# 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 Oxley Highway to Kempsey 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:

**Table 9.1 Preferred Route Corridor**

| Section | Section Description | Preferred Option |
|---|---|---|
| A | 700m north of Oxley Highway Interchange to Blackmans Point Road | Orange Option |
| B | Blackmans Point Road to Cooperabung Drive | Combination of Orange and Refined Orange options including a wider corridor through Cairncross State Forest |
| C | Cooperabung Drive to Mingaletta Road | Blue / Green / Purple Option |
| D | Mingaletta Road to Maria River | Blue Option |

The location of proposed grade separated interchanges and service roads will be determined during the concept design phase. The location of the existing interchange with the Oxley Highway to the south, the proposed grade separated interchange south of Kempsey (part of the Kempsey to Eungai Pacific Highway Upgrade project), connection to local road network and connectivity issues will all be considered in finalising the proposed grade separated interchange locations.

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.

A local road strategy between Maria River and the proposed grade separated interchange south of Kempsey will also be undertaken.

The ultimate arrangement of grade separated interchanges and service roads may result in further impacts and benefits beyond those considered in this report and will be considered further during the Environmental Assessment of the preferred route.

## 9.2 Reasons why the Preferred Route was Selected

### 9.2.1 Overview

The preferred route chosen provides the best overall balance between functional, ecological, heritage, social, and economic considerations.

### 9.2.2 Section A – Orange Option

Of the three options in Section A, the orange option was selected for the following key advantages:

- Avoids proposed marine precinct adjacent to Dennis Bridge, upstream of the existing crossing;
- Traffic delays would be minimised during construction where this option deviates from the existing highway;
- The existing highway between Fernbank Creek and Telegraph Point will be retained as a local access road; and
- Minimises impacts to rural residences in Glen Ewan Road.

### 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 RSW, a combination of the Refined Orange and Orange options has been selected by the project team for further investigations to minimise the impacts to Cairncross State Forest, flora and fauna (including koalas), agricultural lands and rural residential properties.

Of the four options in Section B, a combination of refined orange and orange options were selected for the following key advantages:

- Has the least overall noise impact on communities;
- Bypasses Telegraph Point township;
- Has less impact on residential areas than the blue and green options;
- Has less impacts on SEPP 14 (State Environmental Planning Policy 14) wetlands than the purple option; and
- Has less overall impact on endangered ecological communities than the purple option.

### 9.2.4 Section C - Blue / Green / Purple Option

Of the two options in Section C, the blue, green and purple options were selected for the following key advantages:

- Has a minor impact on the Cooperabung Creek Nature Reserve and Ballengarra State Forest;
- The existing highway is duplicated;
- Reduces the grade through Cooperabung Range; and
- Northbound carriageway will be constructed clear of the southbound carriageway, which minimises construction delays.

### 9.2.5 Section D – Blue Option

Of the two options in Section D, the blue option was selected for the following key advantages:

- Has less intrusion on the Maria River State Forest;
- Existing accesses to the highway modified to improve safety and
- Realignment to the east of the existing highway through Maria River State Forest improving safety.

## 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 9.5.

### 9.3.1 Section A – Orange Option

Commencing 700 metres north of the Oxley Highway interchange duplication of the existing alignment will occur on the west side of the existing alignment until the right hand bend 900 metres north of Sancrox Road/Fernbank Creek Road intersection, with the existing carriageway used for southbound traffic.

From the right hand bend north of Sancrox Road the duplication will switch to the east side to take advantage of the available road reserve. The preferred route then deviates to the west of the existing alignment and crosses the Hastings River approximately 400 metres upstream of the existing Dennis Bridge, continuing on a straight alignment and rejoining the existing alignment 800 metres south of Blackmans Point Road.

The new crossing of the Hastings River (and Glen Ewan Road) would require new bridges for both carriageways and would maintain existing navigational clearances. Two new bridges are required at Fernbank Creek. A number of major box culverts would require duplication through this section.

The preferred route in the vicinity of Hastings River has minimal impact on the existing shipyard and marine precinct adjacent to Dennis Bridge, however it introduces potential land use conflicts with agricultural land as it deviates from the existing highway alignment. The alignment has a minor impact on Cairncross State Forest and Rawdon Creek Nature Reserve north of Hastings River and on the west side in the vicinity of Blackmans Point Road. The preferred route also brings the highway closer to some rural properties at Glen Ewan Drive and north of Hastings River.

The crossing of Hastings River is located close to and downstream of a bend in the river. Geomorphological investigation would be required to determine bank and riverbed stability and incorporated into the bridge design if required.

The Hastings River floodplain on both sides of the Dennis Bridge will require special construction techniques to address the existing deep soft soil conditions.

Under a Class A scenario, a grade separated interchange may be provided either south of Fernbank Creek or in the area from Blackmans Point Road to Bill Hill Road in Section B (to be determined). In addition, and as a part of the staging strategy for the upgrade, only one carriageway could be constructed for the realignment over Hastings River with the existing highway becoming the southbound carriageway.

It should be noted that the existing Dennis Bridge over the Hastings River does not conform to SM1600 loading standards or design cross section and cannot be expanded to three lanes (future upgrade to three lanes each way).

Under a Class M scenario the additional carriageway over the Hastings River would be completed and the existing highway south and north of Dennis Bridge, including the bridge would be used as a local access road. A new local access road connection would be required to connect the final interchange location to the highway, Hastings River Drive and Blackmans Point Road. The existing intersection of the Pacific Highway with Hastings River Drive could be retained as a local access connection to the existing Pacific Highway.

The location of a proposed grade separated interchange will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase. The location of the existing interchange with the Oxley Highway to the south, connection to local road network and connectivity issues will all be considered in finalising the proposed grade separated interchange location.

### 9.3.2 Section B – Combination of Orange and Refined Orange Options

At Blackmans Point Road, the preferred route follows the existing highway alignment for approximately two kilometres. The preferred route then deviates to the east, across the Wilson River east of Telegraph Point, over the North Coast Railway and Haydons Wharf Road, rejoining the existing highway alignment south of Cooperabung Drive.

As the new carriageways depart from the existing highway, they pass through Cairncross State Forest, cross over Bill Hill Road and emerge from the forest to pass east of Moorside Drive, and the ski park facility.

The alignment in this area lies outside the study area set for the project in November 2004.

A wider preferred route corridor has been adopted through Cairncross State Forest to allow further investigations and assessment so as to position an alignment that has least impact on koala habitat, Cairncross State Forest, agricultural, private property and utilities.

South of the Wilson River the alignment crosses the Wilson River floodplain for more than three kilometres. Consideration of soft soil conditions (varying depths) in this area would be necessary.

Several major culvert structures would be required across the floodplain, possibly aligned to existing floodplain channels.

There would be significant private property acquisition both south and north of the Wilson River, in addition to acquisition of state forest throughout this section.

The alignment crosses the Wilson River at the southern end of Dalhunty Island approximately 2.4 km downstream from the existing bridge at Telegraph Point. The new bridges over the Wilson River would maintain clearance for vessels passing beneath. New bridges are also required over the North Coast Railway, Haydons Wharf Road and Cooperabung Creek

Access to the new alignment from side roads and other accesses would be via the existing Pacific Highway, which would be retained as a local access road along with the existing Wilson River bridge.

Class M conditions would exist along the majority of this section at project opening. Possible provision of a grade separated interchange in the vicinity of Haydons Wharf Road will be investigated as part of the concept design phase.

### 9.3.3 Section C – Blue / Green / Purple Option

Through Section C, the preferred route is a duplication of the existing alignment. Duplication is proposed on the western side from Cooperabung Drive to south of Yarrabee Road where the duplication switches to the eastern side and continues this arrangement through to Mingaletta Road.

A major consideration for this section is Cooperabung Hill, which rises from a level of approximately 30 metres (AHD) to a level of 100 metres (AHD). The existing vertical curve through Cooperabung Hill would be lowered approximately 11 metres to achieve a 110 km/h design speed. The extent of widening of the existing rock cuttings through this area would be determined in the concept design phase.

There are several major box culverts that would require duplication for the new carriageway from Yarrabee Road to Mingaletta Road.

The alignment passes through Cooperabung Creek Nature Reserve and Ballengarra State Forest. A concentration of koala road kills through the Ballengarra State Forest area indicates an important movement corridor for koalas in this area and would require particular attention (e.g. fauna underpasses) to alleviate impacts on wildlife. The old Pacific Highway (via Yarrabee Road intersection) is an accredited Confederation of Australian Motor Sport (CAMS) hill climb track and the duplication on the eastside at this location is close to this facility. Any impact on the track would be minimised in the concept design phase.

In a Class A scenario the local road access points within this section would be restricted to a left in / left out arrangement, except for Yarrabee Road and Mingaletta Road where a seagull type treatment would be applied.

Under a Class M scenario, a left in deceleration / left out acceleration arrangement would be provided at the Yarrabee Road intersection or possible underpass/overpass arrangement and additional local access road connection. The location of possible underpass/overpasses and additional local access roads will be determined as part of the detailed investigations to be undertaken for the preferred route during the concept design phase.

### 9.3.4 Section D – Blue Option

The duplication of the existing alignment continues through this section on the eastern side, along the Kundabung straight to Ravenswood Road (north). Constructing the additional carriageway on the east side takes advantage of the available road reserve and minimises property acquisition.

Between the end of the Kundabung straight and the Maria River, realignment on the east side of the existing highway is required using flatter curves to achieve a 110 km/h design speed. At Maria River the realignment connects to the southern end of the existing section of dual carriageway.

New bridges would be required for the southbound carriageway at Smiths Creek and Pipers Creek. The existing bridges could be rebuilt to meet SM1600 loading standards and design cross section. The Smiths Creek bridge if reconstructed would provide for flood immunity for the 100 year ARI flood level. At Maria River, a new bridge is required for the northbound carriageway adjacent to the existing low level timber bridge. The exact location of the new northbound bridge will be decided in the concept design phase.

Existing major box culverts would require duplication where necessary through this section.

North of Kundabung straight, the existing alignment passes between Kumbatine National Park and Maria River State Forest. The realignment in this section would encroach upon the Maria River State Forest where there is a known koala movement corridor as indicated by a concentration of road kills and this would require particular attention (e.g. fauna underpasses) to alleviate impacts on wildlife.

The existing rest area facility opposite Smiths Creek Road would require reconstruction due to the east side duplication. The existing rest area facility south of Maria River would be retained or reconstructed and access to the rest area constructed as part of the new realignment.

Consideration of noise attenuation would be required in the vicinity of the Kundabung where a number of residences could be exposed to increased road traffic noise.

In a Class A arrangement, seagull intersection treatments would be provided at Kundabung Road, Smiths Creek Road and Ravenswood Road (south) and all other local access points and private accesses would be left in / left out only. The final arrangement of at grade intersection through this area will be investigated further in the concept design phase. In addition, the possible provision of a local access road would rationalise the number of accesses and improved safety.

Access to the Maria River State Forest and Kumbatine National Park may be maintained by providing left in / left out arrangements at some of the existing access points.

Under a Class M scenario a grade separated interchange may be provided in the vicinity of Kundabung Road. New local access roads would be required both east and west of the alignment, to connect existing local roads and private properties to the interchange. The location of a possible interchange in this area will be investigated in the concept design phase and the positioning of a future interchange north of Maria River as part of the Kempsey to Eungai upgrade will also have to be considered.

