway) scenario, no bus stops would be provided on the upgraded highway, however local bus routes and bus stops would be provided via local access roads.

Pedestrian and Cyclist Access

For safety reasons, pedestrian access across the upgraded highway would be limited under a Class A (Arterial) scenario and banned under a Class M (Motorway) scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway under a Class A (Arterial) scenario. Pedestrian and cyclist needs will be further assessed during concept design of the preferred route, including possible integration with any proposed local and regional cycleway strategies.

Potential Economic Impacts

Based on discussions with Clarence Valley Council, and a review of relevant planning instruments, there are no plans for significant economic development in this section.

At Halfway Creek the final alignment of the preferred route is subject to further investigations, and subject to concept design may result in economic impacts to the existing service station and general store and shopfront for Benefields Rose Farm located at the intersection of Kungala Road and Big Garden Furniture, located in Luthers Road. Potential impacts on these businesses include changed access arrangements, reduced visibility for passing traffic and possible property acquisition. Depending on the final alignment selected, and if required, appropriate signage would be provided in accordance with RTA policy.

The preferred route may result in minor impacts to Banana Coast Wreckers due to changed access arrangements, but is not expected to require any property acquisition.

The preferred route may involve minor economic impacts due to property acquisition from Glenugie State Forest and rural properties fronting the existing highway.

9.5.2 Traffic and Transport

The preferred route would result in traffic and transport benefits across the study area for both through and local traffic. Through traffic would be removed from the existing Pacific Highway, which currently passes near and / or through Corindi Beach, Blackadder Gully and Corindi village. This would result in improved local amenity and traffic safety. These benefits would be gained in both the Class A (Arterial) and Class M (Motorway) upgrade scenarios.

Intersections and Interchanges

In an upgrade to Class A (Arterial) scenario, local road intersections along the highway would be upgraded. Private accesses and local roads would be rationalised where possible to reduce the number of direct accesses onto the highway. Local roads would generally pass over or under the upgraded Pacific Highway, dependent on terrain; existing road alignment; geotechnical conditions; and urban design principles. These arrangements would be developed during the concept design phase.

In the Class M (Motorway) upgrade scenario, a continuous local access road would be provided. Access to and from the highway would only be via a grade-separated interchange located in Section A of the project. This would further reduce the potential number of traffic conflicts along the highway, resulting in improved safety for road users.

The location of the grade separated interchange would be determined as part of detailed investigations to be undertaken during the concept design phase. One possible location being investigated for a grade separated interchange is in the vicinity of Arrawarra Beach Road where there is sufficient width between the existing Highway and the old Pacific Highway (Eggins Drive) to accommodate an interchange.

Crash Rates

The upgraded Pacific Highway would result in a high standard road alignment in accordance with the Pacific Highway Upgrade Program objectives as stated in Section 2.2. The current accident rate on the Pacific Highway between Woolgoolga and Wells Crossing is 29.5 crashes per 100 million vehicle kilometres travelled. Construction of dual carriageway to current Pacific Highway Upgrade design guidelines will potentially decrease the total number of crashes per 100 MVK if a Class A upgrade or Class M upgrade is undertaken over the entire highway.

Travel Time

Based on a number of travel speed surveys, the existing average time taken for passenger vehicles to travel from Arrawarra Creek (southern extent of project) to Bald Knob Tick Gate Road (northern extent of project) is 16.5 minutes, an average speed of 101 km/h. Forecast travel times for through traffic on the preferred route indicate that the travel time for passenger vehicles would be approximately 14.9 minutes at an average speed of 110 km/h.

Travel time for heavy vehicles would also be improved by the proposed upgrade. Improvements to the horizontal alignment would limit the amount of braking required, and smoother grades would result in less loss of momentum and higher average speeds up Dirty Creek Range.

Rest Areas and Breakdown Bays

Rest areas that cater for heavy vehicles currently exist at Lemon Tree Road adjacent to both the northbound and southbound carriageways. These rest stops would be either retained in their current locations or relocated as part of the upgrade. Consideration would also be given to constructing a new truck stop / rest area between Arrawarra Creek and Corindi Beach.

Truck breakdown bays suitable for B-double trucks combined with crossover facilities would also be spaced approximately 5 km apart. Locations for these would be determined during the concept design phase.

9.5.3 Land Use

Section A

Property Impact – Properties Affected

The preferred route would require approximately 16 hectares of land acquisition, potentially affecting 18 separate properties (lots).

Property Impact – Description of Properties Affected

The preferred route is likely to result in strip acquisition from Wedding Bells State Forest to the west of the existing highway, and acquisition and severance of land upon which the sewerage treatment plant (Kangaroo Trail Road) is located. However this is not expected to affect the operation of the plant. The two parcels of Wedding Bells State Forest located to the east of the existing highway near Arrawarra Beach Road are not expected to be affected.

Land Use – Residential

Adjacent residences are predominantly located in the caravan parks to the east of the existing highway and will not be affected by land acquisition or land use impacts.

Land Use – Productive Land

Potential rural land (currently owned by Coffs Harbour City Council as part of the sewage treatment plant site) and rural properties located to the west of the existing highway and to the north of Wedding Bells State Forest would be impacted by the preferred route, as a result of land acquisition.

The strip acquisition from Wedding Bells State Forest would include lands zoned by Forests NSW for production (zones 4 and 5), limited harvesting (zone 3A) and lands zoned for further assessment (zone 8). Depending on the presence of any special values within the areas requiring further assessment that may qualify these areas for classification as a special management zone it is considered likely that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.

Section B

Property Impact – Properties Affected

The final alignment of the preferred route is subject to further investigations and consultation, and subject to determination of the alignment the area required for acquisition and number of properties affected may vary. Subject to concept design the preferred route may require approximately 48 to 54 hectares of land acquisition, potentially affecting 15-21 separate properties (lots).

Property Impact – Description of Properties Affected

The preferred route would result in acquisition and severance impacts to rural residential properties located on the Corindi River floodplain.

Land Use – Residential

The preferred route would not have any land use impacts on residential areas within Corindi Beach or Corindi. It would however, result in potential impacts on rural residential properties located in Kangaroo Trail Road and scattered rural residential properties throughout the Corindi River floodplain.

Land Use – Productive Land

The Corindi River floodplain has been identified as containing some of the better quality agricultural land within the study area. The preferred route would require acquisition and severance of agricultural land throughout the floodplain.

There are no areas of state forest in this section. The preferred route may impact on a horticultural operation located adjacent to the existing highway near the end of this section depending on the final alignment chosen.

Section C

Property Impact – Properties Affected

The final alignment of the preferred route is subject to further investigations and consultation, and subject to determination of the alignment the area required for acquisition and number of properties affected may vary. Subject to concept design the preferred route may require approximately 26 to 30 hectares of land acquisition, potentially affecting 31 to 33 separate properties (lots).

Property Impact – Description of Properties Affected

The preferred route would result in both strip acquisition and severance to varying degrees to a number of rural properties.

Strip acquisition from the large blueberry farm operated by Blueberry Farms of Australia may be required but is not expected to include any areas subject to production or result in any substantial impacts to the packing shed located in Range Road.

The preferred route, subject to selection of the final alignment, may require acquisition of the quarry at the base of Dirty Creek Range, which is currently non-operational but is understood to contain further resources and could be reactivated.

Land Use – Residential

Residential land use in this section is limited to scattered rural residential properties, which would be affected to varying degrees.

Land Use – Productive Land

The preferred route would impact on a number of rural properties, which contain potentially productive agricultural land, although the majority of this land is currently heavily vegetated.

The preferred route would not impact on any currently productive land within the large blueberry farm operation in Range Road.

The preferred route would not have any impacts on state forests in this section.

Section D

Property Impact – Properties Affected

The preferred route would require approximately 32 hectares of land acquisition, potentially affecting 61 separate properties (lots).

Property Impact – Description of Properties Affected

The preferred route is likely to require varying degrees of strip acquisition from rural residential properties fronting the existing highway.

The preferred route is likely to require strip acquisition from the parcel of Newfoundland State Forest located to the west of the existing highway.

