

6. Preferred concept design

This section provides an overview to the development of the Iluka Road to Woodburn project to meet a Class A standard. It outlines construction issues affecting the design development and presents an overall preferred concept with these issues and requirements in consideration. It also provides a preliminary indication of a possible design layout for a Class M scenario.

6.1 Approach to preferred concept design development

At an early stage in the Iluka Road to Woodburn project it was identified that a limited study area would meet the objectives of the highway upgrade. With other Pacific Highway upgrade projects, several options were able to be investigated to identify the best solution for road users, communities and the environment while meeting the functional project objectives. In the case of the Iluka Road to Woodburn upgrade however, the existing road passes through no built-up areas. The surrounding areas provide limited scope for reasonable improvement in alignment without detrimental effect to private property and the environment and an alternative route would not necessarily have delivered any substantial travel time savings. As such, the approach to the concept design development was to duplicate the existing highway adjacent to the existing highway where possible. The development of the preferred concept design to date has comprised the key stages as detailed below.

6.2 Class A and Class M

The Iluka Road to Woodburn Pacific Highway upgrade preferred concept design comprises a Class A road that is capable of being upgraded in the future to a Class M road. These are defined as:

- Arterial road style (referred to as Class A) — two lanes in each direction (median width to accommodate future upgrading to three lanes in each direction), 100 km per hour posted speed, limited access condition roadway with at grade intersections. This may include intersections where right turn movements are permissible. Under a Class A scenario, local traffic and through traffic would continue to share the highway.
- Motorway style (referred to as Class M) — two lanes in each direction (median width to accommodate future upgrading to three lanes in each direction), 110 km per hour posted speed, controlled access condition roadway with grade-separated interchange access, and a continuous alternative route. If warranted by future traffic growth, the Class M upgrade may include widening within the median to six lanes (three in each direction).

The proposed upgrade of the Pacific Highway between Iluka Road and Woodburn is being approached as a Class A upgrade. However, in carrying out the investigations for the project, the study team has also considered how the proposed concept design might be upgraded to Class M, and what this would entail in terms of the wider road footprint and associated property impacts.

It is not possible to anticipate when the Iluka Road to Woodburn section of the Pacific Highway might be upgraded to Class M. However, planning is important at this stage of the project so that in the event of a possible future Class M upgrade it can be achieved with minimal disruption to property owners and highway operation. The planning and design for the Class A concept seeks to minimise the need for further reconstruction of large sections of new highway, should the Class M strategy be implemented, thus, without further disruption or uncertainty for private landowners.

6.3 Overview of existing conditions and proposed improvements

Substantial lengths of the Pacific Highway between Iluka Road and Woodburn are suitable for reconstruction to a 110 km/h design speed dual carriageway. This potentially facilitates straightforward duplication of the highway on its current alignment, either to the east or west of the existing carriageway. However, there remain a number of locations where the existing alignment is of a relatively poor standard and duplication would not be feasible. These locations are shown in **Figure 6.1**.