## 9.4 Summary of Characteristics of the Preferred Route

The characteristics of the preferred route for the Class M 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 Preferred Route Characteristics**

| Characteristics | Preferred Route | | | |
|---|---|---|---|---|
| | **Section A** | **Section B** [1] | **Section C** | **Section D** |
| | **Orange Option** | **Combination of Orange option and Refined Orange Option** | **Blue / Green / Purple Option** | **Blue Option** |
| **Engineering and Operational** | | | | |
| Total length (km) | 8.2 | 11.0 - 11.3 | 5.3 | 11.8 |
| Length of Major Bridges (m) | 120 | 88 | 0 | 0 |
| Major cuts (>5m depth in rock) | No | No | Yes | No |
| Length of route to be constructed on floodplain (km) | 1.8 | 2.3 – 2.5 | 0.2 | 1.7 |
| Number of Interchanges (Class M) | 1 | 0 | 1 | 1 |
| Number of bridges | 8 | 9 | 3 | 15 |
| Significant public utility constraints | Optic Fibre crossings<br>Water main under alignment<br>Electrical services<br>Potential Sewer upgrades may cross the highway at Fernbank Creek Road | Optic Fibre crossings | Optic Fibre infrastructure<br>Electrical infrastructure | Optic Fibre infrastructure<br>Electrical infrastructure |
| Preliminary Cost Estimate – Class A ($M) | 182 | 210 | 51 | 113 |

| Characteristics | Preferred Route | | | |
|---|---|---|---|---|
| | Section A | Section B [1] | Section C | Section D |
| | Orange Option | Combination of Orange option and Refined Orange Option | Blue / Green / Purple Option | Blue Option |
| Preliminary Cost Estimate – Class M ($M) | 194 | 229 | 67 | 139 |
| **Community** | | | | |
| Potential noise impact (measured by weighted noise impact) | 86 | 55 - 99 | 13 | 101 |
| Does the option sever communities? | No | No (corridor passes immediately east of Moorside Drive rural residential area) | No | Yes (continues existing severance of Kundabung community) |
| Approximate area of potential property acquisition (ha) | 61 | 84 -119 | 17 | 53 |
| Number of properties potentially affected by acquisition | 29 | 26 - 31 | 17 | 41 |
| Potential impact to state forest, national park or nature reserve? | Yes (minor severance of Cairncross State Forest and strip acquisition from Rawdon Creek Nature Reserve) | Yes. (Potential minor strip acquisition from Rawdon Creek Nature Reserve, and likely severance of Cairncross State Forest) | Yes (strip acquisition from Ballengarra State Forest and possible minor strip acquisition from Cooperabung Creek Nature Reserve) | Yes (strip acquisition from Maria River State Forest & possible minor strip acquisition from Kalateenee State Forest) |
| Impacts on known Aboriginal Heritage? | No impacts to listed heritage. The preferred route traverses areas of cultural sensitivity. | No (an open camp site listed on DEC register occurs approximately 200m east) | No | No impacts to listed heritage. Corridor traverses an area of cultural sensitivity around Maria River. |

| Characteristics | Preferred Route | | | |
|---|---|---|---|---|
| | Section A | Section B [1] | Section C | Section D |
| | Orange Option | Combination of Orange option and Refined Orange Option | Blue / Green / Purple Option | Blue Option |
| Impacts on known Non-Aboriginal Heritage? | No | No | No | Yes. Potential impact on Maria River (northbound) bridge, which has been assessed as being of State heritage significance. |
| **Environmental** | | | | |
| Impact to SEPP 14 wetlands? | No | Yes. Approx. <1ha. (potentially traverses edges of two areas of SEPP 14 wetland on Dalhunty Island and northern bank of Wilson River) | No | No |
| Extent of vegetation clearing (ha) | 58 | 50 - 57 | 38 | 77 |
| Extent of endangered ecological community clearing (ha) | 15 (area is based on field investigations generally north of Fernbank Creek only) | 13 - 31 | 18 | None known subject to further detailed investigations during concept design. |
| Impact to NPWS designated wildlife corridors | Yes (widening of existing cleared corridor along edge of one regional wildlife corridor, and widening of existing cleared corridor through one sub-regional wildlife corridor) | Yes (widening of existing cleared corridor along edge of one regional wildlife corridor) | Yes (widening of existing cleared corridor along edge of one regional wildlife corridor) | Yes (creation of a new cleared corridor through one regional wildlife corridor, and widening of existing cleared corridor through one regional and one sub-regional wildlife corridors) |

Note: (1) Characteristics within Section B are indicative only and may change depending upon the final alignment of the preferred route.

## 9.5 Potential Impacts of the Preferred Route

### 9.5.1 Local Community

**Section A**

***Community Severance / Consolidation***

There are no villages within this section of the study area. The community of Blackmans Point, rural dwellings located along Glen Ewan Road, and proposed residential / rural residential areas (Area 13 and off Sancrox Road to the west) would be provided with changed access to the upgraded highway.

***Amenity***

The general amenity for residents in the vicinity of the preferred route would be affected during construction.

Where the preferred route deviates to the west of the existing highway there is likely to be amenity impacts during operation to residents in Glen Ewan Road and to the north of the Hastings River, a number of which would be located between the upgraded highway and the existing highway.

***Local Vehicular Access***

There are a number of public and private accesses to the existing highway in this section, including Sancrox Road, Fernbank Creek Road, Hastings River Drive, Glen Ewan Road, Blackmans Point Road, private and forestry accesses north of Hastings River.

The preferred route follows the existing highway to south of Fernbank Creek and also for a small length before Blackmans Point Road. Otherwise the preferred route is a realignment to the east over Hastings River.

In a Class A scenario, all existing local road intersections would be upgraded to tie in with the preferred route. Access to forestry trails would be consolidated where possible to minimise the number of direct access points onto the highway. Private accesses would be left-in and left-out only.

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.

The location of a possible grade separated interchange at a location either south of Fernbank Creek or in the vicinity of Blackmans Point Road will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase. The location of the existing interchange with the Oxley Highway to the south, connection to local road network and connectivity issues will all be considered in finalising the proposed grade separated interchange location.

***Bus Access***

Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing where the existing highway forms part of the preferred route. However, the provision of improved clear zones and possibly designated bus bays should improve the current situation. Under a Class M scenario, no bus stops would be provided on the upgraded highway, 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 scenario and banned under a Class M scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway. 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.

There is the possibility for impacts on pedestrian movements along the existing underpass between Cassegrain Wines and Expressway Spares, particularly during construction. The existing pedestrian access on Dennis Bridge would be retained.

### *Potential Economic Impacts*

Known potential significant economic development in this section includes Area 13 and a proposed Marine Precinct in Glen Ewan Road adjacent to the existing highway. Port Macquarie – Hastings Council have also recently identified land in the vicinity of Sancrox Road as potential industrial land however, this is subject to further consultation and investigations and is not yet an endorsed strategy. Further, council recently received a rezoning application to allow establishment of a possible industrial fabrication facility south of Expressway Spares. This application has not yet been approved pending resolution of highway access. The preferred route is not expected to significantly impact on these potential developments although changed access arrangements are likely.

The preferred route, subject to concept design, is not expected to have any significant economic impacts to the service centre (Oxley Highway interchange), Billabong Koala Park, Expressway Spares, Hanson Construction Materials, TNT Express, Cassegrain Wines, Hastings River oyster leases, Birdon Marine or Birdons Dredging, although changed access arrangements are likely.

The preferred route would have an economic impact on Cairncross State Forest through loss of productive estate.

The preferred route would also result in loss of productive agricultural land that is currently subject to grazing, particularly where it deviates to the west of the existing highway on the Hastings River floodplain.

## Section B

### *Community Severance / Consolidation*

The preferred route would result in improved community consolidation within Telegraph Point, both north and south of the Wilson River.

### *Amenity*

The general amenity for residents in the vicinity of the preferred route would be affected during construction.

The general amenity for the majority of residents in this section is likely to be improved as a result of the deviation of the preferred route alignment to the east of Telegraph Point. However, there would be a reduction in amenity generally for those residents that are located substantially closer to the new alignment, in particular at the eastern end of Moorside Drive, and on the southern and northern sides of the Wilson River where the alignment crosses the river.

### *Local Vehicular Access*

This section is largely a realignment to the east of the highway with some duplication just north of Blackmans point Road. The preferred route passes over Bill Hill Road, Hacks Ferry Road, North Coast Railway Line and Haydons Wharf Road. At the northern end of this section the preferred route intersects with Cooperabung Close and Cooperabung Drive.

In a Class A scenario, existing local road intersections at the northern end would be upgraded to tie in with the preferred route. Access to forestry trails would be consolidated where possible at the southern end of the section to minimise the number of direct access points onto the highway. Private accesses at the northern end of this section would be left-in and left-out only.

Class M conditions would exist along the majority of this section at project opening. Possible provision of a grade separated interchange in the vicinity of Haydons Wharf Road will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase.

### *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 scenario and banned under a Class M scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway. 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.

Pedestrian and cyclist amenity within Telegraph Point would be improved as a result of the preferred route.

### *Potential Economic Impacts*

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

Depending on the final alignment selected the preferred route in Section B has the potential to impact on the service station and café in Pembrooke Road, and Pear Tree Cottage due to possible loss of passing trade.

Irrespective of the final alignment selected the preferred route would have economic impacts to Cairncross State Forest and a number of rural properties on the Wilson River floodplain due to property acquisition.

There are no expected significant economic impacts to Gean Custom Marine located in Haydons Wharf Road, Stoney Park Watersports and Recreation or Cairncross Waste Management Facility.

The preferred route may impact on Sharky's Skirmish, which is located within Cairncross State Forest, due to possibly substantial property acquisition of land from Forests NSW including lands leased by Sharky's Skirmish.

The preferred route may impact on Port Macquarie Tea Tree Plantation located immediately to the north of Cairncross State Forest through property acquisition and subsequent loss of productive land.

## Section C

### *Community Severance / Consolidation*

There are no significant community impacts expected in this section.

### *Amenity*

There are no significant amenity impacts expected in this section.

### *Local Vehicular Access*

There are a number of public and private accesses to the existing highway in this section, including Yarrabee Road, Mingaletta Road and forestry accesses.

The preferred route is a duplication of the existing highway alignment throughout this section with some reconstruction (lowering) at Cooperabung Hill.

In a Class A scenario Yarrabee Road and Mingaletta Road intersections would be upgraded to tie in with the preferred route. 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 nearby grade separated interchanges would be provided via new service roads and the provision of overpasses or underpasses, linking existing local roads to the new service roads. The location of new service roads and overpasses or underpasses will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase.

### *Bus Access*

Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However, the provision of improved clear zones and possibly designated bus bays should improve the current situation. Under a Class M scenario, no bus stops would be provided on the upgraded highway, 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 scenario and banned under a Class M scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway. 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 Port Macquarie – Hastings Council and Kempsey Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.

Yarrabee Road quarry has been identified by the Department of Primary Industries (Mineral Resources) as a substantial potential resource however, apart from changed access arrangements there are no expected significant economic impacts as a result of the preferred route.