The preferred route may result in possible strip acquisition of land from Halfway Creek truck stop and motel located to the east of the existing highway at Lemon Tree Road.

Land Use – Residential

Residential land use in this section is limited to scattered rural residential properties, which would be affected to varying degrees.

Land Use – Productive Land

The preferred route would require strip acquisition from a number of rural properties, which contain potentially productive agricultural land.

Strip acquisition from Newfoundland State Forest would include lands zoned by Forests NSW for limited production (zone 3B) and lands zoned for further assessment (zone 8). Depending on the presence of any special values within the areas requiring further assessment that may qualify these areas for classification as a special management zone it is considered likely that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.

Section E

Property Impact – Properties Affected

The final alignment of the preferred route in the vicinity of Kungala Road and Halfway Creek is subject to further investigations and consultation, and subject to determination of the alignment the area required for acquisition and number of properties affected may vary. Subject to concept design the preferred route may require approximately 33 to 40 hectares of land acquisition, potentially affecting 18 to 28 separate properties (lots).

Property Impact – Description of Properties Affected

The preferred route is likely to require varying degrees of strip acquisition from rural residential properties fronting the existing highway and Wells Crossing Flora Reserve.

Depending on the final alignment selected in the vicinity of Kungala Road and Halfway Creek, the preferred route may require strip acquisition from the travelling stock reserve (TSR 46942) located to the west of the existing highway approximately 400 metres north of Kungala Road and the service station and general store (including the shopfront for Benefields Rose Farm) located on the corner of Kungala Road, and may require substantial acquisition from Big Garden Furniture.

The preferred route, subject to further investigations and concept design, is not expected to require any acquisition from the two parcels of land vested in Grafton-Ngerrie LALC or Banana Coast Wreckers.

Land Use – Residential

Residential land use in this section is limited to scattered rural residential properties, which would be affected to varying degrees.

Land Use – Productive Land

The preferred route would require strip acquisition from a number of rural properties, which contain potentially productive agricultural land. Some of these lands within the Halfway Creek floodplain, although mostly heavily vegetated, contains some of the higher quality agricultural land (in terms of unimproved value) within the study area.

The preferred route is not expected to result in any land use impacts to Benefield's Rose Farm or Glenugie State Forest.

All lands affected by strip acquisition within Wells Crossing Flora Reserve are zoned by Forests NSW for conservation (Zone 1 Special Protection). Revocation of this land, irrespective of the area involved will require an Act of Parliament.

The preferred route may result in minor loss of land from the travelling stock reserve (TSR 46942) located on the western side of the existing highway approximately 400 metres north of Kungala Road.

9.5.4 Heritage

Section A

Indigenous Heritage

There are no known listed indigenous heritage items within or in immediate proximity of the preferred route however, the entire coastal zone is an area of high heritage potential, particularly in undisturbed areas, around watercourses and swamps. Midden sites have potential to occur in association with present or remnant water sources in the coastal zone.

Much of the land in the southern part of this section contains areas of cultural sensitivity to the local Aboriginal community in the form of corridors of movement, historical campsites and a men's ceremonial site. The preferred route would traverse the corridors of movement along the existing highway alignment, but is not expected to affect the historical campsites or men's ceremonial place.

Two parcels of land to the east of the existing highway and south of Arrawarra Beach Road have been vested in Coffs Harbour and District LALC under the *Aboriginal Land Rights Act 1983*. The local Aboriginal community have advised that these parcels are of cultural significance. The preferred route would not require any acquisition of these lands.

Non-indigenous Heritage

There are no known listed non-indigenous heritage items within or in immediate proximity of the preferred route. Potential historical relics include those relating to the themes of timber cutting, farming and transport. The former Great Northern Timber Company tramline route is located to the south and would not be impacted.

Section B

Indigenous Heritage

There are no known listed indigenous heritage items located within the vicinity of the preferred route corridor. However, artefacts from a recorded artefact scatter (AHIMS site #22-1-0076) may extend to within close proximity.

The entire coastal zone is an area of high heritage potential, particularly in undisturbed areas, around watercourses and swamps, and in particular around Redbank Creek. Midden sites have potential to occur in association with present or remnant water sources in the coastal zone. The potential also exists for sites within older sediment deposits of the Corindi River floodplain.

The entire area generally encompassed by the study area boundaries, Corindi and Corindi Beach, is an area of high cultural sensitivity to the local Aboriginal community. Sensitive sites within this area include a massacre site, burials, corridors of movement, campsites, and sacred men's and women's sites and story places.

Immediately to the west of the preferred route, in the vicinity of Kangaroo Trail Road, is an area of known burials. Based on consultation with the local Aboriginal community it is expected that the current alignment of the preferred route would not impact on this area.

Non-indigenous Heritage

There are no known listed non-indigenous heritage items within or in immediate proximity of the preferred route. Potential historical relics include those relating to the themes of timber cutting, farming, transport and social / communal.

Section C

Indigenous Heritage

There are no known listed indigenous heritage items within or in the immediate proximity of the preferred route however, there is a high potential for stone artefacts to occur, particularly in undisturbed ground and around watercourses. There is also potential for rock shelters, grinding grooves and scarred trees to occur where the preferred route traverses the higher ground, particularly where it has been largely undisturbed.

Non-indigenous Heritage

There are no known listed non-indigenous heritage items within or in immediate proximity of the preferred route. Potential historical relics include those relating to the themes of timber cutting, farming and transport.

Section D

Indigenous Heritage

One indigenous heritage item listed on a State register, an isolated artefact (AHIMS site #13-4-0092) occurs within or in close proximity to the preferred route in the vicinity of the existing Halfway Creek duplication. There is a high potential for stone artefacts to occur in a widespread distribution, particularly in undisturbed areas and around watercourses.

An area of this section generally bounded by the start of the section to north of Grays Road and the study area boundaries, contains sites of cultural sensitivity to the local Aboriginal community including a number of historical campsites. The preferred route traverses this area generally along the existing highway alignment.

Non-indigenous Heritage

There are no known listed non-indigenous heritage items within or in immediate proximity of the preferred route. Potential historical relics include those relating to the themes of timber cutting, farming and transport.

Section E

Indigenous Heritage

There are no known listed indigenous heritage items within or in the immediate proximity of this option. There is a high potential for stone artefacts to occur in a widespread distribution, particularly in undisturbed areas and around watercourses.

Within this section areas of cultural sensitivity to the local Aboriginal community include two travel routes (that traverse the study area) and associated campsites, and a ceremonial site in the vicinity of Halfway Creek to the east of the existing highway. The preferred route would traverse the two travel routes generally along the existing highway alignment.

The precise location of the ceremonial site is unknown and is subject to further ongoing investigations and consultation to ensure the final alignment does not result in any impacts to this highly sensitive site.

Within this section there are two parcels of land vested in Grafton-Ngerrie LALC under the *Aboriginal Land Rights Act 1983*, both of which are located adjacent to the eastern edge of the existing highway. The local Aboriginal community have advised that these parcels are of cultural significance. The preferred route, subject to further investigations and concept design, is not expected to require any acquisition from these parcels.

Non-indigenous Heritage

There are no known listed non-indigenous heritage items within or in immediate proximity of the preferred route. Potential historical relics include those relating to the themes of timber cutting, farming and transport.

9.5.5 Visual Amenity

Section A

For the majority of this section the preferred route follows the existing highway alignment and the main potential visual impact would be from the clearance of the existing native vegetation to the west of the existing highway. Towards the end of this section where the preferred route deviates to the west, a new cleared corridor would be created, resulting in a visual change in the landscape.

The possible grade separated interchange would be a prominent feature. The potential change to the landscape would depend on the interchange location, design and associated landscape treatments.

Section B

This preferred route is located to the west of Corindi and therefore not visually prominent from the village. The adjacent landscape is a mosaic of woodland and pastureland requiring sporadic clearing, with more extensive clearing required in the northern part of the section. Where the preferred route deviates substantially from the existing highway alignment, it has potential to result in new visual disturbance in the landscape through which it passes, although there are few residents in the vicinity.

Section C

The preferred route traverses the characteristic forested landscape of the Dirty Creek Range, but also runs along the eastern edge of the extensive blueberry farms along Range Road.