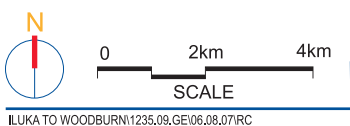
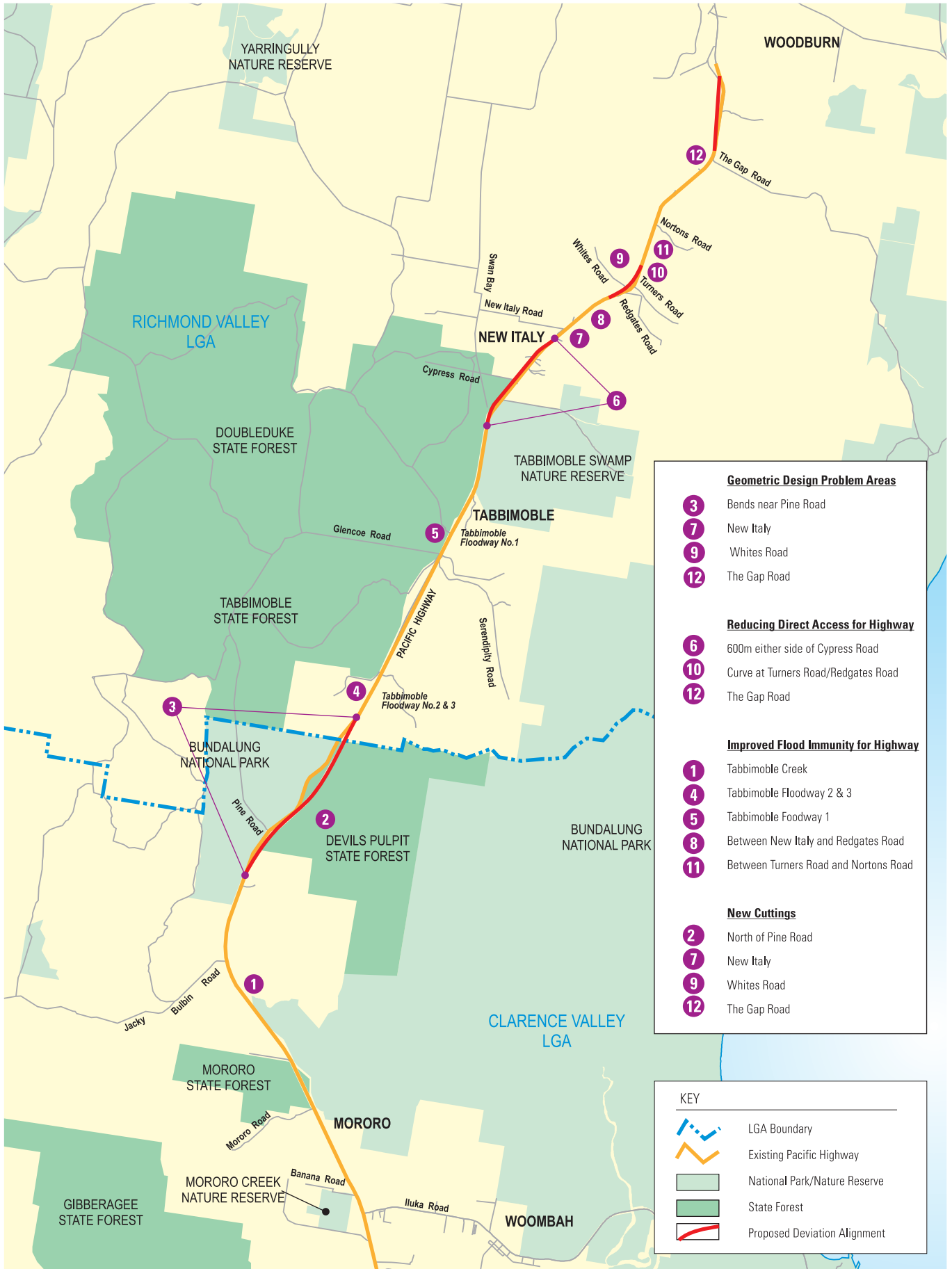


Figure 6.1

Existing Pacific Highway Opportunities for Improvement

6.4 Description of the preferred concept design

Given the considerations outlined in this chapter, the issues raised by the community and government stakeholders, and the constraints identified through the detailed studies documented in **Chapter 3**, a proposed concept design has been developed that responds to the issues and constraints. The main features of the proposed concept design are listed below:

The proposed concept design is presented in **Figure 6.2a** to **6.2i**.

6.4.1 *Typical cross-section*

The typical cross-section (see **Figure 6.4**) of the proposed concept design consists of the following:

- Typical 10 m verge.
- Typical 2.5 m shoulder (typical).
- Minimum 2 x 3.5 m traffic lanes.
- Minimum 0.5 m offside shoulder.
- Minimum 11 m central median reserve.
- Minimum 0.5 m offside shoulder.
- Minimum 2 x 3.5 m traffic lanes.
- Typical 2.5 m shoulder (typical).
- Typical 10 m verge.

Additionally, a road reserve has been identified to enable future parallel service roads to be provided on either side or both sides of the carriageway under a Class M scenario (also illustrated in **Figure 6.4**).