**Section D**

***Community Severance / Consolidation***

Potential increased severance of the community of Kundabung, that is already present as a result of the existing highway. However, subject to concept design the existing situation may be improved through the possible provision of an underpass or overpass.

***Amenity***

The general amenity for residents in the vicinity of the preferred route would be affected during construction, and is not expected to substantially change during operation as the preferred route 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 Wharf Road, Upper Smiths Creek Road, Kundabung Road, Smiths Creek Road Ravenswood Road (north and south), Old Coast Road, Kundabung Road (north), private and forestry accesses.

The preferred route is a duplication of the existing highway alignment throughout this section with some realignment from Ravenswood Road (north) to Maria River.

In a Class A scenario, existing local road intersections would be upgraded to tie in with the preferred route. Intersections and private accesses through the Kundabung area maybe consolidated with the provision of new service roads. Where private accesses are not consolidated, left-in and left-out access will only be provided. Access to forestry trails to the north of this section 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 nearby grade separated interchanges would be provided via new service roads and the provision of overpasses or underpasses, linking existing local roads to the new service roads. The location of new service roads and overpasses or underpasses will be determined as part of the detailed investigations to be undertaken for the preferred route and during the concept design phase.

***Bus Access***

Under a Class A scenario, the provision of bus stops and access arrangements for buses would generally remain the same as existing. However, the provision of improved clear zones and possibly designated bus bays should improve the current situation. Under a Class M scenario, no bus stops would be provided on the upgraded highway, 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 scenario and banned under a Class M scenario. Cyclists would be permitted to use the left hand shoulder (2.5 metres wide) on the upgraded highway. 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 Kempsey Council and a review of relevant planning instruments, there are no plans for significant economic development in this section.

The preferred route may result in economic impacts to Kundabung Motor Inn and Kundabung Service Station as a result of changed access arrangements and possible loss of passing trade.

The preferred route would result in economic impacts through loss of productive lands within Maria River State Forest.

### 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 Telegraph Point and Kundabung. 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 grade-separated interchange in Section A, Section D and possibly Section B 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. Possible locations being investigated for a grade separated interchanges are in the vicinity of:

- Hastings River Drive and Blackmans Point Road in Section A;
- Haydons Wharf Road in Section B; and
- Kundabung Road in Section D.

**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 for the Pacific Highway within the Oxley Highway to Kempsey study area is 24.8 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.

**Rest Areas and Breakdown Bays**

Rest areas that cater for heavy vehicles currently exist opposite Smiths Creek road for southbound traffic and south of Maria Creek for northbound traffic. These rest stops would be either retained in their current locations or relocated as part of the upgrade. In any case, rest areas would most likely be upgraded to a larger facility than that currently provided. 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 may require approximately 57 hectares of land acquisition, potentially affecting 43 separate properties (lots).

***Property Impact – Description of Properties Affected***

Where the preferred route follows the existing highway alignment strip acquisition from rural and industrial properties would be required. This is likely to include strip acquisition from vacant land fronting, and owned by Expressway Spares.

North of Fernbank Creek, the preferred route deviates to the west of the existing highway and would require acquisition and severance of rural properties on both sides of the Hastings River. Acquisition of land within Cairncross State Forest and possibly Rawdon Creek Nature Reserve would also be required.

***Land Use – Residential***

Residential land use in this section is currently limited to scattered rural residential properties, and these would be affected to varying degrees as a result of strip acquisition where the preferred route follows the existing highway alignment, and greater acquisition where the preferred route deviates to the west of the existing highway alignment.

Proposed residential land use as part of Area 13 to the east of the existing highway, and proposed rural residential land uses to the west of the existing highway generally between the Oxley Highway and Sancrox Road, are not expected to be significantly affected by property acquisition.

***Land Use - Productive land***

The preferred route would involve some minor strip acquisition of rural land generally between the project start and Fernbank Creek. Thereafter the preferred route deviates to the west and would involve acquisition and severance of a number of rural properties on both the northern and southern sides of the Hastings River.

The preferred route would require acquisition and severance of Cairncross State Forest, including lands zoned by Forests NSW for production (zone 4), 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 possible that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette. It is noted that the preferred route would result in a portion of the state forest being landlocked between the alignment and the existing highway, and the ultimate area requiring acquisition could be greater subject to negotiations with Forests NSW.

Revocation of land within Rawdon Creek Nature Reserve, irrespective of the area involved, would require an Act of Parliament.

**Section B**

***Property Impact – Properties Affected***

The final alignment of the preferred route in the vicinity of Cairncross State Forest 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 84 to 95 hectares of land acquisition, potentially affecting 23 to 28 separate properties (lots).

***Property Impact – Description of Properties Affected***

Irrespective of the final alignment selected the preferred route would result in acquisition and severance of Cairncross State Forest and of rural properties north of the state forest through to the end of this section. The preferred route may also result in acquisition of the land on which Sharky's Skirmish is located within Cairncross State Forest. There are no expected requirements for property acquisition from Gean Custom Marine in Haydons Wharf Road.

***Land Use – Residential***

As a result of the deviation of the preferred route to the east of the residential areas of Telegraph Point, land use impacts would be limited to those rural residential properties located on the southern bank of the Wilson River (at its point of crossing) and those to the east of the existing highway generally between the Wilson River and Haydons Wharf Road.

***Land Use - Productive land***

The preferred route would affect a number of rural properties throughout this section. Those affected properties immediately adjacent to the banks of the Wilson River, are amongst those believed to contain potentially highly productive agricultural land in terms of unimproved value within the study area.

The preferred route may require acquisition of the western portion of a large tea tree plantation located immediately north of Cairncross State Forest.

This preferred route would require acquisition and severance of Cairncross State Forest. Potentially affected lands include those zoned by Forests NSW for special management (zone 2), production (zone 4), limited production (zone 3B), limited harvesting (zone 3A) and lands zoned for further assessment (zone 8).

If the preferred route alignment impacts on zone 2, revocation would require an Act of Parliament irrespective of the area involved. Otherwise depending on the presence of any special values within the areas requiring further assessment (zone 8) that may qualify these areas for classification as a special management zone it is possible that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette. It is noted that the preferred route could result in a portion of the state forest being landlocked between the alignment and the existing highway, and the ultimate area requiring acquisition could be greater subject to negotiations with Forests NSW.

**Section C**

***Property Impact – Properties Affected***

The preferred route may require approximately 15 hectares of land acquisition, potentially affecting 12 separate properties (lots).

***Property Impact – Description of Properties Affected***

Strip acquisition from Ballengarra State Forest would be required throughout this section. Subject to concept design there may be minor strip acquisition from Cooperabung Creek Nature Reserve.

***Land Use – Residential***

There are no expected significant land use impacts to rural residential properties as a result of the preferred route in this section.

***Land Use - Productive land***

There are no expected requirements for acquisition of productive rural lands.

The preferred route would require strip acquisition from Ballengarra State Forest, including lands zoned by Forests NSW for production (zone 4), 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 possible that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.

**Section D**

***Property Impact – Properties Affected***

The preferred route may require approximately 100 hectares of land acquisition, potentially affecting 56 separate properties (lots).

***Property impact – Description of Properties Affected***

The preferred route would involve strip acquisition of rural residential property along the Kundabung straight and would require acquisition from Maria River State Forest, and possibly very minor acquisition from Kalateenee State Forest, in the northern part of this section. Subject to concept design there are no expected requirements for acquisition from Kumbatine National Park.

***Land Use – Residential***

Residential and rural residential land use in this section is generally located along the existing highway around the village of Kundabung. It is expected that the preferred route would be predominantly contained within the existing highway reserve, with potential land use impacts expected to be limited to strip acquisitions.

***Land Use - Productive land***

Likely minor strip acquisition of rural properties generally fronting the existing highway. Land immediately adjacent to the banks of Pipers Creek and the Maria River are amongst those believed to have the potential for high agricultural productivity based on the soil types. However, the majority of this land is currently contained within the highway reserve, and therefore no significant impacts on land of high agricultural value is expected.

The preferred route would require acquisition from Maria River State Forest, including lands zoned by Forests NSW for production (zone 4), limited production (zone 3B), lands zoned for further assessment (zone 8) and land zoned for non-forestry use (zone 7) (electricity easement). Subject to concept design there may also be some minor strip acquisition from Kalateenee State Forest including zone 8 lands. 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 possible that the area required would be less than 20 ha, and that revocation could be effected by a notice in the Gazette.

### 9.5.4 Heritage

**Section A**

***Indigenous Heritage***

There are no known listed indigenous heritage items located within the vicinity of the preferred route. However, there are several Aboriginal sites listed on the Department of Environment and Conservation (NSW) Aboriginal Heritage Information Management System situated between approximately 200 and 300 metres to the west of the preferred route, south of the Hastings River. These include artefact scatters (DEC #30-3-194, 30-3-195, 30-3-210, 30-3-211 and 30-3-212) and a scarred tree (#30-3-162).

High potential for stone artefacts to occur, particularly in undisturbed ground and around water courses such as the Hastings River.

A ceremonial site is known to the local Aboriginal community west of the preferred route, around the hard rock quarry north of Sancrox Road. The general area on the northern and southern banks of the Hastings River is also an area of cultural sensitivity where battles between the Dunghutti and Birpai people were fought. The preferred route would traverse this area.

An unconfirmed possible artefact scatter is located in the vicinity of the preferred route just south of Cairncross State Forest and would require further investigation.

***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.

Dennis Bridge over the Hastings River was constructed in 1959 and would potentially be a heritage item after 2009.

**Section B**

***Indigenous Heritage***

One Aboriginal site (DEC #30-3-101, an artefact scatter) listed on the Department of Environment and Conservation (NSW) Aboriginal Heritage Information Management System is situated approximately 200 metres east of possible preferred route alignment. There is a high potential for stone artefacts to occur, particularly in undisturbed ground and around watercourses such as the Wilson River. The project team have also been advised of the potential for burials on Dalhunty Island and will require further consultation and investigations.

***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. Unidentified or unlisted heritage items may be present within or in close proximity of the preferred route, including wharfs and relics relating to the North Coast Railway.

**Section C**

***Indigenous Heritage***

There are no indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of the preferred route. There is a high potential for stone artefacts to occur, particularly in undisturbed ground and around watercourses such as Barrys Creek and Cooperabung Creek.

***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***

There are no indigenous heritage items listed on any Commonwealth, State or local heritage registers that occur within or in the immediate proximity of the preferred route. There is a high potential for stone artefacts to occur, particularly in undisturbed ground and around water courses such as Maria River, Pipers Creek, Smiths Creek and Barrys Creek.

The general area surrounding the Maria River has been identified as having possible cultural sensitivity. The preferred route would traverse 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 and transport.

The Maria River bridge, which is located on the northbound carriageway of the existing highway, has recently been assessed by the RTA as being of State heritage significance.

### 9.5.5 Visual Amenity

**Section A**

Other than the Hastings River floodplain, the gently undulating topography would largely result in a minimal requirement for cut and fill along the preferred route. Some areas of small cut and fill, and widening of the cleared vegetation corridor would result in some localised visual change, although the overall visual impact is likely to be limited.

At the southernmost part of the upgrade, the possible development of a residential and commercial development (known as Area 13), and to a lesser extent rural residential land to the west, would alter the visual character of this area so that any visual impacts of the widening of the highway may be reduced depending on the provision of suitable buffers in the development.