The preferred route would require cut and fill as it traverses Dirty Creek Range that may result in a change to the landscape at this location, although there are few residents in the vicinity.

The preferred route is largely located in existing forested country. The creation of a cleared corridor through this forest would add to the local landscape change although there are potential viewers other than highway users. The few rural residences that are in close proximity would be likely to be largely screened by surrounding forest.

Section D

The preferred route generally follows the existing highway alignment in this section and traverses an undulating forested landscape. There are some cleared areas for agricultural uses however the only significant cleared areas adjacent to the existing highway is at Halfway Creek where there is a service station, motel and rural fire brigade shed. The existing cleared corridor would therefore be widened for the upgraded highway.

Except for the southern part of the section, where there is some cut and fill on the northern side of Dirty Creek Range, the preferred route closely follows the existing flat to undulating topography. The small amount of cut and fill required for the majority of the section would result in a negligible change to the landscape. The number of potential viewers, other than highway users, is relatively low.

Section E

The preferred route generally follows the existing highway alignment in this section, requiring widening of the existing cleared corridor through the flat to undulating forested landscape. The visual impact of cut and fill would be negligible with the alignment closely following the existing flat to undulating topography. Potential viewers in this section are limited to road users and a small number of rural residents.

9.5.6 Noise

Section A

Within this section the greatest concentration of potential receivers are those located within the caravan parks to the east of the existing highway. The total number of potential receivers within 500 metres of the centreline of the existing highway is 137 and the total number of potential receivers within 500 metres of the possible centreline of the preferred route is 129. These potential receivers are located in the following distance bands:

- ▶ Existing highway – <100 metres (nil), 100 metres to 200 metres (4), and 200 metres to 500 metres (123); and
- ▶ Preferred route – <100 metres (nil), 100 metres to 200 metres (1), and 200 metres to 500 metres (128).

All potential receivers are expected to be subject to the NSW Department of Environment and Conservation's (DEC) "Redeveloped Highway" criteria.

The weighted noise impact (without mitigation) score for the existing highway in this section is 138. and the weighted noise impact (without mitigation) score for the preferred route is 137, indicating a similar potential noise impact relative to the existing highway.

Section B

As the final alignment of the preferred route through the northern part of Section B is subject to further investigations, the following general comments are made regarding the potential noise impacts.

The majority of potential receivers in this section are located along the existing highway within the villages of Corindi Beach and Corindi. There are also scattered rural residences throughout this section.

The identified preferred route corridor deviates to the west of both Corindi Beach and Corindi and as a result the potential noise environment is expected to improve relative to the existing highway. With respect to those residences located in Kangaroo Trail Road and for those scattered rural residences in the vicinity of the preferred route corridor, the overall noise environment is considered likely to worsen, as these receivers are now located closer to the proposed highway alignment.

The weighted noise impact (without mitigation) score for the existing highway in this section is 147 and the weighted noise impact (without mitigation) score for the preferred route corridor is approximately 68 to 69, indicating a substantial reduction in potential noise impact relative to the existing highway.

Therefore, subject to further investigations, the preferred route is expected to result in a decrease in the overall noise impact for the majority of residents in this section relative to the existing highway however, it is also likely to result in an increase in road traffic noise levels for those residences located the vicinity of the preferred route corridor.

All of the potential receivers are expected to be subject to the NSW Department of Environment and Conservation's (DEC) "New Highway" criteria.

Section C

As the final alignment of the preferred route through the southern part of Section C is subject to further investigations, the following general comments are made regarding the potential noise impacts.

Potential receivers in this section are limited to scattered rural residences. For the majority of these located in the southern part of this section, the overall noise environment relative to the existing highway is expected to improve as a result of the westerly deviation. For those in the northern part of this section, where the preferred route corridor rejoins the existing highway, the overall noise impact is not expected to substantially change relative to the existing highway.

The weighted noise impact (without mitigation) score for the existing highway in this section is 17 and the weighted noise impact (without mitigation) score for the preferred route corridor is approximately 6 to 16, indicating a similar or lower potential noise impact relative to the existing highway.

Therefore, subject to further investigations, the preferred route is expected to result in a decrease in the overall noise impact for the majority of residents in this section relative to the existing highway however, it is also likely to result in an increase in road traffic noise levels for those residences located the vicinity of the preferred route corridor.

All potential receivers are expected to be subject to the NSW Department of Environment and Conservation's (DEC) "New Highway" criteria.

Section D

The total number of potential receivers in this section within 500 metres of the existing highway is 27 and the total number of potential receivers in this section within 500 metres of the possible centreline of the preferred route is 27. These potential receivers are located in the following distance bands:

- ▶ Existing highway – <100 metres (7), 100 metres to 200 metres (4), and 200 metres to 500 metres (16); and
- ▶ Preferred route – <100 metres (1), 100 metres to 200 metres (10), and 200 metres to 500 metres (16).

All potential receivers are expected to be subject to the NSW Department of Environment and Conservation's (DEC) "Redeveloped Highway" criteria.

The weighted noise impact (without mitigation) score for the existing highway in this section is 34 and the weighted noise impact (without mitigation) score for the preferred route is 27, indicating a slightly lower potential noise impact relative to the existing highway.

Section E

As the final alignment of the preferred route in the vicinity of Halfway Creek is subject to further investigations, the following general comments are made regarding the potential noise impacts.

Potential receivers in this section are limited to scattered rural residences.

For the majority of this section the preferred route corridor generally follows the existing highway alignment and is expected to result in no substantial change in the noise environment.

In the vicinity of Halfway Creek, where the preferred route may take a short easterly deviation, it may result in increased noise exposure for those rural residences in the vicinity, and equally reduce the overall noise environment for those currently fronting the existing highway.

The weighted noise impact (without mitigation) score for the existing highway in this section is 51 and the weighted noise impact (without mitigation) score for the preferred route corridor is approximately 38 to 50, indicating a similar or lower potential noise impact relative to the existing highway.

Where the preferred route generally follows the existing highway alignment the potential receivers are expected to be subject to the NSW Department of Environment and Conservation's (DEC) "Redeveloped Highway" criteria. Should the preferred route deviate from the existing highway alignment, the potential receivers in the vicinity may be subject to NSW Department of Environment and Conservation's (DEC) "New Highway" criteria.

9.5.7 Ecology

Section A

Wetlands

The preferred route avoids the mapped SEPP 14 wetlands in the vicinity, which are located to the east, and downstream of, the existing highway. The mapped SEPP 14 wetland immediately south of Corindi Beach extends close to the eastern edge of the existing highway. The preferred route also avoids the Solitary Island Marine Park, which extends along Arrawarra Creek to within the study area.

There are also known estuarine wetlands in the area, including those associated with Arrawarra Creek and Arrawarra Gully, downstream of the existing highway.

Potential water quality impacts on these wetlands and the marine park will be considered further during the environmental assessment of the preferred route.

Native Flora

The preferred route would not impact on any designated NPWS or other conservation reserves in this section.

The preferred route would involve clearing of native vegetation to the west of the existing highway, which is likely to include vegetation within Wedding Bells State Forest.

The native vegetation in this area is comprised of swamp and transitional moist sclerophyll vegetation of various community and habitat types.

Much of the low lying vegetation in this area on both sides of the existing highway is dominated by *Melaleuca* species, which is considered likely to be an endangered ecological community(s) listed under the TSC Act.

The approximate area of vegetation that may be cleared as a result of the preferred route is 30 hectares. The majority of this vegetation is considered possible to qualify as an endangered ecological community.

There are no records of threatened flora species within the vicinity of the preferred route however, based on the vegetation communities present it is possible that the swamp orchid (*Phaius australis*) could be present.

Native Fauna

The preferred route corridor would not impact any NPWS designated Wildlife Corridors or area of NPWS designated Key Habitat.

Fauna habitats potentially impacted include wetland communities and estuarine wetlands. Coffs Harbour City Council has mapped secondary koala habitat in the general vicinity of the preferred route.