6.5 Summary of changes since publication of concept design in March 2006.

Following consultation and display of the Concept Design Report, the following changes were made to the concept design:

6.5.1 *Strategic changes*

Strategic changes have occurred following publication of the Concept Design in March 2006 in order to address access and public transportation issues.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined u-turn, crossover facilities located at an average of 3 km at:
 - CH 58.000.
 - CH 61.800.
 - CH 65.000.
 - CH 68.500.
 - CH 70.800.
 - CH 73.600.
 - CH 77.300.
 - CH 81.300.
 - CH 81.300 with u-turn north to south only.
 - CH 87.450.
- Bus stops added to egress side of selected side roads.

6.5.2 *Specific Changes*

Specific design changes have occurred following publication of the Concept Design in March 2006 in order to address a number of issues. These are summarised as follows (from south to north):

- Iluka Road access to be designed to connect final dual carriageway under Wells Crossing to Iluka Road Project, as a result Banana Road would connect to the Iluka Road Interchange via a new slip road.
- U-turn located at CH 59.400 just north of Mororo Road.
- Rest area just north of Mororo Road to be retained under Class A only.
- Southbound rest area to be shifted 30m north to reduce environmental impact.
- Jacky Bulbin Road seagull to include u-turn.
- Offline section realigned to conform with revised cadastral information.
- Median right turn added at CH 65.650 into private access.
- Merge Taper added at Serendipity Road.
- Median right turn added at CH 80.400 into Cypress Road.
- Cut at New Italy reduced to decrease impact on area, including *Melaleuca irbyana*.
- Road realigned between Cypress Road and New Italy Road to reduce land acquisition and impact of mango trees. Retaining wall added to eliminate batter adjacent to mango trees and well.
- Access to four properties 300 to 600 m north of Cypress Road to be combined to one egress only.
- Parking area to be formalised at New Italy to enable parking for 60 vehicles.
- Median right turn added with u-turn facility at Whites Road.
- Bend at Gap Road realigned to 1000 m to reduce impact on western side.
- Cut at New Italy reduced to decrease footprint and impact on area.
- U-turn located at CH 85.800 Nortons Road.
- Parallel service road from Wondawee Way to Trustums Hill Road added.
- Major design change at northern tie in due to excessive material requirements for the Woodburn to Ballina project. Full dumbbell interchange to be incorporated into design with future north facing ramps.

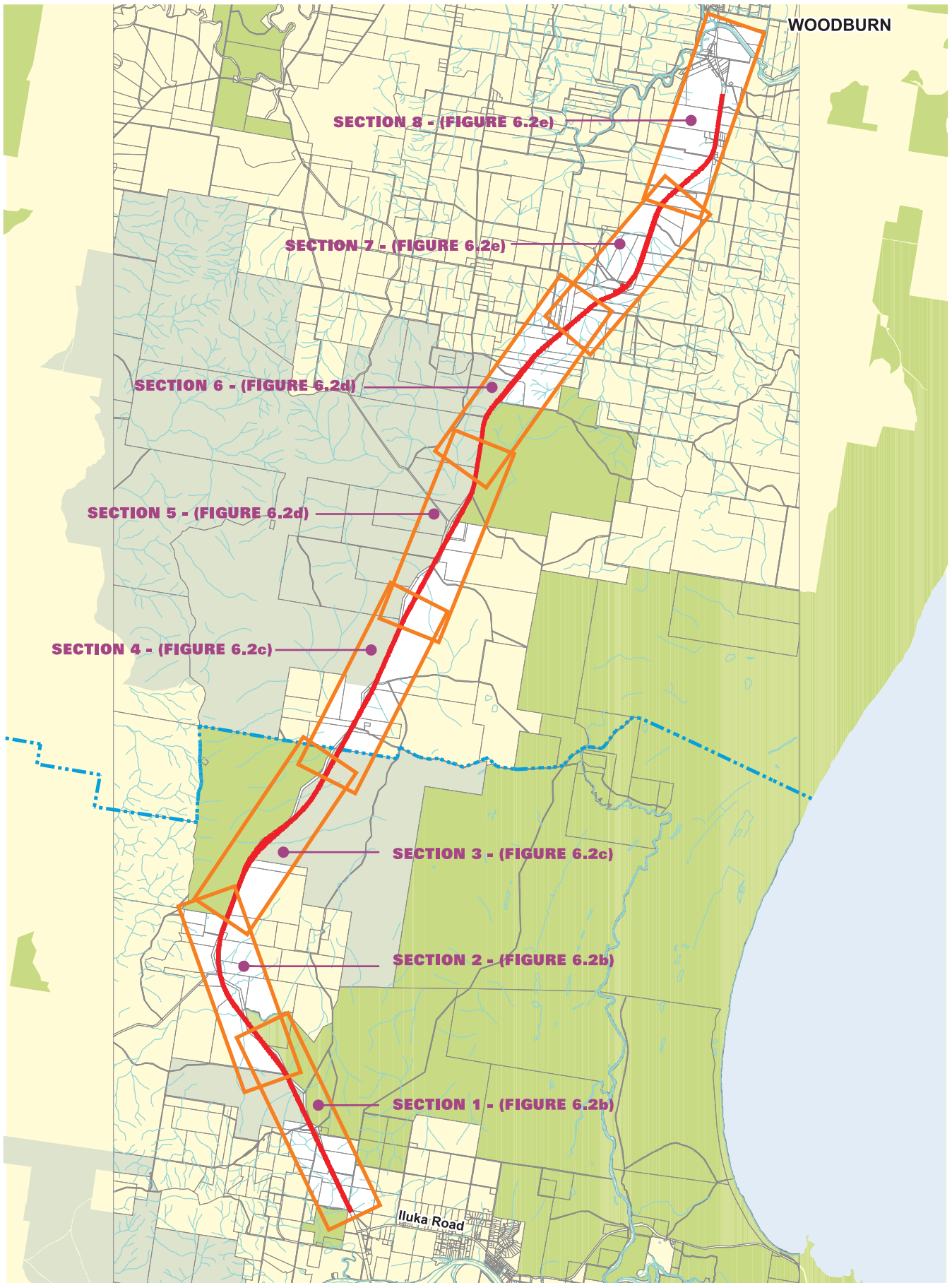
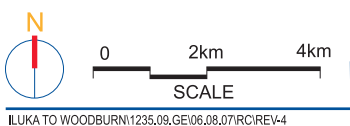