The preferred route would be elevated above the existing ground level as they approach the Hastings River, which is identified as one of the 16 key landmarks along the existing Pacific Highway. Road users are likely to experience similar expansive views as exist from the existing highway. This elevation would increase the prominence of the upgraded highway, however specific landscape measures and fill batter design would greatly influence the overall impact of the embankment.

The possible grade separated interchange would be likely to be a highly prominent feature, however its visual impact will depend on its location, design, and landscape treatments.

North of the Hastings River a new area of clearing would be created through the forested areas and be visually prominent. There are few views from beyond the highway corridor that would be subject to these visual impacts due to the enclosure provided by the surrounding forest, and moderate landform.

The preferred route creates a new river crossing at a location west of the existing highway bridge. The new bridges would be located to the west of a cluster of dwellings located on Glen Ewan Road. The visual effects of the addition of two bridges across the Hastings River would be in the loss of some riverside vegetation, as well as the increase in built structure in the vicinity. The bridges would be visually prominent, and there are likely to be cumulative visual impacts as it runs within view of the existing bridge. These impacts would also affect any viewpoints located to the east or west along the river and its banks.

**Section B**

Generally in the southern and northern parts of this section, the preferred route would result in some local visual impact associated with widening of the cleared corridor and cut and fill. However, there are few views from beyond the highway corridor that would appreciate these impacts due to the enclosure provided by the surrounding forest, and moderate landform.

At the Wilson River there would be a new visual disturbance associated with the bridge and approaches, as well as potential loss of riparian vegetation. Some glimpses of the river crossing would potentially occur from Telegraph Point, however it is not likely to be prominent from the village due to its distance and screening by vegetation in the foreground. Road users are likely to experience similar expansive views as exist from the existing highway.

Across the Wilson River floodplain the preferred route would result in a new visual disturbance in the landscape through which it passes, increasing the potential magnitude of its visual impact. However, the avoidance of bushland on the floodplain is likely to reduce this impact somewhat.

Beyond the Wilson River, the alignment continues almost due north, creating a new corridor through the mosaic of pastureland, woodland blocks, and rural residential properties. The moderate amount of cut and fill, and loss of vegetation sporadically through this area, would result in this alignment being visually prominent. There would however be few viewers in this area.

**Section C**

The preferred route passes through the relatively steep forested landscape around Cooperabung Hill. This area includes Ballengarra State Forest and Cooperabung Creek Nature Reserve. There would be clearing required along this length, and there would be a number of areas of cut created. This cut and fill would be a prominent feature on the landscape. It would also increase the width of clearing required. In particular, at the summit, this would increase the existing visual break in the ridgeline. This is likely to be visible from some distance, although it is not a major part of any distant, panoramic view to the range. There are low numbers of long-term viewers in this area, which would lessen the overall visual impact. The main source of views in this area would be road users. Southbound road users are likely to experience similar expansive views as exist from the existing highway.

**Section D**

The preferred route follows the existing highway adjacent to Kundabung. Intervening vegetation, distance, and the falling landform result in there being a very limited likelihood of any visual impact upon this village. The landscape is forested as the preferred route passes through Maria River State Forest. This alignment creates a new corridor of clearing through the state forest. This widening would create some local visual impact upon the landscape of the road corridor. Potential viewers would be limited mainly to highway users in this area.

### 9.5.6 Noise

**Section A**

The total number of potential receivers within 500 metres of the centreline of the existing highway is 63 and the total number of potential receivers within 500 metres of the possible centreline of the preferred route is 63. These potential receivers are located in the following distance bands:

- Existing highway – <100 metres (11), 100 metres to 200 metres (10), and 200 metres to 500 metres (42); and
- Preferred route – <100 metres (11), 100 metres to 200 metres (16), and 200 metres to 500 metres (36).

Potential receivers expected to be subject to the NSW Department of Environment and Conservation's (DEC) "Redeveloped Highway" criteria are 41. Potential receivers expected to be subject to the DEC "New Highway" criteria are 22.

The weighted noise impact (without mitigation) score for the existing highway in this section is 74 and the weighted noise impact (without mitigation) score for the preferred route is 86, indicating a slightly higher potential noise impact relative to the existing highway.

**Section B**

As the final alignment of the preferred route through the southern 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 widespread village of Telegraph Point. This community is comprised of residences generally located around Moorside Drive and Mooney Street south of the Wilson River, Rollands Plains Road / Cooperabung Drive immediately north of the Wilson River, and the northern end of Cooperabung Drive. There are also scattered rural residences throughout this section.

The identified preferred route corridor is located approximately 1.5 kilometres to the east the residences in Mooney Street and Rollands Plains Road / Cooperabung Drive, and as a result the potential noise environment is expected to improve relative to the existing highway. For those residents located in the northern end of Cooperabung Drive to the west of the existing highway, the preferred route corridor is marginally east of the existing highway and the overall noise environment may marginally improve.

With respect to those residences located in Moorside Drive (predominantly those at the eastern end) and for those scattered rural residences in the vicinity of the preferred route corridor (in particular those on the Wilson River floodplain and on the northern bank of the Wilson River), the overall noise environment is considered likely to worsen, as these receivers are now located substantially closer to the proposed alignment.

The weighted noise impact (without mitigation) score for the existing highway in this section is 292 and the weighted noise impact (without mitigation) score for the preferred route corridor is approximately 55 to 99, indicating a substantially lower potential noise impact relative to the existing highway. This is attributed to their easterly deviation around the main concentration of potential viewers in Telegraph Point.

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 at the eastern end of Moorside Drive and for rural residences on the northern and southern sides of the Wilson River in proximity to 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**

The total number of potential receivers within 500 metres of the centreline of the existing highway is 9 and the total number of potential receivers within 500 metres of the possible centreline of the preferred route is 9. These potential receivers are located in the following distance bands:

- Existing highway – <100 metres (1), 100 metres to 200 metres (7), and 200 metres to 500 metres (1); and
- Preferred route – <100 metres (2), 100 metres to 200 metres (6), and 200 metres to 500 metres (1).

All of the 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 12. and the weighted noise impact (without mitigation) score for the preferred route is 13, indicating a similar potential noise impact relative to the existing highway.

**Section D**

The total number of potential receivers within 500 metres of the centreline of the existing highway is 83 and the total number of potential receivers within 500 metres of the possible centreline of the preferred route is 83. These potential receivers are located in the following distance bands:

- Existing highway – <100 metres (11), 100 metres to 200 metres (25), and 200 metres to 500 metres (47); and
- Preferred route – <100 metres (12), 100 metres to 200 metres (26), and 200 metres to 500 metres (45).

Potential receivers expected to be subject to the NSW Department of Environment and Conservation's (DEC) "Redeveloped Highway" criteria are 64. Potential receivers expected to be subject to the DEC "New Highway" criteria are 19.

The weighted noise impact (without mitigation) score for the existing highway in this section is 100. and the weighted noise impact (without mitigation) score for the preferred route is 101, indicating a similar potential noise impact relative to the existing highway.

### 9.5.7 Ecology

**Section A**

***Wetlands***

There are no areas of SEPP 14 wetlands in this section. The preferred route traverses floodplain wetlands (estuarine and freshwater) surrounding Fernbank Creek and the Hastings River however, it avoids a number of large wetlands east of the existing highway.

***Native Flora***

*Conservation Estates and State Forests*

The preferred route would involve clearing to the west of the existing highway within Cairncross State Forest and possibly on the edge of Rawdon Creek Nature Reserve.

*Vegetation Communities*

Vegetation community mapping of vegetated areas has been undertaken from just south of Fernbank Creek through to the end of the section. To the south of this the identified vegetation communities are based on preliminary site inspections only.

Generally the preferred route traverse areas of native vegetation from the start of this section through to Fernbank Creek, then traverses predominantly open pasture with some wetland communities on the Hastings River floodplain, and reentering native vegetation to the north of the Hastings River within, and immediately south of Cairncross State Forest and Rawdon Creek Nature Reserve near the end of this section.

South of Fernbank Creek the predominant vegetation type appears to be Blackbutt / Stringybark Forest ranging from about 25 - 30 metres height, (variously with turpentine (*Syncarpia glomulifera*), bloodwood sp., white mahogany (*Eucalyptus acmenoides*) or the occasional tallowwood (*E.microcorys*). The forest is immature regrowth from past clearing. The understorey consists of various combinations of black she-oak (*Allocasuarina littoralis*), prickly-leaved paperbark (*Melaleuca styphelioides*), cheese trees (*Glochidion ferdinandi*) and *Callistemon* species.

In the vicinity of Fernbank Creek vegetation community mapping indicates the preferred route would traverse, generally along the existing highway alignment, the following vegetation communities: blackbutt – turpentine forest, swamp mahogany – broad-leaved paperbark forest; broad-leaved paperbark forest; and broad-leaved paperbark – swamp oak forest. Where the preferred route deviates to the west of the existing highway just south of Fernbank Creek it would take a new alignment through swamp mahogany – broad-leaved paperbark forest and broad-leaved paperbark forest.

Where the preferred route crosses the Hastings River and its floodplain the potential vegetation communities impacted are open pasture, freshwater and estuarine wetland areas and estuarine vegetation on the banks of the river.

Where the preferred route re-enters vegetated areas to the north of the Hastings River it would traverse the following vegetation communities: moist slopes forest; swamp forest – paperbark; open pasture with scattered trees; dry ridgetop forest and moist gully forest.

The approximate area of vegetation that may be cleared as a result of the preferred route is 58 hectares.

*Endangered Ecological Communities*

Based on the vegetation community mapping in this section the following endangered ecological communities listed under the TSC Act have been identified in the vicinity of the preferred route corridor:

- Fernbank Creek – freshwater wetlands, subtropical coastal floodplain forest and swamp schlerophyll forest; and
- Cairncross State Forest / Rawdon Creek Nature Reserve – a small area of swamp forest – paperbark vegetation community is considered likely to qualify as the EEC swamp sclerophyll forest on coastal floodplains. Some of the flatter gully bottoms with a permanent water course within the moist gully forest vegetation community could qualify for either the lowland rainforest on coastal floodplain or subtropical coastal floodplain forest EEC.

The approximate area of confirmed and potential endangered ecological communities that may be cleared as a result of the preferred route is 15 hectares.

*Threatened and Rare Species*

There are no database records of any sightings of threatened or rare flora species in the vicinity of the preferred route corridor.

Preliminary field investigations undertaken for this project identified one occurrence of the threatened species, *Acronychia littoralis*, in the vicinity of the preferred route corridor to the east of the existing highway just south of Fernbank Creek within the swamp mahogany – broad-leaved paperbark forest.

Based on the vegetation communities present the following threatened flora species have the potential to occur: *Melaleuca biconvexa, Maundia triglochinoides* (Maundia)*, Phaius tankervilliae* (Swamp Orchid) and *Phaius australis*. The rare aquatic flora species *Hydrocharis dubia* has the potential to be present in small shallow freshwater bodies or swamps.

***Native Fauna***

*Wildlife Corridors and Key Habitats*

The preferred route would involve widening of the existing cleared corridor through the Lake Innes Cowarra Subregional Corridor, and widening of existing cleared corridor on the edge of the Rawdon Creek Nature Reserve Regional Corridor.