There are no records of threatened fauna species within the vicinity of the preferred route however, based on the habitat types present it is possible that the following threatened species could be present: Glossy black cockatoo, black-necked stork, osprey, square-tailed kite, powerful owl, grass owl, koala, squirrel glider, spotted-tailed quoll, grey-headed flying-fox, little bent-wing bat, hoary wattled bat, common blossom bat, variety of insectivorous bats, wallum froglet and eastern chestnut mouse.

Based on mapping provided by NSW Fisheries there are no known habitats for the endangered fish species, Oxleyan Pygmy Perch in this section.

Section B

Wetlands

Two mapped SEPP 14 wetlands occur downstream of the existing highway to the north of Corindi Beach, the nearest of which is approximately 1.5 kilometres northeast of the existing highway. The SEPP 14 wetland located south of Corindi Beach is also located at the start of this section. The preferred route would be located substantially further from these areas relative to the existing highway.

The preferred route also avoids the Solitary Island Marine Park, which extends along the Corindi River to within the study area.

Potential water quality impacts on these wetlands and the marine park will be considered further during the environmental assessment of the preferred route.

Native Flora

Conservation Estates and State Forests

There are no areas of NPWS estate, conservation reserves or state forests that would be impacted by the preferred route in this section.

Vegetation Communities

The preferred route traverses the Corindi River floodplain to the west of Corindi. Vegetation in the vicinity is generally comprised of open pasture (either totally cleared or with scattered remnant mature trees) interspersed with remnant vegetation and riparian vegetation along creek lines in the southern part of the section, and larger vegetated areas in the northern part of the section.

The preferred route corridor traverses, and could potentially impact on, the following mapped vegetation communities: cleared open pasture; cleared pasture with scattered trees; dry ridgetop forest – rich soil; moist floodplain forest; riparian; moist gully forest and lower slopes; swamp forest – paperbark; and swamp forest – swamp mahogany / paperbark.

Depending on the final alignment of the preferred route in this section the area of vegetation that may be cleared will vary. Subject to concept design the preferred route may require clearing of approximately 21 to 22 hectares of endangered ecological communities (potential and confirmed).

Endangered Ecological Communities

The riparian vegetation community along Corindi River would be likely to qualify as the EEC *Subtropical coastal floodplain forest*. The preferred route corridor also traverses a number of areas of moist floodplain forest, of which some of the wetter parts may also qualify as this EEC.

The preferred route corridor traverses areas of swamp forest – paperbark and swamp forest – swamp mahogany / paperbark, all of which are considered likely to be the EEC *Swamp sclerophyll forest on coastal floodplains*.

Depending on the final alignment of the preferred route in this section the approximate area of endangered ecological communities that may be cleared will vary.

Threatened and Rare Species

There are no records of listed threatened species within, or in the immediate vicinity of the preferred route corridor.

Based on the species and structure of the mapped vegetation communities the potential habitat for threatened flora in this section has been identified as generally low in the southern part of the section due to the extent of clearing on the Corindi River floodplain, with small patches of medium or high value, usually corresponding to riparian, swamp or uncleared forest. In the northern part of this section high value areas are predominantly located towards the western edge of the preferred route corridor, which showed little signs of recent logging, clearing or other disturbance. Closer to the existing highway, where clearing and other disturbance is evident, the area is dominated by medium to low value flora habitat.

The following threatened and rare flora species have the potential to occur within the mapped vegetation communities:

- ▶ Threatened – *Boronia umbellata*, *Lindsaea incisa*, *Eucalyptus tetrapleura*. The orchid *Phauis australis* could occur in the swamp areas at the southern end of Section B or wet grassy areas; and
- ▶ RoTAP – *Brasenia schreberi* and *Botrychium australe*.

Native fauna

Wildlife Corridors and Key Habitats

The preferred route would result in the creation of a new cleared corridor through the “Corindi River Subregional Corridor” and, depending on the final alignment chosen, may result in either widening of the existing cleared corridor or creation of a new cleared corridor through the “Dirty Creek Subregional Corridor” at the end of this section.

There are no areas of NPWS designated Key Habitats that would be affected by the preferred route.

Fauna Habitats

The southern part of the preferred route passes through land consisting of low undulating dry ridgetop forest on rich soil separated by swamp forest and moist floodplain forest. Although some selective logging has taken place, scattered hollow bearing mature trees are present, providing potential nest/roost habitat for the gliders, insectivorous bats and hollow dependent birds. Although the shrub layer is generally sparse, the ground cover is moderate to dense. Fallen timber, including some large logs, is plentiful, providing potential shelter for mammals. Other species may also forage and/or nest in these areas. A transition away from low-lying floodplain habitat towards more undulating habitat occurs at the far northern end of this section.

The habitats through which the preferred route passes were assessed and assigned a rating based on the species present, floristic structure, breeding, nesting and foraging resources available, evidence of fauna and linkages to other systems.

The majority of vegetation through which the preferred route passes is considered to have medium value as fauna habitat due to evidence of a relatively high level of past disturbance from logging, gravel extraction, vehicle tracks and in some areas land clearing. However, there were habitat elements that could suit individual threatened species, such as scattered hollow bearing trees, well vegetated ponds and fallen timber, including some large logs. In addition, open water in the form of ponds and farm dams provide habitat for frogs and water birds, as well as a focal foraging area for insectivorous bats and birds. The exception to this is the swamp forest vegetation community dominated by swamp mahogany and paperbark, which is considered to have a high habitat value.

Threatened and Migratory Species

The following threatened and migratory species have been recorded in the vicinity of the preferred route corridor: Brolga, Osprey and Black-necked stork.

The tributaries of Cassons Creek and Redbank Creek are mapped by NSW Fisheries as known habitat for the endangered fish species, Oxleyan Pygmy Perch.

Preferred habitat is present for the following potential threatened and migratory species: glossy black cockatoo; black-necked stork; brolga; square-tailed kite; powerful owl; osprey; grey-crowned babbler; masked owl; sooty owl; yellow-bellied glider; squirrel glider; hoary wattled bat; little bent-wing bat; eastern bent-wing bat; grey-headed flying-fox; and black flying-fox.

Marginal habitat is present for the following threatened and migratory species: bush stone-curlew; Brown treecreeper; barred cuckoo-shrike, emu; painted honeyeater; black bittern; swift parrot; hooded robin; black-chinned honeyeater; turquoise parrot; barking owl; diamond firetail; regent honeyeater; rufous bettong; eastern pygmy-possum; spotted-tailed quoll; brush-tailed phascogale; koala; common planigale; large-eared pied bat; eastern false pipistrelle; greater broad-nosed bat; golden-tipped bat; southern myotis; east-coast freetail-bat; yellow-bellied sheath-tail-bat; common blossom-bat; wallum froglet; green and golden bell frog; olongburra frog; stephens' banded snake, pale-headed snake; and giant dragonfly.

Section C

Wetlands

There are no mapped SEPP 14 wetlands in the vicinity. The preferred route crosses several creeks but does not impact on known significant aquatic ecological habitats.

Native Flora

Conservation Estates and State Forests

There are no areas of NPWS estate, conservation reserves or state forests that would be impacted by the preferred route in this section.

Vegetation Communities

The preferred route traverses the Dirty Creek Range to the west of the existing highway and adjacent to large areas of blueberry farms. Vegetation in the vicinity is generally comprised of predominantly remnant vegetation interspersed with small areas of cleared pasture and the adjacent blueberry farms.

The preferred route corridor traverses, and could potentially impact on, the following mapped vegetation communities: cleared open pasture; cleared pasture with scattered trees; dry ridgetop forest – rich soil; dry ridgetop forest – sandstone; moist floodplain forest; moist gully forest and lower slopes; and swamp forest – paperbark.

Depending on the final alignment of the preferred route in this section the approximate area of vegetation that may be cleared will vary. Subject to concept design the preferred route may require clearing of approximately 29 to 47 hectares of vegetation.

Endangered Ecological Communities

The preferred route corridor traverses one small area of swamp forest – paperbark to the north of Range Road on Dundoo Creek, which is considered likely to be the EEC *Swamp sclerophyll forest on coastal floodplains*.

The approximate area of confirmed and potential endangered ecological communities that may be cleared as a result of the preferred route is 1 hectare.