Figure 6.2a

Preferred Concept Design Sections Map - Arterial (class A)



6.6 Concept design Iluka Road to Woodburn Class A

6.6.1 Section 1 – Iluka Road to Mororo State Forest (Figure 6.2b)

At the southern end of the study area, the project will connect to the upgraded Pacific Highway being developed concurrently by the RTA for the Wells Crossing to Iluka Road project. This adjoining project includes a proposed grade-separated interchange (ie flyover) at Iluka Road, and associated on and off ramps enabling u-turns to be made in both directions. The proposed concept design will connect to the interchange, with the existing highway becoming the southbound lanes, and two new northbound lanes being constructed on the western side. Just north of Banana Road the proposed carriageway switches sides to the eastern side with the existing road forming the northbound carriageway.

Banana Road would connect to the grade separated interchange via a two way extended north facing ramp.

A double u-turn bay incorporating a maintenance cross-over is located between Banana Road and Mororo Road.

Mororo Road would have left-in, left-out access onto the highway's northbound carriageway with access to the south via a u-turn bay directly opposite enabling refuge within the median for u-turn movement. Access into Mororo Road from the north would be via the u-turn bay 1 km to the south.

A bus stopping bay would be located at Mororo Road

It is envisaged that the existing rest area to the north of Mororo Road will remain under a Class A arrangement, but may not be suitable for Class M.

A new southbound only rest area would be provided 800 m north of Mororo Road. This would be served by dedicated slip roads. This rest area would be designed to accommodate overnight parking for B-doubles as well as all other types of heavy and light vehicles.

The location for the rest areas meets the RTA rest area strategy, which requires a typical spacing of 50 km between major rest areas along the Pacific Highway. The proposed locations would also ensure that the rest areas are not in close proximity to any residences or other noise-sensitive land uses.

At the curve north of Mororo Road, the new carriageway would switch sides, with the existing highway becoming the southbound carriageway, and two new lanes being constructed on the western side.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Bus stops added to egress side of side roads.
- Iluka Road access and to be designed to connect final dual carriageway with short northbound slip (1:15 taper). As a result of this, Banana Road to be left in left out.
- Rest area just north of Mororo Road to be retained under Class A only.
- Southbound rest area to be shifted 30m north to reduce environmental impact.
- Combined u-turn, crossover facilities located halfway between Mororo Road and Banana Road.
- U-turn located at CH 59.400 just north of Mororo Road.