The preferred route corridor traverses the edge of designated key habitat areas to the west of the existing highway, mainly associated with the wildlife corridors, Cairncross State Forest, Rawdon Creek Nature Reserve, and other areas associated with a tributary of Fernbank Creek. The preferred route may require some clearing on the edges of these areas.

*Fauna Habitats*

The preferred route generally follows the existing highway until Fernbank Creek before veering northwest through remnant swamp forest and floodplain wetland habitats, traverses the Hastings River floodplain and re-enters forested areas to the north of the river to the south of, and within Rawdon Creek Nature Reserve and Cairncross State Forest. The preferred route would remove, fragment or alter a number of habitats, which provide habitat for a number of threatened species.

In the vicinity of Fernbank Creek the preferred route would potentially impact the following fauna habitat units: eucalypt forest; swamp mahogany forest; paperbark forest; swamp forest; and deep water wetland. All of these fauna habitats have been identified as being of medium or high habitat quality due to the potential for presence of threatened and migratory species.

On the Hastings River floodplain the land is predominantly cleared with remnant mature trees. The pasture areas provide potential habitat for birds (e.g. osprey, square-tailed kite and black-necked stork), while remnant trees provide potential habitat for koalas, grey-headed flying-fox, hollow dependent insectivorous bats and birds. Farm dams with abundant aquatic vegetation within the private properties provide potential habitat for the green and golden bell frog, black-necked stork and comb-crested jacana.

South of Fernbank Creek, and north of the Hastings River where the preferred route re-enters vegetated areas to the north of the Hastings River it would traverse a range of vegetation communities that have been subject to variable levels of disturbance, particularly logging. As a result the vegetation communities provide variable habitat quality from medium to high.

*Threatened and Migratory Species*

The following threatened and migratory species have been recorded in the immediate vicinity of the preferred route: koala; masked owl; and black-necked stork.

There are no records of threatened aquatic species within the study area. Threatened aquatic fish species with potential to occur is the Oxleyan Pygmy Perch (*Nannoperca oxleyana*).

In the vicinity of Fernbank Creek the following threatened species have the potential to occur in the potentially affected habitat units:

- Eucalypt forest –good quality foraging habitat for masked owl, koala, microbats and spotted-tailed quoll. The presence of small to large hollows suggests that it has the potential to support squirrel glider although important winter flowering shrubs (i.e. Banksia spinulosa) were only recorded in low densities;
- Swamp mahogany forest –core koala habitat;
- Paperbark forest –good to moderate quality habitat for many threatened and migratory species, particularly in terms of foraging resources. However, this habitat is unlikely to offer potential roost or nesting habitat for these species. This area does however, provide good quality habitat for green-thighed frog, which was found only to be moderate to low in adjoining habitats;
- Swamp forest – good foraging opportunities for masked owl, koala and little bent-wing bat; and
- Deep water wetland – core habitat (foraging and nesting) for square-tailed kite and good to moderate quality habitat for black-necked stork, osprey and microbats.

South of Fernbank Creek, across the Hastings River floodplain, and north of the Hastings River where the preferred route re-enters forested areas it passes through potential habitat for a number of threatened species as listed below.

- The following threatened and migratory species have either medium to high potential to occur or the available habitat is preferred or good – glossy black cockatoo, black-necked stork, square-tailed kite, powerful owl, osprey, masked owl, squirrel glider, brush-tailed phascogale, koala, greater broad-nosed bat, little bent-wing bat, eastern bent-wing bat, east-coast freetail-bat, grey-headed flying-fox and green-thighed frog; and
- The following threatened and migratory species have either low potential to occur or the available habitat is marginal – brown treecreeper, barred cuckoo-shrike, painted honeyeater, brolga, comb-crested jacana, swift parrot, hooded robin, black-chinned honeyeater, barking owl, sooty owl, grass owl, regent honeyeater, spotted-tailed quoll, yellow-bellied glider, common planigale, eastern chestnut mouse, eastern false pipstrelle, golden-tipped bat, southern myotis, yellow-bellied sheathtail-bat, common blossom bat, wallum froglet, green and golden bell frog, stephens' banded snake and pale-headed snake.

**Section B**

***Wetlands***

The preferred route corridor traverses the edges of two separate areas of SEPP 14 wetland, located on Dalhunty Island and the adjacent northern bank of the Wilson River.

The Wilson River floodplain and riparian vegetation along the river contain a number of areas of both freshwater and estuarine wetlands. The preferred route would traverse some of these.

### *Native Flora*

*Conservation estates and state forests*

The preferred route is likely to result in a new cleared corridor through Cairncross State Forest and possible clearing on the edge of Rawdon Creek Nature Reserve.

*Vegetation Communities*

Vegetation mapping of key vegetated areas has been undertaken from the start of this section through to the northern bank of the Wilson River. North of the river the identified vegetation communities are based on preliminary site inspections only, with the exception of some further mapping that has been completed at the northern end of this section.

Generally the preferred route traverses areas of native vegetation within Cairncross State Forest and Rawdon Creek Nature Reserve in the southern part of this section and then traverses remnant vegetation, wetlands and open pasture through to the Wilson River. At the Wilson River crossing the preferred route traverses areas of riparian and estuarine vegetation before traversing remnant vegetation interspersed with open pasture through to the end of the section.

The mapped vegetation communities that would be potentially impacted by the preferred route are:

- Within Cairncross State Forest / Rawdon Creek Nature Reserve – moist slopes forest, moist floodplain forest, dry ridgetop forest, moist gully forest, swamp forest – swamp mahgany / paperbark and swamp forest – paperbark;
- Wilson River floodplain (south) –swamp mahogany – broad-leaved paperbark forest, swamp oak forest, wetland areas, open pasture, open pasture with scattered trees and broad-leaved paperbark – swamp oak forest; and
- Wilson River crossing – swamp oak riparian forest, mangrove forest, swamp oak swamp forest, eucalypt forest and wetland vegetation.

North of the Wilson River the potential vegetation communities that may be impacted appear to be predominantly dry forest areas with possibly wetter riparian vegetation along drainage lines, and areas of open pasture and open pasture with scattered trees.

At the northern end of this section mapped vegetation communities in the vicinity of the preferred route are open pasture (cleared) and open pasture with scattered trees, riparian forest, moist floodplain forest and moist gully forest

Subject to determination of 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 50 to 57 hectares of vegetation.

*Endangered Ecological Communities*

Based on the vegetation community mapping in this section the following endangered ecological communities listed under the TSC Act have been identified in the vicinity of the preferred route corridor:

- Cairncross State Forest / Rawdon Creek Nature Reserve – the swamp forest – swamp mahogany/paperbark and swamp forest - paperbark vegetation communities are considered likely to qualify as the EEC swamp sclerophyll forest on coastal floodplains. Some of the wetter parts of the moist floodplain forest vegetation community may qualify for the EEC subtropical coastal floodplain forest. Some of the flatter gully bottoms with a permanent water course within the moist gully forest vegetation community could qualify for either the lowland rainforest on coastal floodplain or subtropical coastal floodplain forest EEC;
- Wilson River floodplain – freshwater wetlands; swamp oak coastal floodplain forest; and swamp schlerophyll forest;
- Wilson River crossing – freshwater wetlands; swamp oak coastal floodplain forest; and subtropical floodplain forest or river-flat eucalypt forest; and
- Northern end – the riparian forest vegetation community is considered likely to qualify as the EEC subtropical coastal floodplain forest. Some of the wetter parts of the moist floodplain forest vegetation community may qualify for the EEC subtropical coastal floodplain forest. Some of the flatter gully bottoms with a permanent water course within the moist gully forest vegetation community could qualify for either the lowland rainforest on coastal floodplain or subtropical coastal floodplain forest EEC.

Subject to determination of the final alignment of the preferred route in this section the approximate area of confirmed and potential endangered ecological communities that may be cleared will vary. Subject to concept design the preferred route may require clearing of approximately 13 to 31 hectares of endangered ecological communities (confirmed and potential).

*Threatened and Rare Species*

There are no database records of any sightings of threatened or rare flora species in the vicinity of the preferred route corridor.

The preferred route corridor traverses areas of variable flora habitat quality on the floodplain and at its point of crossing the Wilson River. Most areas have been relatively highly disturbed by agriculture, although the large remnant patch of vegetation on the western edge of the preferred route corridor is highly undisturbed.

Preliminary field investigations undertaken for this project identified one occurrence of the threatened species, *Acronychia littoralis*, in the vicinity of the preferred route corridor within the swamp mahogany – broad-leaved paperbark forest on the Wilson River floodplain.

Threatened aquatic flora species with potential to occur are *Melaleuca biconvexa, Maundia triglochinoides* (Maundia)*, Phaius tankervilliae* (Swamp Orchid), *Cynanchum elegans* and *Phaius australis*. The rare aquatic flora species *Hydrocharis dubia* has the potential to be present in small shallow freshwater bodies or swamps.

### *Native Fauna*

*Wildlife Corridors and Key Habitats*

The preferred route would require widening of the existing cleared corridor along the edge of the Rawdon Creek Nature Reserve Regional Corridor.

The preferred route corridor traverses areas of designated key habitat areas to the east of the existing highway north of the Wilson River and within Cairncross State Forest and Rawdon Creek Nature Reserve.

*Fauna Habitats*

Within the forested areas in the south of this section, predominantly within Cairncross State Forest, and areas immediately north of the state forest, the preferred route corridor passes through eucalypt and swamp vegetation communities that provide known and potential habitat for threatened and migratory species. The more mature paperbarks within Cairncross State Forest could provide potential roost/nest habitat for gliders, insectivorous bats and hollow-dependent birds. Suitable seasonal foraging habitat is also available for the birds and insectivorous bats. The cleared vegetation north of the state forest contains scattered trees, some of which are large, mature and hollow-bearing. The scattered trees also potentially provide an important corridor linking the state forest with forest remnants to the north.

On the Wilson River floodplain the preferred route would potentially impact the following fauna habitat units: swamp mahogany / paperbark forest; swamp oak forest (without eucalypts); swamp oak forest (with eucalypts); and wetlands. All of these fauna habitats have been identified as being of medium or high habitat quality due to the potential for presence of threatened and migratory species.

At the Wilson River the preferred route would potentially impact the following fauna habitat units: swamp forest; swamp oak forest (with eucalypts); mangroves; eucalypt forest; and wetlands. All of these fauna habitats have been identified as being of medium or high habitat quality due to the potential for presence of threatened and migratory species.

North of the Wilson River a variety of habitats of differing quality are available including cleared areas, scattered trees, riparian forest and moist forests.

*Threatened and Migratory Species*

The following threatened and migratory species have been recorded in the immediate vicinity of the preferred route: koala.

There are no records of threatened aquatic species within the study area. Threatened aquatic fish species with potential to occur is the Oxleyan Pygmy Perch (*Nannoperca oxleyana*).

Within the forested areas in the south of this section, predominantly within Cairncross State Forest, and areas immediately north of the state forest, the preferred route corridor passes through potential habitat for a number of threatened species as listed below. Generally similar species are considered likely to occur in the forested and cleared areas in the northern part of this section.