Threatened and Rare Species

There are no records of listed threatened species within the preferred route corridor. There is one record of *Eucalyptus tetrapleura* approximately 200 metres west of the corridor near Dundoo Creek.

Based on the species and structure of the mapped vegetation communities the potential habitat for threatened flora in this section has been identified as generally high as the vegetation in this area generally showed little signs of recent logging, clearing or other disturbance, the complete floristic values generally remain and there is little or no weed invasion.

The following threatened and rare flora species have the potential to occur within the mapped vegetation communities:

- ▶ Threatened – *Boronia umbellata*, *Lindsaea incisa*, *Eucalyptus tetrapleura*, *Amorpha sp.* *whitei*, *Boronia hapalophylla*; and
- ▶ RoTAP – *Brasenia schreberi*, *Botrychium australe*, *Olearia stillwelliae* and *Plectranthus suaveolens*.

Compensatory Habitat

The preferred route may require clearing on the edges of some parcels of land in the immediate vicinity of the large blueberry farm operated by Blueberry Farms (Chiquita) on Range Road that are subject to a yet to be formalised conservation agreement. These areas were identified for flora and fauna protection to allow expanded cropping operations. While this agreement has not been formally signed off the Department of Planning has advised that they would request the RTA to compensate for any loss of these areas by protecting a similar area of vegetation in the immediate area.

Native Fauna

Wildlife Corridors and Key Habitats

The preferred route continues the alignment from Section B and, depending on the final alignment chosen, may result in either widening of the existing cleared corridor or creation of a new cleared corridor through the “Dirty Creek Subregional Corridor” at the start of this section, and would result in widening of the existing cleared corridor within the “Lazyman Creek Subregional Corridor” and “Newfoundland – Sherwood Regional Corridor”.

There are no areas of NPWS designated Key Habitats that would be affected by the preferred route.

Fauna Habitats

The preferred route generally traverses an area characterised by steeper more undulating terrain and transition to dry ridgetop forest on rich soils. Parts of this forest appear to have been previously cleared and subject to bushfires in 2002 and are now regenerating. Despite this, scattered hollow bearing trees still occur and fallen timber is widespread. The shrub layer is fairly dense and consists of eucalypt regeneration, wattles and bush peas. Despite gravel extraction and selective logging in some places, scattered hollow bearing mature trees are present. The habitat changes at the escarpment, with sandstone outcrops occurring along the ridgetop and plateau. The tree cover is generally sparse with a moderate to dense heathy shrub layer and moderate ground cover of grasses and herbs.

The habitats through which the preferred route passes were assessed and assigned a rating based on the species present, floristic structure, breeding, nesting and foraging resources available, evidence of fauna and linkages to other systems.

The majority of vegetation through which the preferred route passes is considered to have medium value as fauna habitat due to evidence of a relatively high level of past disturbance from logging, gravel extraction, vehicle tracks and in some areas land clearing. However, there were habitat elements that could suit individual threatened species, such as scattered hollow bearing trees, well vegetated ponds and fallen timber, including some large logs. In addition, open water in the form of ponds and farm dams provide habitat for frogs and water birds, as well as a focal foraging area for insectivorous bats and birds. The exception to this is the moist gully forest and lower slopes vegetation community dominated by blackbutt and turpentine along Dirty Creek, which is considered to have a high habitat value.

Threatened and Migratory Species

There are no records of threatened and migratory species within the vicinity of the preferred route corridor.

Based on mapping provided by NSW Fisheries there are no known habitats for the endangered fish species, Oxleyan Pygmy Perch in this section.

Preferred habitat is present for the following potential threatened and migratory species: glossy black cockatoo; black-necked stork; brolga; square-tailed kite; powerful owl; osprey; grey-crowned babbler; masked owl; sooty owl; yellow-bellied glider; squirrel glider; hoary wattled bat; little bent-wing bat; eastern bent-wing bat; grey-headed flying-fox; and black flying-fox.

Marginal habitat is present for the following threatened and migratory species: bush stone-curlew; Brown treecreeper; barred cuckoo-shrike, emu; painted honeyeater; black bittern; swift parrot; hooded robin; black-chinned honeyeater; turquoise parrot; barking owl; diamond firetail; regent honeyeater; rufous bettong; eastern pygmy-possum; spotted-tailed quoll; brush-tailed phascogale; koala; common planigale; large-eared pied bat; eastern false pipistrelle; greater broad-nosed bat; golden-tipped bat; southern myotis; east-coast freetail-bat; yellow-bellied sheath-tail-bat; common blossom-bat; wallum froglet; green and golden bell frog; longburra frog; stephens' banded snake, pale-headed snake; and giant dragonfly.

Section D

Wetlands

There are no mapped SEPP 14 wetlands in the vicinity.

The preferred route generally runs parallel to Halfway Creek, which contains a number of freshwater wetlands, although it is unlikely that any of these areas would be subject to clearing.

Native Flora

The boundary of Yuraygir State Conservation Area occurs along the eastern edge of the existing highway for a short distance between Grays Road and Lemon Tree Road. The preferred route is unlikely to intrude into the state conservation area. The preferred route could include clearing of vegetation adjacent to the western side of the existing highway alignment within Newfoundland State Forest.

The vegetation communities within the vicinity of the preferred route is generally dominated by dry forest consisting variously of red bloodwood, smooth-barked apple, tallwood and forest oak. Near the Halfway Creek duplication a Tall Moist Forest community dominated by blackbutt/ stringybark and red ash with a rainforest understorey or drier black sheoak understorey occurs.

Some of the vegetation communities associated with freshwater wetlands of Halfway Creek could also contain endangered ecological communities, although it is unlikely that the preferred route would require clearing within these areas.

The approximate area of vegetation that may be cleared as a result of the preferred route is 20 hectares.

There are no records of threatened flora species within the vicinity of the preferred route however, based on the vegetation communities present the following have the potential to occur: *Eucalyptus tetrapleura*; *Olearia stilwelliae*; *Plectranthus suaveolens*; and *Leucopogon confertus*.

Native Fauna

Within this section the preferred route commences within the "Newfoundland Sherwood Regional Corridor", passes through the "Yuraygir Sherwood Regional Corridor" and along the edge of the "Yuraygir CR Regional Corridor". The existing highway already passes through, or adjacent to these wildlife corridors, and the preferred route would involve widening of the existing cleared corridor.

An area of NPWS designated Key Habitat, associated with the "Yuraygir Sherwood Regional Corridor", located adjacent to Grays Road extends to the edge of the existing highway corridor. Subject to concept design, it is expected that there would be no clearing of this key habitat.

The following threatened fauna species have been recorded within the immediate vicinity of the preferred route: common planigale; grey-headed flying-fox; spotted-tailed quoll; and yellow-bellied glider. Based on the habitat types present it is possible that the following threatened species could be present: koala; glossy black cockatoo; powerful owl; yellow-bellied glider; squirrel glider; common planigale; brush-tailed phascogale; spotted-tailed quoll; grey-headed flying-fox; little bent-wing bat; rufous bettong; sooty owl; masked owl; wompoo fruit-dove; and giant barred frog.

The freshwater wetlands associated with Halfway Creek could also contain threatened aquatic species (listed under the NSW *Fisheries Management Act 1994* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*). In particular there is potential for the presence of the Oxleyan Pygmy Perch and Eastern Freshwater Cod within Halfway Creek.

Section E

Wetlands

There are no mapped SEPP 14 wetlands in the vicinity.

The Halfway Creek floodplain contains a number of areas of freshwater wetlands that, subject to determination of the final alignment, could be impacted.

Native Flora

There are no NPWS reserves in this section. The preferred route is likely to involve some clearing generally along the existing corridor within Glenugie State Forest and Wells Crossing Flora Reserve. The latter is managed by Forests NSW as an area of conservation value.

Vegetation communities in the vicinity of the preferred route include:

- ▶ A mature Scribbly Gum community that is quite distinct from those in the broader study area in that it contains a large number of mature trees;
- ▶ A Rough-barked Angophora Scrub community, largely within Wells Crossing Flora Reserve, that is also an unusual community-type in the context of the study area; and
- ▶ A Spotted Gum/ Ironbark / Stringybark Forest.