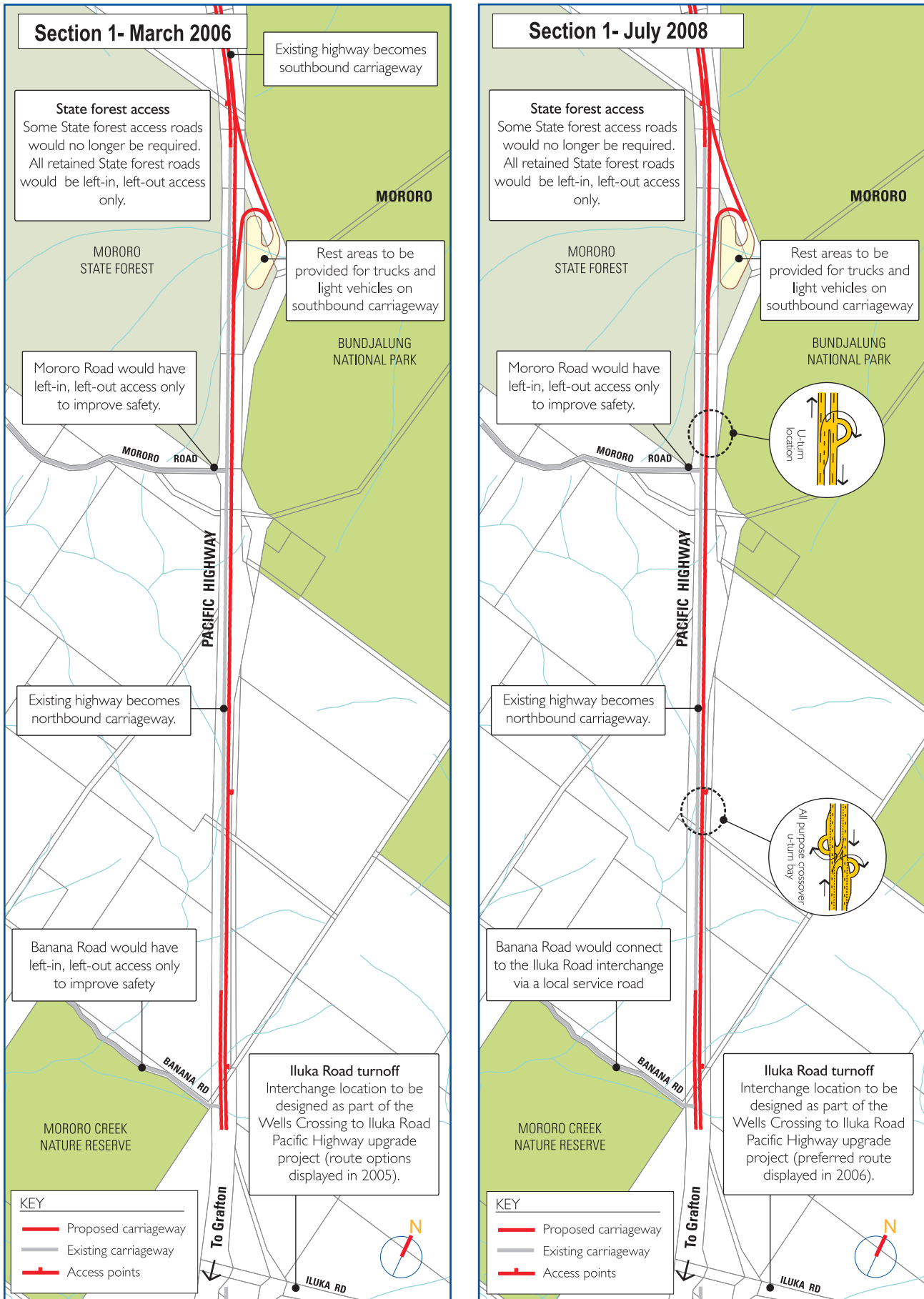
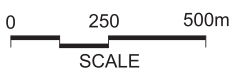


Figure 6.2b

Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design



6.6.2 Section 2 – Mororo State Forest to Bee Keepers (Figure 6.2c)

The duplication of the existing highway continues to the west of the existing from Mororo State Forest for approximately 4 km. A 'Seagull' type T-intersection is proposed at Jacky Bulbin Road

A double u-turn bay incorporating a maintenance cross-over is located 1.8 km south of Jacky Bulbin Road.