- The following threatened and migratory species have either medium to high potential to occur or the available habitat is preferred or good – glossy black cockatoo, black-necked stork, square-tailed kite, powerful owl, osprey, masked owl, squirrel glider, koala, eastern false pipstrelle, greater broad-nosed bat, little bent-wing bat, eastern bent-wing bat, east-coast freetail-bat, yellow-bellied sheathtail-bat, grey-headed flying-fox and green-thighed frog; and
- The following threatened and migratory species have either low potential to occur or the available habitat is marginal – brown treecreeper, barred cuckoo-shrike, painted honeyeater, brolga, australasian bittern, black bittern, comb-crested jacana, swift parrot, black-breasted buzzard, hooded robin, black-chinned honeyeater, barking owl, australian painted snipe, sooty owl, grass owl, regent honeyeater, rufous bettong, spotted-tailed quoll, yellow-bellied glider, brush-tailed phascogale, common planigale, eastern chestnut mouse, golden-tipped bat, southern myotis, common blossom bat, wallum froglet, green and golden bell frog, stephens' banded snake and pale-headed snake.

On the Wilson River floodplain the following threatened species have the potential to occur in the potentially affected habitat units:

- Swamp mahogany / paperbark forest – core habitat for the squirrel glider, yellow-bellied glider and favoured foraging habitat for little bent-wing bat. This vegetation also provides good quality habitat for a range of other threatened species such as owls, glossy-black cockatoo, and spotted-tail quoll as it contained a more diverse understorey with large trees and hollows and ground debris;
- Swamp oak forest (without eucalypts) – good to moderate quality foraging habitat for a range of threatened bird and bat species. However, this habitat is unlikely to offer potential roosting or nesting habitat for these species as no hollows were recorded. This area would also be likely to provide moderate habitat for amphibians like wallum froglet and the green-thighed frog;
- Swamp oak forest (with eucalypts) – good to moderate quality habitat for a range of threatened species including masked owl, grass owl, spotted-tailed quoll, koala, grey-headed flying-fox, microbats, and wallum froglet. This habitat provides limited hollows for nesting and ground debris important for nesting and roosting; and
- Wetlands – good quality habitat for black-necked stork, large-footed myotis and provided expansive areas of potential grass owl habitat. Moderate quality habitat for eastern chestnut mouse, green and golden bell frog, green-thighed frog and square-tailed kite.

At the Wilson River following threatened species have the potential to occur in the potentially affected habitat units:

- Swamp forest – periodic habitat for amphibians during flooding. The open understorey provided good quality habitat for bush-stone curlew and adjacent grassy framing areas provided foraging habitat. Good foraging habitat for little bentwing-bat and large-footed myotis;
- Swamp oak forest (with eucalypts) – good quality habitat for osprey by providing large mature trees within which it can perch overlooking the river and forage from. It provides moderate quality foraging habitat for grey-headed flying-fox, little bentwing-bats and the pacific baza. This habitat provides a limited number of hollows given that much of the habitat was riparian roadside vegetation consisting of *Casuarina glauca* and paperbarks. This habitat provided flyways for microchiropteran bats and resting locations during flight;

- Mangroves –Dalhunty Island contains mature mangroves and periodically flooded pools provide habitat for birds, amphibians and flying mammals. This habitat is likely to provided moderate quality habitat for black-necked stork, bush-stone curlew and little bentwing-bat. The periodically flood pools provide foraging opportunities for black-neck stork and bush-stone curlew whilst the mature stands of mangroves provide flyways for microbats and small hollows for resting;
- Eucalypt forest – This habitat contains visible hollows, a potential owl stag and preferred koala feed trees. Positive identification of fresh Koala scats and scratches indicated that koala utilised this habitat. The presence of large mature trees provided foraging and nesting opportunities for the osprey and koala. This habitat also provides good quality habitat for the brown goshawk, squirrel glider and little bentwing-bat with abundant hollows, winter-flowering foraging resources and flyways. This habitat provides moderate quality habitat for an array of species including the pacific baza, regent honeyeater, masked owl, yellow-bellied glider and grey-headed flying-fox; and
- Wetlands –good quality habitat for the black-necked stork and moderate quality habitat for the magpie goose, little bentwing-bat and large-footed myotis. The wetland is likely to provide habitat for amphibians but has been degraded by current management practices.

**Section C**

***Wetlands***

The preferred route would traverse aquatic habitats associated with Barrys Creek and its tributaries, and a tributary of Pipers Creek, but subject to further investigation does not impact on known significant aquatic ecological habitats.

***Native Flora***

*Conservation Estates and State Forests*

The preferred route follows the existing highway alignment through Ballengarra State Forest and, for a short distance, along the edge of Cooperabung Creek Nature Reserve. The preferred route is likely to require clearing within Ballengarra State Forest but is not expected to require any clearing within Cooperabung Creek Nature Reserve.

*Vegetation Communities*

Vegetation mapping of the preferred route corridor has been undertaken for the entire length of this section. Based on this mapping the vegetation communities potentially impacted by the preferred route are: open pasture with scattered trees; open pasture (cleared); moist slopes forest; moist gully forest; dry ridgetop forest; rainforest; and riparian forest.

The approximate area of vegetation that may be cleared as a result of the preferred route is 38 hectares.

*Endangered Ecological Communities*

Based on the vegetation community mapping in this section the following endangered ecological communities listed under the TSC Act have been identified in the vicinity of the preferred route corridor:

- The riparian forest vegetation community is considered likely to qualify as the EEC subtropical coastal floodplain forest;

- The rainforest vegetation community is considered likely to qualify as the EEC lowland rainforest on coastal floodplain; and
- Some of the flatter gully bottoms with a permanent water course within the moist gully forest vegetation community could qualify for either the lowland rainforest on coastal floodplain or subtropical coastal floodplain forest EEC.

The approximate area of confirmed and potential endangered ecological communities that may be cleared as a result of the preferred route is 18 hectares.

*Threatened and Rare Species*

There are no database records of any sightings of threatened or rare flora species in the vicinity of the preferred route corridor.

The threatened grass *Arthraxon hispidus* and the rainforest tree scented acronycchia (*Acronychia littoralis*) could occur in rainforest areas.

Threatened aquatic flora species with potential to occur are *Melaleuca biconvexa, Maundia triglochinoides* (Maundia)*, Phaius tankervilliae* (Swamp Orchid) and *Phaius australis*. The rare aquatic flora species *Hydrocharis dubia* has the potential to be present in small shallow freshwater bodies or swamps.

***Native Fauna***

*Wildlife Corridors and Key Habitats*

The preferred route may require widening of the existing cleared corridor along the edge of the Cooperabung Creek Nature Reserve Regional Corridor. Areas of designated key habitat are generally located throughout this section associated with the wildlife corridor, Ballengarra State Forest and Cooperabung Creek Nature Reserve.

*Fauna Habitats*

The preferred route follows the existing highway alignment and potentially affects a range of habitat quality for threatened species. The majority of habitat is relatively undisturbed apart from agricultural areas in the southern parts. No recent logging is evident within Ballengarra State Forest. The majority of the available habitats were identified as medium quality. The moist and riparian forest along Barrys Creek Gully with rainforest elements provides was identified to provide high quality habitat for the koala and other threatened fauna, particularly forest owls, arboreal mammals and bats.

*Threatened and Migratory Species*

The following threatened and migratory species have been recorded in the immediate vicinity of the preferred route: koala, osprey and square-tailed kite.

There are no records of threatened aquatic species within the study area. Threatened aquatic fish species with potential to occur is the Oxleyan Pygmy Perch (*Nannoperca oxleyana*).

The preferred route passes through potential habitat for a number of threatened species as listed below.

- The following threatened and migratory species have either medium to high potential to occur or the available habitat is preferred or good – glossy black cockatoo, square-tailed kite, powerful owl, masked owl, yellow-bellied glider, squirrel glider, brush-tailed phascogale, koala, greater broad-nosed bat, golden-tipped bat, little bent-wing bat, eastern bent-wing bat, east-coast freetail-bat, grey-headed flying-fox and stephens' banded snake; and
- The following threatened and migratory species have either low potential to occur or the available habitat is marginal – brown treecreeper, barred cuckoo-shrike, painted honeyeater, swift parrot, hooded robin, black-chinned honeyeater, barking owl, marbled frogmouth, osprey, wompoo fruit-dove, rose-crowned fruit-dove, superb fruit-dove, sooty owl, regent honeyeater, rufous bettong, spotted-tailed quoll, common planigale, large-eared pied bat, eastern false pipstrelle, southern myotis, yellow-bellied sheathtail-bat, common blossom bat, green and golden bell frog, green-thighed frog, giant barred frog, stuttering frog and pale-headed snake.

**Section D**

***Wetlands***

The preferred route would traverse aquatic habitats associated with Barrys Creek, Pipers Creek, Smiths Creek, Maria River and their associated tributaries, but subject to further investigation does not impact on known significant aquatic ecological habitats.

***Native Flora***

*Conservation estates and state forests*

Kumbatine National Park adjoins the existing highway road reserve on the western side. The preferred route is not expected to require any clearing within the national park. The preferred route would require clearing within Maria River State Forest to the east of the existing highway. Kalateenee State Forest adjoins the existing highway in the north western corner of the study area and may be subject to some minor clearing as a result of the preferred route.

*Vegetation Communities*

The preferred route generally follows the existing highway alignment for the majority of this section and passes through patches of native vegetation interspersed with open pasture (both totally cleared and with scattered trees). At the northern end of the section within the heavily vegetated Maria River State Forest, the preferred route takes a slight easterly deviation. Within the state forest the predominant vegetation type appears to be regrowth red bloodwood/ blackbutt/ turpentine forest.

The approximate area of vegetation that may be cleared as a result of the preferred route is 76 hectares.

*Endangered Ecological Communities*

Vegetation community mapping has not been undertaken in this section to date. The mapping undertaken in Section C did identify the following vegetation communities and EEC (potential and confirmed) at the southern end of Section D in the vicinity of the preferred route corridor:

- An area of riparian forest vegetation community to the east of the existing highway is considered likely to qualify as the EEC subtropical coastal floodplain forest; and

- An area of moist gully forest vegetation community to the west of the existing highway of which, some of the flatter gully bottoms with a permanent water course could qualify for either the lowland rainforest on coastal floodplain or subtropical coastal floodplain forest EEC.

In this vicinity only, the approximate area of confirmed and potential endangered ecological communities that may be cleared as a result of the preferred route is 2 hectares. In all other parts of Section D there are no known endangered ecological communities subject to further investigations.

*Threatened and Rare Species*

There are no database records of any sightings of threatened or rare flora species in the vicinity of the preferred route corridor.

Threatened aquatic flora species with potential to occur are *Melaleuca biconvexa, Maundia triglochinoides* (Maundia)*, Phaius tankervilliae* (Swamp Orchid) and *Phaius australis*. The rare aquatic flora species *Hydrocharis dubia* has the potential to be present in small shallow freshwater bodies or swamps.

***Native Fauna***

*Wildlife Corridors and Key Habitats*

The preferred route traverses four wildlife corridors in this section and would involve widening of the existing cleared corridor through the Kundabung Subregional Corridor, Ballengarra – Maria River Regional Corridor and Maria Link Regional Corridor, and is likely to result in creation of a new cleared corridor through the Maria River State Forest Regional Corridor.