The approximate area of vegetation that may be cleared as a result of the preferred route is 73 to 92 hectares subject to selection of the final alignment in the vicinity of Halfway Creek.

The preferred route passes through riparian vegetation associated with Halfway Creek, which may, subject to further investigations contain endangered ecological communities listed under the TSC Act.

The following threatened flora species have been recorded within the immediate vicinity of the preferred route: *Brasenia schreberi*; *Eucalyptus tetrapleura*; and *Lindsaea incisa*. Based on the vegetation communities present it is possible that the following threatened species could be present: *Botrychium australe*.

Native Fauna

Within this section the preferred route passes through the “Halfway Creek Regional Corridor,” and along the western end of the “Snake Creek Subregional Corridor”, and would involve widening of the existing cleared corridor.

A number of NPWS designated Key Habitats occur in the vicinity of the preferred route, and may be impacted as a result of clearing. The mature Scribbly Gum community contains many mature trees that contain good hollows for fauna. Vegetation in the vicinity of Halfway Creek is expected to contain areas of high habitat value.

There are no records of threatened fauna species within the vicinity of the preferred route however, based on the habitat types present it is possible that the following threatened species could be present: koala; rufous bettong; yellow-bellied glider; brush-tailed phascogale; powerful owl; square-tailed kite; glossy black cockatoo; bush stone-curlew; grey-crowned babbler; squirrel glider; common planigale; spotted-tailed quoll; grey-headed flying-fox; little bent-wing bat; greater broad-nosed bat; hoary wattled bat; yellow-bellied sheath-tail-bat; east-coast freetail-bat and masked owl.

The freshwater wetlands associated with Halfway Creek could also contain threatened aquatic species (listed under the NSW *Fisheries Management Act 1994* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*). In particular there is potential for the presence of the Oxleyan Pygmy Perch and Eastern Freshwater Cod within Halfway Creek.

9.5.8 Topography, Geology and Soils

The description of the study area topography and geology provided in Section 5 was generally common to all routes considered and is applicable to the preferred route.

9.5.9 Geotechnical Issues

Soils

The major issues relating to soils within the preferred route corridor is the localised presence of potential Acid Sulphate soils and alluvial soils located within the Corindi River floodplain. Other issues including dispersive, waterlogged and high plasticity soils, localised contaminated sites and local stability of colluvial soils are also expected within sections of the preferred route alignment and will require further consideration and assessment for development of the highway upgrade design.

Alluvial (soft) Soils

The preferred route traverses the Corindi River floodplain over a length of approximately 1.8km. This includes shallow surface soft soil deposits of up to 2m thick. The depth to bedrock across the floodplain varies according to the relative location of a paleochannel across the floodplain. Bedrock depths can be expected to vary from 10 up to 24m within the central portion of the floodplain. The route also traverses localised alluvial soils in the south of the Corindi River and at the northern extent around Halfway Creek. These areas are not expected to present any extensive soft soil conditions but will require appropriate measures to improve trafficability during construction.

The future highway crossing of the Corindi River floodplain are likely to require embankments of 3 to 5m height, with embankments locally higher at the locations of possible interchanges (due to on and off ramps and overpasses), bridge approaches and where larger culverts are required. These embankment lengths will require significant quantities/sources of fill materials that can be sourced within an appropriate timeframe to suit construction sequencing.

Soft soil treatments are expected to be relatively localised, with investigations to date not having identified any significant extent or depth of soft soils. Treatments could include embankment preload and/or removal/replacement of shallow soft soil areas. More significant engineering treatments to stabilise soft soil area are not expected to be required. The assessment of the suitability of treatments to the prevailing conditions within the floodplain areas should take appropriate consideration of construction staging, program and cost. The design of higher embankments in areas of soft soil would generally require more detailed geotechnical assessment.

Acid Sulphate Soils

The Corindi River floodplain and the alluvial gullies south of this floodplain were identified from acid sulphate risk maps as having a risk of encountering acid sulphate soils. Excavated acid sulphate soils may require treatment to prevent water quality impacts. Drainage measures in these areas will also need to consider the presence of potential acid sulphate soils to prevent acid generation associated with the dewatering of submerged soils.

Rock Cuttings

With the exception of the Dirty Creek Range, the remainder of the preferred route will contain relatively shallow cuttings located within residual soils and generally weak rock units. The existing highway batters are characterised in these areas by numerous small scale slumps and wedge style failures and cutting erosion, most likely a result of the combination of dispersive soils and soil plasticity in conjunction with typically weak rock. The preferred route rock cuttings in these areas should consider flattening of cut batters to 2H:1V to permit establishment of vegetation and reduce the occurrence of these types of instability.

Within the central portion of the preferred route, the conditions are dominated by the steep topography of the Dirty Creek Range. This steep topography will necessitate several deep rock cuttings along the preferred route. The geology of Dirty Creek Range includes various sedimentary rock units varying from siltstone to conglomerate with bedding dip in the range 0 to 35 degrees, though typically in the range of 10 to 15 degrees. A number of subvertical joints are also prevalent through the various rock units in Dirty Creek Range.

The design of the preferred route rock cuttings will need to consider the interaction of the various sedimentary rock units with the subvertical jointing and cutting orientation to optimise cut batter design, whilst also ensuring the design incorporates appropriate measures for further rock cutting maintenance.

It is also noted that the Corindi Conglomerate unit at the southern extent of Dirty Creek Range is expected to provide a reasonable source of construction material, eg select material. Some of the sandstone beds within the range may also provide reasonable fill material. However, these beds are not expected to be as extensive as the Corindi Conglomerate unit.

9.5.10 Hydrology and Flooding

The existing major bridge crossings at Arrawarra Creek, Corindi River, Blackadder Gully, Cassons Creek, Halfway Creek and Wells Crossing were shown by the preliminary analysis to have varying levels of flood immunity. New crossings at these locations for this project would be designed to have a 100 year ARI flood immunity. With an appropriate selection of the waterway area for the new crossings there would be a minimal impact on flood levels. The final location and form of the bridges would be dependant on the concept design of the preferred route.

Approximately 60 minor structures (either new culverts or extensions to existing culverts) would be required along this section of the Pacific Highway. These new structures will be sized and positioned so that they have a minimal impact on the existing flooding regime. Flow velocities through these structures would be selected to reduce the downstream erosion risk.

9.5.11 Public Utilities

A number of overhead and underground public utilities exist along the preferred route corridor. Depending on the type of utility, local, regional and / or interstate connections may be provided. Further refinement of the preferred route during the concept design phase of the project will determine more accurate impacts to public utilities.

There is no known information regarding possible planned future upgrades to public utility assets in the study area.

The utilities that may be impacted by the preferred route are discussed for each of project section and include:

Section A

Telecommunications

Optic fibre along the western side of the existing alignment may require protection at four crossing locations.

Electricity

Approximately 2.5km of 11kV overhead line may require relocation.

Water

No impacts.

Sewerage

No impacts.

Section B

Telecommunications

Optic fibre may require protection at 4 crossing locations.

Electricity

There are up to 3 crossings of overhead power lines that may require adjustment.

Water

No impacts.

Sewerage

No impacts.

Section C

Telecommunications

Optic fibre may require protection or relocation.

Electricity

Overhead powerlines run adjacent to the western side for approximately one kilometre approaching Falconers Lane and may require relocation.

Water

No impacts.

Sewerage

No impacts.

Section D

Telecommunications

Telstra optic fibre adjacent to existing highway is likely to be clear of the proposed route for the majority of the section. One crossing may require protection or relocation near Falconers Lane.

Electricity

Minor relocations to overhead powerlines may be required.

Water

No impacts.

Sewerage

No impacts.

Section E

Telecommunications

Optic fibre adjacent to existing highway north of Kungala Road may require relocation.

Electricity

Minor relocations to overhead powerlines may be required.

Water

No impacts.

Sewerage

No impacts.

9.6 Strategic Cost Estimates

9.6.1 Approach to Cost Estimating

Strategic cost estimates have been prepared for the preferred route for the Class A (Arterial) and Class M (Motorway) upgrade scenarios. The estimates were based on preliminary design plans and long-sections for the preferred route as well as preliminary geotechnical investigations carried out within the study area.