Jacky Bulbin Road is located on the floodplain of Tabbimoble Creek, where existing highway levels are likely to require raising to achieve the desired flood immunity level. Some fill is therefore likely to be required.

A bus stopping bay would be located at Jacky Bulbin Road and Old Pacific Highway opposite.

Approximately 1 km north of Jacky Bulbin Road, the new lanes would again switch sides, with the existing highway becoming the northbound lanes and two new lanes being constructed on the eastern side.

A double u-turn bay incorporating a maintenance cross-over is located 100m south of the Bee Keepers rest area.

The Bee Keepers rest area would be removed as a full rest area is to be provided north of Mororo Road.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Bus stops added to egress side of side roads.
- Combined u-turn, crossover facilities located near Mororo State Forest.
- Jacky Bulbin Road seagull to include u-turn.
- Combined u-turn, crossover facilities located near Bundjalung National Park.

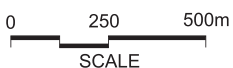
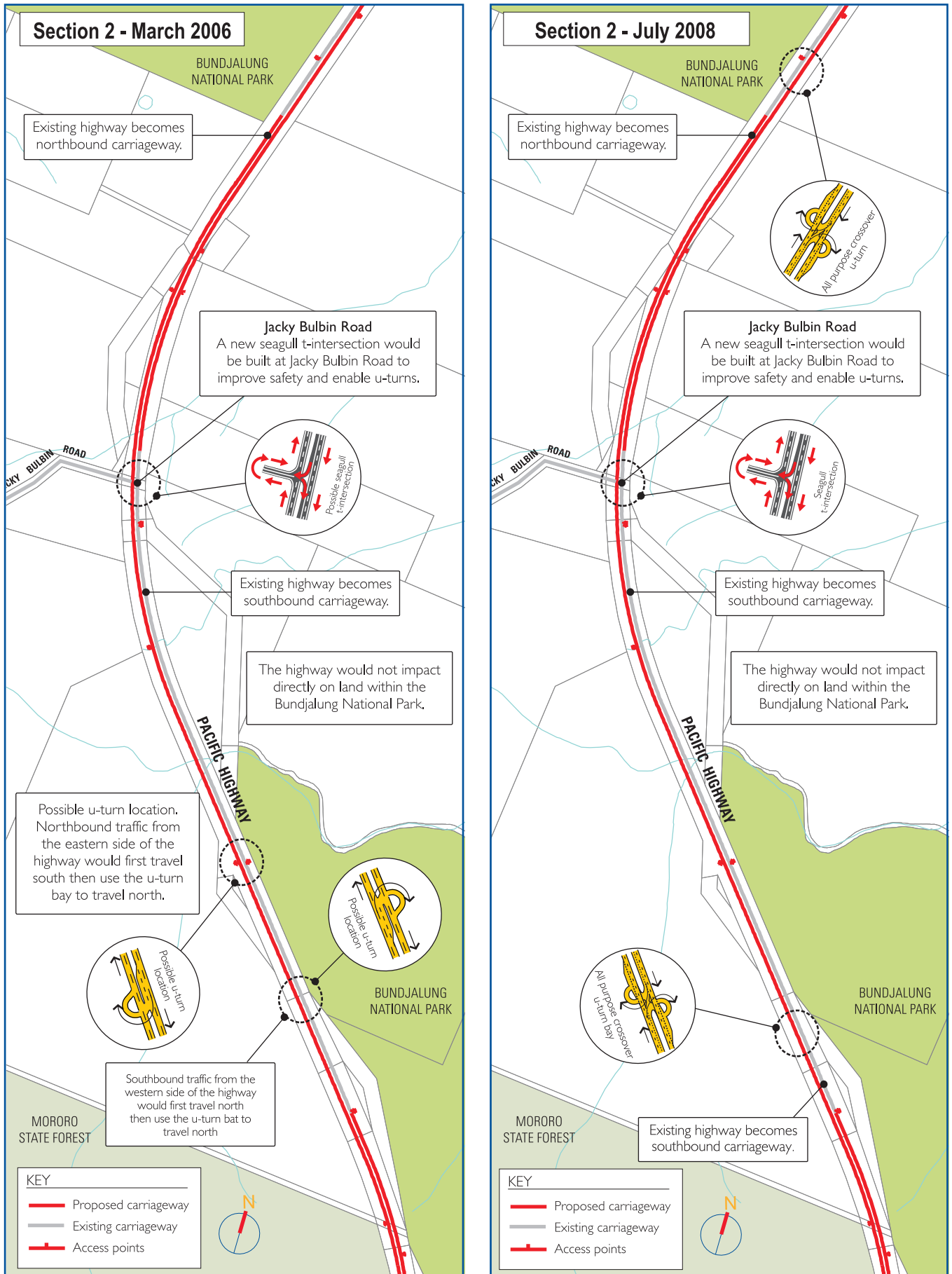