The preferred route traverses, along the existing highway alignment, a medium-sized key habitat area between the northern boundary of Ballengarra State Forest and Smiths Creek. Other designated key habitat areas associated with Pipers Creek and its tributaries and Maria River State Forest would be affected towards the northern end of the section.

*Fauna Habitats*

The predominant vegetation type through which the preferred route passes in the Maria River State Forest is red bloodwood/blackbutt/turpentine forest, which is mostly thin regrowth and heavily disturbed. To the south of the state forest, the patches of remnant forest and remnant trees occur in otherwise cleared farmland. There are individual mature habitat trees in paddocks and remnant strips of roadside trees and shrubs. The preferred route crosses several creeks but does not impact on known significant aquatic ecological habitats.

*Threatened and Migratory Species*

Koala is the only threatened fauna species that has been recorded within the immediate vicinity of the preferred route. Based on the habitat types present it is possible that the following additional threatened species could be present: glossy black cockatoo; painted honeyeater; square-tailed kite; masked owl; sooty owl; powerful owl; brush-tailed phascogale; spotted-tailed quoll; grey-headed flying-fox; little bent-wing bat; eastern bent-wing bat; and green-thighed frog.

There are no records of threatened aquatic species within the study area. Threatened aquatic fish species with potential to occur is the Oxleyan Pygmy Perch (*Nannoperca oxleyana*).

### 9.5.8 Geotechnical Considerations

**Topography**

Given the linear nature of the study area, the description of the study area topography provided in Section 3.9 was generally common to all of the short listed route options considered and is applicable to the preferred route.

**Geology**

Given the linear nature of the study area, the description of the study area geology provided in Section 3.9 was generally common to all of the short listed route options considered and is applicable to the preferred route.

**Soils**

The major issues relating to soils within the preferred route corridor is the localised presence of potential acid sulphate soils and soft soils located within the Hastings and Wilson River floodplains. 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.

**Soft Soils**

The preferred route traverses the Hastings River floodplain over a length of approximately 1.8 km. This includes soft soil deposits of up to 15m thick to a depth in the vicinity of the existing river alignment of up to 20m below existing surface levels, with bedrock located up to 26m below surface. The Wilson River floodplain is traversed over a length of approximately 3.5 km with a depth of alluvium of up to 24m, containing predominately over consolidated soils with near surface soft soils, generally varying in depth from 2m up to 8m adjacent to the existing river alignment.

The future highway crossing of the Hastings and Wilson river floodplains are likely to require embankments of up 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.

At the Hastings River floodplain, soft soil treatments could include preload embankments, wick drains, timber piles and/or stone columns or any combination of the above. The soft soils at the Wilson River are typically shallower than that encountered at the Hastings River, and should be adequately catered for by preload treatment with wick drains. Some localised timber piling may be required for higher embankments, for example at bridge approaches. The assessment of the suitability of these treatments to the prevailing conditions within these floodplains 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 following areas were identified from acid sulphate risk maps as having a risk of encountering acid sulphate soils – Partridge Creek, Fernbank Creek to Hastings River, Blackmans Point Road to Bill Hill Road, Wilson River Floodplain, Cooperabung Creek, Smiths Creek and Pipers Creek. 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

The southern length (south from the Wilson River), and the northern length of the preferred route (north from Mingaletta Road), 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, 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 Cooperabung Range. This steep topography will necessitate several deep rock cuttings along the preferred route. The structural geology of the Cooperabung Range is dominated by the presence of a regional east-southeast trending anticline. This feature has generated locally highly deformed and weathered rock strata and varying structural jointing within the stronger rock units of Cooperabung Range. The design of the preferred route rock cuttings will need to consider the interaction of the structural geology and cutting orientation to optimise cut batter design, whilst also ensuring the design incorporates appropriate measures for future rock cutting maintenance.

## 9.5.9 Hydrology and Flooding

The existing major bridge crossings at Wilson River and Hastings River are not flood affected for events up to the Probable Maximum Flood (PMF) magnitude. With an appropriate selection of the waterway area for the new crossings at these locations there will be a minimal impact on flood levels. The final location and form of the bridges would be dependent on the selection of a preferred route.

As part of the design development for the preferred route there will be a review of potential inundation impacts on the floodplain of the Wilson and Hastings Rivers. The investigation will be used to identify any potential floodplain impacts that could be caused by either the location of structures or the size of the structures. The impacts could be either changed inundation depths, change inundation frequency or changed duration of inundation. Downstream of the proposed alignment on the Wilson River floodplain there are drains that appear to have been constructed to enhance the local drainage. A detailed investigation is planned for the portion of the study area to demonstrate any impacts and to assist in the design of any mitigation measures.

The proposed lesser crossings of the new alignment of the Pacific Highway will be made flood free, to at least the 100 year ARI standard, at the Maria River, Piper's Creek, Cooperabung Creek, and Smith's Creek. With appropriate sizing there will be minimal flooding impacts from these structures.

Approximately 100 minor structures (either new culverts or extensions to existing culverts) will 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.

### 9.5.10 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.

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

**Section A**

***Telecommunications***

No optic fibre requires relocation, however a total of three road crossings would require protection. These are located at:

- Sancrox Road; and
- Two crossings approximately 500 metres north of the Hastings River.

***Electricity***

The following electricity utility infrastructure may require adjustment:

- Overhead 33kV powerlines cross Pacific Highway approximately 750 metres south of the intersection of Pacific Highway and Sancrox / Fernbank Creek Road. These may also require road protection;
- Overhead 11kV powerlines, pole mounted substation, and some underground low voltage power supply provided adjacent to Sancrox Road;
- Overhead 11kV powerlines that cross the highway at the intersection of the Pacific Highway and Fernbank Creek Road; and
- An 11kV overhead service crosses the alignment near the south bank of the Hastings River.

***Water***

Approximately 60 metres of 150mm water main passes under the Pacific Highway at the intersection with Sancrox / Fernbank Creek Roads and may require relocation.

***Sewerage***

Port Macquarie - Hastings Council is currently undertaking a West Port Macquarie Effluent Strategy, which would connect Port Macquarie with Wauchope. This would involve the sewer crossing the highway at either Oxley Highway or Fernbank Creek Road.

**Section B**

***Telecommunications***

Telstra and Visonstream optic fibre adjacent to the route approximately two kilometres south of Wilson River may require relocation. These areas are located approximately.

A total of eight road crossings may also require protection. These are located at:

- Bill Hill Road;
- Immediately south of Wilson River;
- Two crossings immediately north of Wilson River;
- Two crossings approximately one kilometre north of the Wilson River; and
- Two crossings approximately 650 m south of the limit of Section B.

***Electricity***

The following power lines may require relocation:

- Approximately 8.3 km north of Blackmans Point Road two 66kV poles may need to be relocated and road protection installed;
- Approximately 9.0 km north of Blackmans Point Road five 11kV poles and one 11kV pole mounted substation may need to be relocated; and
- Approximately 10.3 km north of Blackmans Point Road three LV poles and one substation may need to be relocated.

***Water***

No impacts.

***Sewerage***

No impacts.

**Section C**

***Telecommunications***

Telstra optic fibre runs on the eastern side of the Pacific Highway up to Cooperabung Drive (North). Approximately 100 metres may need to be relocated.

***Electricity***

Within the first 800 metres of the section, four 11kV poles, two pole mounted substations and one LV pole may require relocation.

***Water***

No impact.

***Sewerage***

No impact.

**Section D**

***Telecommunications***

A total of approximately 1.7 km of optic fibre may require relocation. These areas are located at:

- 20 to 500 metres north of Ravensworth Road (southern intersection); and
- 4.3 to 3.1 km south of Maria River.

A total of four road crossings may require protection. These are located at:

- Dual crossing at Kundabung Road;
- 230 metres south of Ravensworth Road (southern intersection);
- 640 metres north of Ravensworth Road (southern intersection); and
- 3.1 km south of Maria River.

***Electricity***

The following power lines may require relocation:

- Transgrid 132 kV crosses the Pacific Highway 400 metres south of Wharf Road intersection. Two poles may be relocated and road protection may need to be installed;
- Overhead 11kV powerlines cross the Pacific Highway in the vicinity of Smiths Creek. Two poles and one pole mounted substation to be relocated;
- Overhead 11kV powerlines cross the Pacific Highway at the intersection of the Pacific Highway and Wharf Road. Two poles may need to be relocated;
- Approximately 2.8 km north of Mingaletta Road two 11kV poles to be relocated;
- Overhead 11kV powerlines cross the Pacific Highway at the intersection of the Pacific Highway and Smiths Creek Road/ Kundabung Road. Two poles and one pole mounted substation may need to be relocated;
- At Pipers Creek two 11kV poles may need to be relocated;
- Approximately 300 metres north of Pipers Creek three 11kV poles may need to be relocated;
- Approximately 400 metres north of Ravensworth Road (southern intersection) two 11kV poles may need to be relocated;
- Approximately 5.8 to 8.0 km north of Mingaletta Road twenty 11kV poles and three 11kV pole mounted substations may need to be relocated; and
- Approximately 6.0 km north of Mingaletta Road a voltage regulator may need to be relocated.

***Water***

No impact.

***Sewerage***

No impact.

## 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 and Class M 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 estimates have evolved and increased in accuracy as a result of further investigations carried out as an outcome of the Value Management Workshop.

The strategic cost estimate has been developed in accordance with RTA's document *"Project Management Guidelines Estimating, Scope and Cost Control for Development Projects".* The project cost is divided 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 facility.

### 9.6.2 Scope Definition

This section provides a summary of the of the major work elements for the development of the Oxley Highway to Kempsey Upgrade Project. The scope of the project would vary depending on whether the Class A or Class M upgrade scenario is adopted. The scope has been defined for the following upgrade scenarios:

- Class A upgrade scenario
- Class M upgrade scenario

The scope of these scenarios is provided in Tables 9.3 and 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 | Section C | Section D | Total |
|---|---|---|---|---|---|
| Starting Point | 700m north of Oxley Highway | Blackmans Point Road | Cooperabung Drive | Mingaletta Road | 700m north of Oxley Highway |
| Finishing Point | Blackmans Point Road | Cooperabung Drive | Mingaletta Road | Maria River | Maria River |
| Length (km) | 8.2 | 11.3 | 5.3 | 11.9 | 36.7 |
| Clearing (ha) | 58 | 57 | 38 | 76 | 229 |
| Noise walls | In vicinity of Glen Ewan Road | In vicinity of Moorside Drive and Haydons Wharf Road | nil | In vicinity of Kundabung | |
| Pavement ($m^2$) | 172,200 | 237,300 | 111,300 | 249,900 | 770,700 |
| Number of Minor Bridges | 6 | 7 | 0 | 1 | 14 |
| Major Bridges (m) | 120 | 88 | 0 | 0 | 208 |
| No. of Local and Access Road at grade intersections | 0 | 2 | 2 | 7 | 11 |
| No. of Local and Access Road Closures | 2 | 0 | 0 | 0 | 2 |
| Realigned Local and New Service Roads (km) | 6.4 | 3.2 | 0 | 0 | 9.6 |

**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 | Section C | Section D | Total |
|---|---|---|---|---|---|
| Starting Point | 700m north of Oxley Highway | Blackmans Point Road | Cooperabung Drive | Mingaletta Road | 700m north of Oxley Highway |
| Finishing Point | Blackmans Point Road | Cooperabung Drive | Mingaletta Road | Maria River | Maria River |
| Length (km) | 8.2 | 11.3 | 5.3 | 11.9 | 36.7 |
| Clearing (ha) | 58 | 57 | 38 | 76 | 229 |
| Noise walls | In vicinity of Glen Ewan Road | In vicinity of Moorside Drive and Haydons Wharf Road | nil | In vicinity of Kundabung | |
| Pavement ($m^2$) | 172,200 | 237,300 | 111,300 | 249,900 | 770,700 |
| Minor Bridges ($m^2$) | 6 | 7 | 3 | 15 | 31 |
| Major Bridges ($m^2$) | 120 | 88 | 0 | 0 | 208 |
| No. of Local and Access Road grade separated interchanges[1] | 1 | 1 | 0 | 0 | 2 |
| No. of Local and Access Road Closures | Subject to further investigations following determination of final alignment | | | | |
| Realigned Local and New Service Roads (km) | 7.1 | 5.2 | 5.3 | 10.6 | 28.2 |

Note 1 Location of Grade Separated Interchanges will be confirmed following the determination of a final alignment. The final locations may be in different project sections than indicated in Table 9.4.