The strategic cost estimate has been prepared in accordance with the RTA's specified format for a Strategic /Preliminary Cost Estimate which, divides the project cost into six major components as follows:

- ▶ Project Development (covering the work required to obtain project approval);
- ▶ Investigation and Design (covering the design and documentation of the project for construction);
- ▶ Property Acquisitions;
- ▶ Public Utility adjustments;
- ▶ Construction (typically the main cost component and often accounts for 80% to 90% of a major rural road project. The main elements are earthworks, pavements, structures and drainage. Also included are environmental works, site management during construction, client representation, etc); and
- ▶ Handover (covering project completion and the handing over of completed assets to the responsible maintaining authority).

The cost estimates assume that the upgrade will be undertaken in one stage, however it is likely that the highway upgrade would be undertaken in stages, ultimately to a Class M (Motorway) facility.

9.6.2 Scope Definition

This section provides a summary of the of the major work elements for the development of the Woolgoolga to Wells Crossing Upgrade Project. The scope of the project would vary depending on whether the Class A (Arterial) or Class M (Motorway) upgrade scenario is adopted. The scope has been defined for the following upgrade scenarios:

- ▶ Class A upgrade scenario; and
- ▶ Class M upgrade scenario.

The scope of these scenarios is provided in Table 9.3 and Table 9.4.

Table 9.3 Comparative Scope Definition of each Section of the Preferred Route for the Class A Upgrade Scenario

Preferred Route Feature	Section A	Section B ⁽¹⁾	Section C ⁽¹⁾	Section D	Section E ⁽¹⁾	Total
Starting Point	Arrawarra Creek	Tasman Street	500m South of Barcoongere Way	400m South of Falconers Lane	Lemon Tree Rd	Arrawarra Creek
Finishing Point	Tasman Street	500m South of Barcoongere Way	400m South of Falconers Lane	Lemon Tree Rd	Bald Knob Tick Gate Road	Bald Knob Tick Gate Road
Length	3.5km	5.2km	4.2km	5.8km	7.8km	26.5km
Clearing	30ha	34ha	47ha	20ha	73ha	204ha
Noise walls	80m	170m	150m	250m	100m	750m
Pavement	74,000m ²	110,000m ²	88,000m ²	126,000m ²	164,000m ²	562,000m ²
Minor Bridges	0	2	0	0	2	4
No. of Local and Access Road at grade intersections	3	0	3	5	4	15
No. of Local and Access Road Closures	0	0	0	0	0	0
Realigned Local and New Service Roads	1.4km	0km	0km	0km	0km	1.4km

Note: (1) Characteristics within Sections B, C and E may change depending on the final alignment of the preferred route.

Table 9.4 Comparative Scope Definition of each Section of the Preferred Route for the Class M Upgrade Scenario

Preferred Route Feature	Section A	Section B ⁽²⁾	Section C ⁽²⁾	Section D	Section E ⁽²⁾	Total
Starting Point	Arrawarra Creek	Tasman Street	500m South of Barcoongere Way	400m South of Falconers Lane	Lemon Tree Rd	Arrawarra Creek
Finishing Point	Tasman Street	500m South of Barcoongere Way	400m South of Falconers Lane	Lemon Tree Rd	Bald Knob Tick Gate Road	Bald Knob Tick Gate Road
Length	3.5km	5.2km	4.2km	5.8km	7.8km	26.5km
Clearing	30ha	34ha	47ha	20ha	73ha	204ha
Noise walls	80m	170m	150m	250m	100m	750m
Pavement	74,000m ²	110,000m ²	88,000m ²	126,000m ²	164,000m ²	562,000m ²
Minor Bridges	0	3	1	4	3	11
No. of Grade Separated Interchanges	1	0	0	0	0	1
No. of Local and Access Road Closures ¹	3	0	0	0	0	3
Realigned Local and New Service Roads	1.0km	2.5km	2.2km	4.0km	4.0km	12.7km

Note: (1) Access directly to the highway from local roads will be restricted upon upgrade to Class M (Motorway) standard. Alternate access will be provided via continuous local access roads and grade separated interchanges.

(2) Characteristics within Sections B, C and E may change depending on the final alignment of the preferred route.

9.6.3 Project Estimate

A breakdown of the project cost (in 2006 dollars) for both Class A and Class M scenarios are provided in Tables 9.5 and 9.6 below. Current RTA guidelines state that the weighted project contingency applied to Strategic Estimates is typically in the range of 35% to 50% and is dependant upon the degree of certainty with the item rate, quantity and design detail envisaged. A weighted project contingency of 40% for both the Class A and Class M scenario has been used for the preferred route.

Table 9.5 Class A Strategic Cost Estimate for the Preferred Route

Estimate Cost Item	Section costs including contingency ⁽¹⁾ (000)'s					Total
	A	B ⁽²⁾	C ⁽²⁾	D	E ⁽²⁾	
Project Development	\$526	\$1,421	\$941	\$475	\$1,493	\$4,856
Investigation and Design	\$1,316	\$3,554	\$2,354	\$1,186	\$3,733	\$12,143
Property Acquisition	\$2,255	\$8,183	\$5,882	\$3,855	\$4,114	\$24,289
Public Utility Adjustments	\$979	\$2,154	\$1,007	\$532	\$825	\$5,497
General Provisions	\$1,111	\$4,198	\$2,159	\$908	\$3,578	\$11,954
Control of Erosion and Sedimentation	\$287	\$456	\$372	\$287	\$731	\$2,133
Drainage	\$3,195	\$6,126	\$5,331	\$3,324	\$9,321	\$27,297
Earthworks	\$6,036	\$22,521	\$13,605	\$3,479	\$8,970	\$54,611
Bridges	\$0	\$13,149	\$0	\$0	\$5,796	\$18,945
Pavements	\$5,441	\$14,710	\$9,613	\$4,581	\$22,326	\$56,671
Roadside Improvements	\$818	\$3,384	\$2,093	\$1,062	\$2,355	\$9,712
Miscellaneous Items	\$548	\$1,025	\$882	\$581	\$1,448	\$4,484
Project Specific Adjustments ⁽³⁾	\$6,672	-\$330	\$8,941	\$7,085	\$12,209	\$34,577
Project Management Services	\$709	\$1,914	\$1,267	\$639	\$2,010	\$6,539
Principal Arranged Insurance	\$236	\$638	\$422	\$213	\$670	\$2,179
Client Representation	\$64	\$172	\$114	\$57	\$181	\$588
Handover	\$99	\$99	\$99	\$99	\$99	\$495
Total Cost of Section	\$30,292	\$83,374	\$55,082	\$28,363	\$79,859	\$276,970
Total (Rounded) Cost of Section	\$30,000	\$85,000	\$55,000	\$30,000	\$80,000	\$280,000

- Note (1) Contingency is the planned allotment of time and cost for unforeseeable elements within a project.
- (2) Costs within Sections B, C and E may vary depending upon the final alignment of the preferred route.
- (3) Project specific adjustments represent the adjustment required to allow for the known differences between the specific alignment as calculated with "Road Works Estimator" software and unique characteristics observed for a particular alignment. The adjustment can be a negative or positive value.