Figure 6.2c

Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

6.6.3 Section 3 –Bee Keepers to Khans Track (Devils Pulpit State Forest) (Figure 6.2d)

Pine Road, which provides access to Bundjalung National Park, would be limited to left-in, left-out turn movements only.

A u-turn bay is proposed to be located approximately 1.2 km south of Pine Road, to permit northbound traffic to gain access to private properties on the eastern side of the highway.

There are five consecutive horizontal curves in the existing alignment North of Pine Road that cannot accommodate a 110 km/h design, and which also vary vertically. The proposed preferred concept therefore incorporates two sections of deviation. A 2 km deviation is proposed at Pine Road. The proposed southbound carriageway would be on a Class M alignment and the northbound makes use of the existing carriageway where possible. Under a Class M arrangement, a new northbound carriageway could be constructed adjacent to the proposed southbound carriageway and the original highway would revert to a service road.

A 3 km deviation is also proposed at Devils Pulpit State Forest. This highway would be realigned in this area to provide a new four lane highway within this corridor. In anticipation of a future deviation, the RTA had previously acquired a 3 km corridor of land through the Devils Pulpit State Forest to the east of the Pine Road bends.

The reserved corridor ends at the southern end of the Tabbimoble Straight, and provides an opportunity to gain substantial quantities of fill material.

A double u-turn bay incorporating a maintenance cross-over is located 1.5 km north of Pine Road within the new deviation.