### 9.6.3 Project Cost 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 is used for this project for the preferred route.

**Table 9.5 Class A Strategic Cost Estimate for the Preferred Route**

| Estimate Cost Item | Section Costs (2006 dollars) including contingency (000)'s | | | | Total |
|---|---|---|---|---|---|
| | A | B | C | D | |
| Project Development | $3,366 | $3,556 | $999 | $2,107 | $10,028 |
| Investigation and Design | $8,414 | $8,891 | $2,497 | $5,268 | $25,070 |
| Property Acquisition | $6,705 | $14,552 | $1,432 | $3,017 | $25,706 |
| Public Utility Adjustments | $1,427 | $4,448 | $140 | $4,406 | $10,421 |
| General Provisions | $6,232 | $3,456 | $1,713 | $4,002 | $15,403 |
| Control of Erosion and Sedimentation | $735 | $1,005 | $480 | $1,052 | $3,272 |
| Drainage | $8,889 | $12,755 | $5,856 | $12,581 | $40,081 |
| Earthworks | $28,590 | $44,121 | $6,293 | $11,385 | $90,388 |
| Bridges | $44,578 | $63,458 | $0 | $4,356 | $112,393 |
| Pavements | $20,034 | $27,520 | $10,275 | $22,387 | $80,216 |
| Roadside Improvements | $4,704 | $5,249 | $1,965 | $3,114 | $15,062 |
| Miscellaneous Items | $1,503 | $2,109 | $960 | $2,114 | $6,686 |
| Project Specific Adjustments [1] | $40,161 | $10,789 | $16,749 | $32,370 | $100,182 |
| Project Management Services | $4,531 | $5,058 | $1,344 | $2,837 | $13,770 |
| Principal Arranged Insurance | $1,510 | $1,686 | $448 | $946 | $4,590 |
| Client Representation | $407 | $455 | $121 | $255 | $1,238 |
| Handover | $180 | $504 | $425 | $461 | $1,570 |
| **Total Cost of Section** | **$181,964** | **$209,611** | **$51,666** | **$112,620** | **$555,861** |
| **Total (Rounded) Cost of Section** | **$180,000** | **$210,000** | **$50,000** | **$115,000** | **$555,000** |

Note 1 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 (2006 dollars) including contingency (000)'s | | | | Total |
|---|---|---|---|---|---|
| | A | B | C | D | |
| Project Development | $3,640 | $3,556 | $1,291 | $2,609 | $11,097 |
| Investigation and Design | $9,100 | $8,891 | $3,227 | $6,523 | $27,741 |
| Property Acquisition | $6,705 | $14,552 | $1,432 | $3,017 | $25,706 |
| Public Utility Adjustments | $1,427 | $4,448 | $140 | $4,406 | $10,421 |
| General Provisions | $6,290 | $3,456 | $1,950 | $1,521 | $13,217 |
| Control of Erosion and Sedimentation | $735 | $1,005 | $489 | $1,009 | $3,238 |
| Drainage | $8,889 | $12,755 | $5,856 | $12,110 | $39,609 |
| Earthworks | $28,590 | $44,121 | $6,572 | $11,529 | $90,812 |
| Bridges | $43,871 | $63,458 | $721 | $8,849 | $116,899 |
| Pavements | $20,034 | $27,520 | $9,873 | $22,971 | $80,397 |
| Roadside Improvements | $4,704 | $5,249 | $1,902 | $3,544 | $15,399 |
| Miscellaneous Items | $1,503 | $2,109 | $968 | $2,023 | $6,602 |
| Project Specific Adjustments | $51,194 | $28,220 | $29,193 | $52,134 | $160,741 |
| Project Management Services | $4,901 | $5,590 | $1,738 | $3,512 | $15,741 |
| Principal Arranged Insurance | $1,634 | $1,863 | $579 | $1,171 | $5,247 |
| Client Representation | $441 | $503 | $156 | $316 | $1,416 |
| Handover | $673 | $2,094 | $538 | $1,336 | $4,640 |
| **Total Cost of Section** | **$194,328** | **$229,389** | **$66,624** | **$138,578** | **$628,919** |
| **Total (Rounded) Cost of Section** | **$195,000** | **$230,000** | **$65,000** | **$140,000** | **$630,000** |

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

**Table 9.7 Strategic Cost Estimate Summary for the Preferred Route**

| | Total Cost ($ Million) | | Cost per km ($ Million) | |
|---|---|---|---|---|
| **Section** | **Class A** | **Class M** | **Class A** | **Class M** |
| A[1] | 180 | 195 | 22.0 | 23.8 |
| B[1] | 210 | 230 | 18.6 | 20.3 |
| C[1] | 50 | 65 | 9.8 | 12.6 |
| D[1] | 115 | 140 | 9.5 | 11.7 |
| Total | 555 | 630 | 15.1 | 17.2 |

Note 1 – total cost rounded to nearest $5m

The cost estimates in Tables 9.5, 9.6 and 9.7 may change subject to determination of the final alignment in Section B and the final location of grade separated interchanges. The total cost should not change significantly as a result.

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

- Twin bridges over Fernbank Creek;
- Twin bridges (major) over the Hastings River;
- Twin bridges (major) over the Wilson's River;
- Twin bridges over the North Coast Railway;
- Construction over soft soils at the Hastings River and Wilson's River floodplains;
- A number of at grade intersection treatments throughout the project for the class A upgrade scenario;
- Two grade separated interchanges for the class M upgrade scenario;
- Major rock cuttings through Cooperabung Hill;
- Construction of a number of overpasses and underpasses for the class M upgrade scenario;
- Twin bridges over Cooperabung, Pipers, and Smiths Creeks and Maria River; and
- Major property acquisition from Fernbank Creek to Haydons Wharf Road due to the realignment of highway.

# 10. The Next Steps

## 10.1 Oxley Highway to Kempsey Upgrade

Following the announcement of the preferred route for the Oxley Highway to Kempsey project the RTA will submit the concept design of the Preferred Route to the Department of Planning (DoP) for 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.

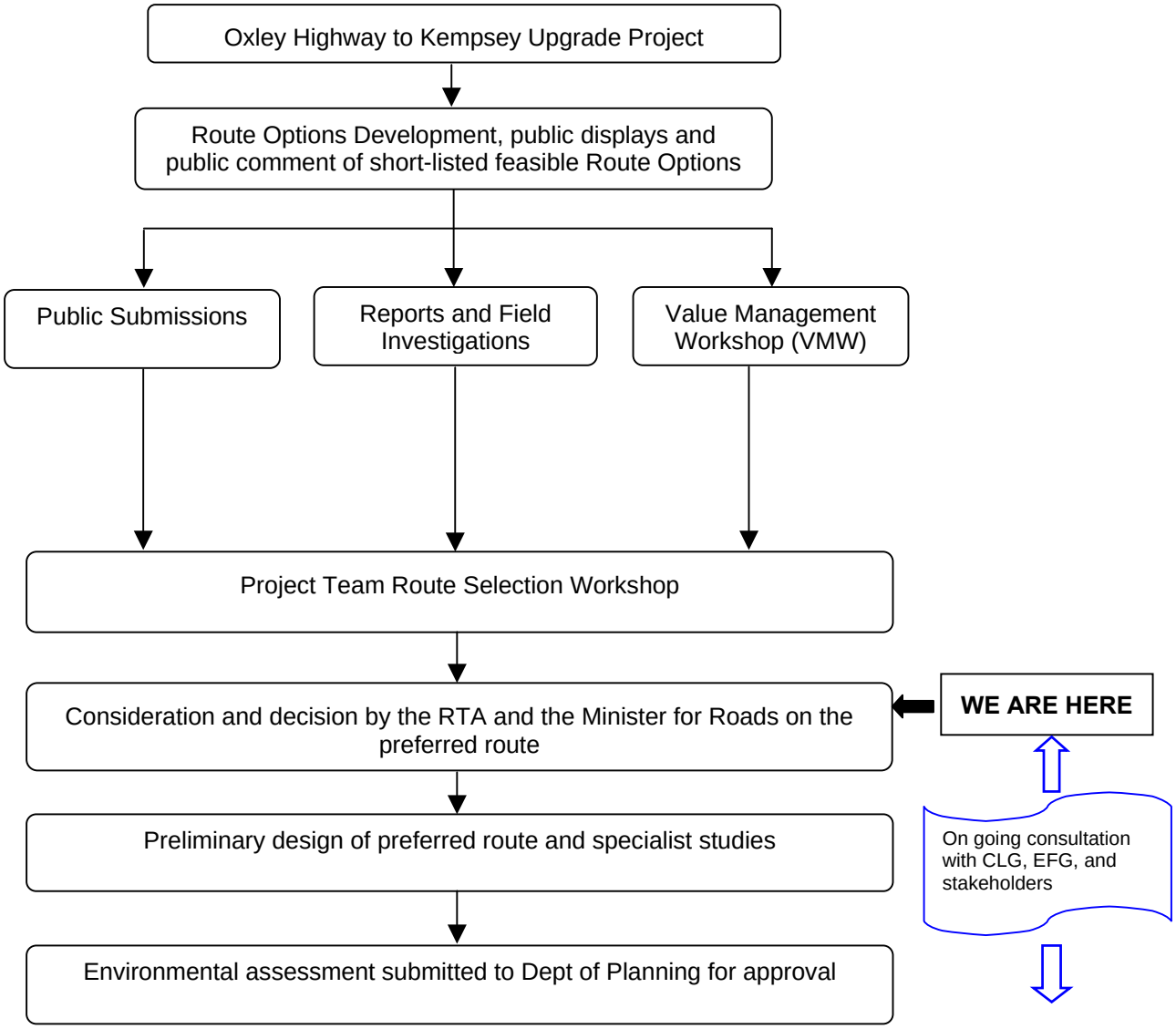
The level or scope of environmental assessment (EA) required for a proposal under Part 3A would be determined by the Director-General of Planning, who issues the EA requirements after consultation with relevant public authorities and local Councils. The EA may include a statement of commitments in respect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

**Figure 10.1 Option Development Process and the Next Steps**



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