Table 9.6 Class M Strategic Cost Estimate for the Preferred Route

Estimate Cost Item	Section costs including contingency ⁽¹⁾ (000)'s					Total
	A	B ⁽²⁾	C ⁽²⁾	D	E ⁽²⁾	
Project Development	\$676	\$1,421	\$1,129	\$807	\$1,777	\$5,810
Investigation and Design	\$1,691	\$3,554	\$2,823	\$2,017	\$4,443	\$14,528
Property Acquisition	\$2,255	\$8,183	\$5,882	\$4,206	\$4,114	\$24,640
Public Utility Adjustments	\$979	\$2,154	\$1,007	\$727	\$825	\$5,692
General Provisions	\$664	\$4,198	\$2,333	\$966	\$3,656	\$11,817
Control of Erosion and Sedimentation	\$309	\$456	\$371	\$287	\$731	\$2,154
Drainage	\$3,545	\$6,126	\$5,331	\$3,323	\$9,321	\$27,646
Earthworks	\$9,180	\$22,521	\$13,721	\$3,633	\$8,970	\$58,025
Bridges	\$53	\$13,149	\$1,994	\$0	\$6,896	\$22,092
Pavements	\$7,012	\$14,710	\$9,839	\$5,035	\$22,326	\$58,922
Roadside Improvements	\$1,169	\$3,384	\$2,232	\$1,277	\$2,355	\$10,417
Miscellaneous Items	\$563	\$1,025	\$882	\$581	\$1,448	\$4,499
Project Specific Adjustments ⁽³⁾	\$8,162	-\$330	\$14,597	\$20,628	\$23,914	\$66,971
Project Management Services	\$910	\$1,914	\$1,520	\$1,086	\$2,392	\$7,822
Principal Arranged Insurance	\$303	\$638	\$507	\$362	\$797	\$2,607
Client Representation	\$82	\$172	\$137	\$98	\$215	\$704
Handover	\$99	\$99	\$99	\$99	\$99	\$495
Total Cost of Section	\$37,652	\$83,374	\$64,404	\$45,132	\$94,279	\$324,841
Total (Rounded) Cost of Section	\$40,000	\$85,000	\$65,000	\$45,000	\$95,000	\$330,000

- Note (1) Contingency is the planned allotment of time and cost for unforeseeable elements within a project.
- (2) Costs within Sections B, C and E may vary depending upon the final alignment of the preferred route.
- (3) Project specific adjustments represent the adjustment required to allow for the known differences between the specific alignment as calculated with "Road Works Estimator" software and unique characteristics observed for a particular alignment. The adjustment can be a negative or positive value.

The strategic cost estimates for the preferred route (for both the Class A and Class M upgrade scenarios) can be summarised as shown in Table 9.7.

Table 9.7 Strategic Cost Estimate Summary for the Preferred Route

Section	Total Cost (\$ Million)		Cost per km (\$ Million/km)	
	Class A	Class M	Class A	Class M
A ⁽¹⁾	\$30	\$40	\$8.6	\$11.4
B ^(1,2)	\$85	\$85	\$16.3	\$16.3
C ^(1,2)	\$55	\$65	\$13.1	\$15.5
D ⁽¹⁾	\$30	\$45	\$5.2	\$7.6
E ^(1,2)	\$80	\$95	\$10.3	\$12.2
Total	\$280	\$330	\$10.6	\$12.5

Note (1) Total cost rounded to nearest \$5M

(2) Costs within Sections B, C and E may vary depending upon the final alignment of the preferred route.

Some of the notable features associated with the cost estimates for the five sections of the route include:

- ▶ Construction over soft soils at the Corindi River floodplains;
- ▶ A number of at grade intersection treatments throughout project for the Class A (Arterial) scenario;
- ▶ One grade separated interchange in Section A for Class M (Motorway) scenario;
- ▶ Construction of a number of overpasses and underpasses for Class M (Motorway) scenario;
- ▶ Major rock cutting at Dirty Creek Range; and
- ▶ Use of the recently completed Halfway Creek duplication.

10. The Next Steps

10.1 Woolgoolga to Wells Crossing Upgrade

Following the announcement of the preferred route for the Woolgoolga to Wells Crossing project the RTA will submit a concept design of the Preferred Route to the Department of Planning (DoP) for project approval under Part 3A of the EP&A Act.

Further survey, geotechnical, ecological and other investigations would also be undertaken to provide input into the refinement of the design and environmental assessment.

The level or scope of environmental assessment (EA) required for a proposal under Part 3A would be determined by the Director-General of Planning, who issues the EA requirements after consultation with relevant public authorities and local Councils. The EA may include a statement of commitments in respect of environmental management and mitigation measures proposed to be undertaken if the project is approved.

When completed, the EA would be publicly exhibited and submissions would be sought. The RTA may be asked to prepare a report on the submissions and revise its statement of commitments. It would also consider modifications to the project to minimise environmental impacts. The DoP may request the RTA to display, for public information, a Preferred Project Report, which identifies the proposed modifications.

The DoP would consider the EA, the public submissions and any report requested from the RTA in recommending to the Minister for Planning whether the project should be approved.

Figure 10.1 demonstrates the option development process and the next steps in the Woolgoolga to Wells Crossing project.

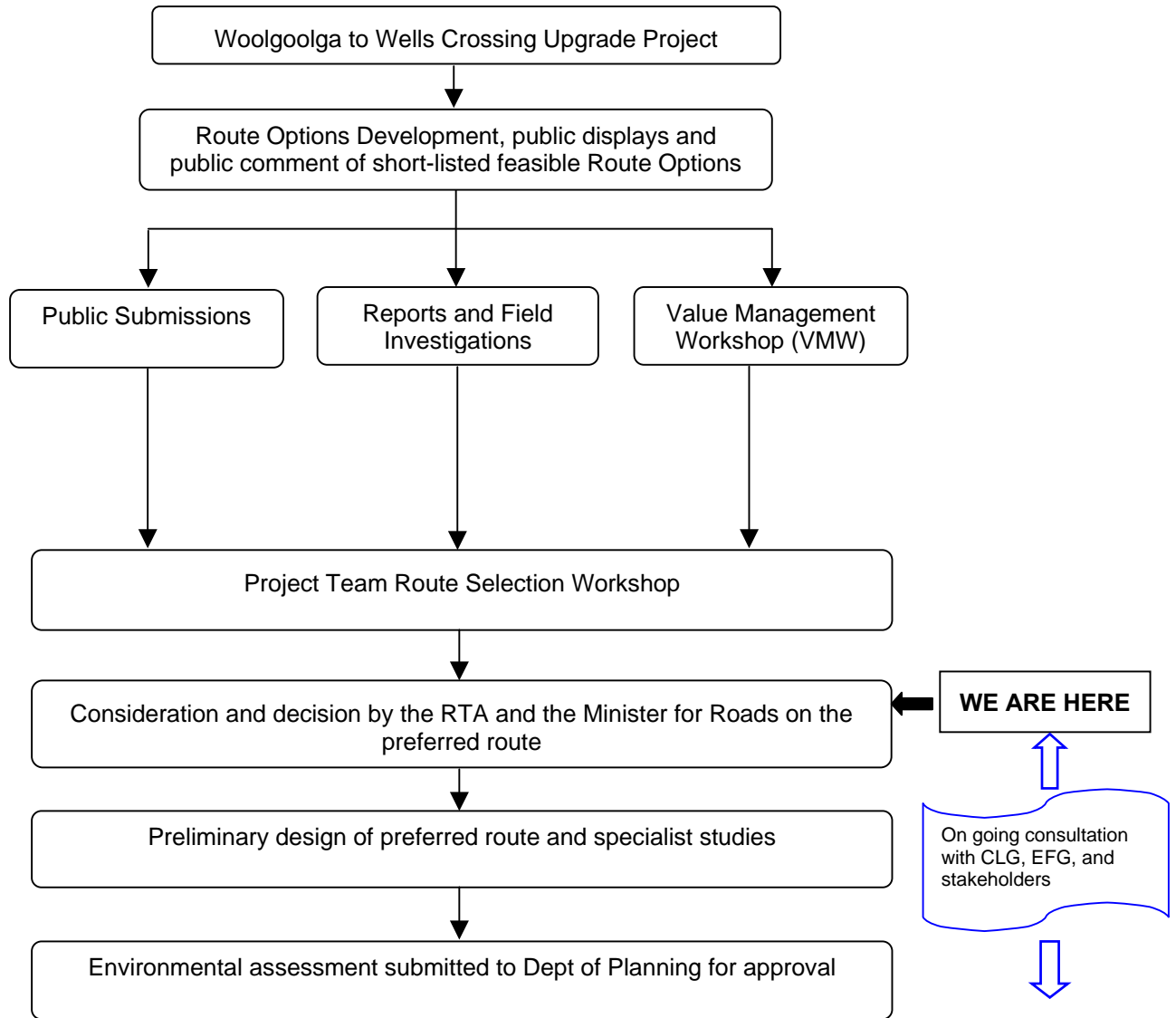


Figure 10.1 Option Development Process and the Next Steps

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