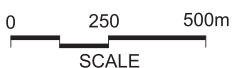
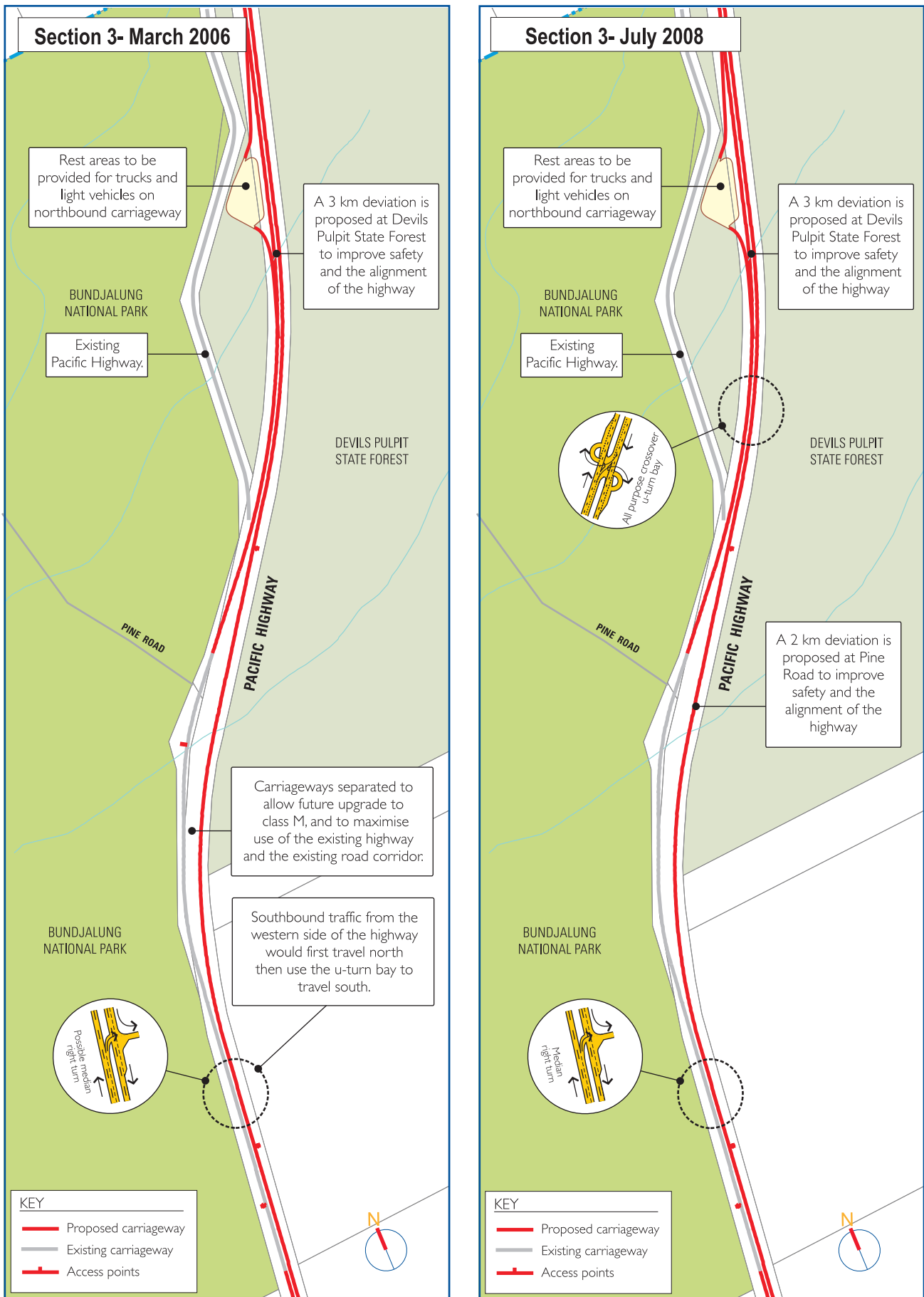
Khans Track would be relocated alongside the highway boundary within the state forest with some current accessed relocated further north or south.

A northbound rest area would be located between the existing alignment and proposed off-line section 2.5 km north of Pine Road. This rest area would be designed to accommodate overnight parking for B-doubles as well as all other types of heavy and light vehicles.

The location for the rest areas meets the objectives of the RTA's rest area strategy, which require a typical spacing of 50 km between major rest areas along the Pacific Highway. The proposed locations would also ensure that the rest areas are not in close proximity to any residences or other noise-sensitive land uses.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Median right turn added at CH 65.650 into private access.
- Combined u-turn, crossover facilities located 1 km north of Pine Road.
- Offline section realigned to conform with revised cadastral information.



Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

Figure 6.2d

6.6.4 Section 4 –Khans Track (Devils Pulpit) to McFaydon Road (Figure 6.2e)

To the north of Tabbimoble Floodway No. 2, the new highway lanes switch again to the western side and the existing highway would become the southbound lanes. This configuration would continue for the length of the Tabbimoble Straight.

A double u-turn bay incorporating a maintenance cross-over is located 1.7 km north of Tabbimoble Floodway No. 2.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Offline section realigned to conform with revised cadastral information.
- Combined u-turn, crossover facilities located 500 m south of Tabbimoble Floodway No. 3. Combined u-turn, crossover facilities located 1.7 km north of Tabbimoble Floodway No.2.

6.6.5 Section 5 –McFaydon Road to Tabbimoble Floodway 1 (Figure 6.2f)

A 'Seagull' type T-intersection is proposed at Serendipity Road, which would be realigned so that it intersects with the highway approximately 150 m south of the existing intersection (back to its original location). The existing intersection is currently a four-way junction, with Glencoe Road (a forest access road) making up the fourth arm of the intersection on the western side. Glencoe road would become left-in, left-out only.

A bus stopping bay would be located at Serendipity Road.

A double u-turn bay incorporating a maintenance cross-over is located 1 km north of Tabbimoble Floodway No. 1.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Bus stops added to egress side of side roads.
- Combined u-turn, crossover facilities located 1 km north of Tabbimoble Floodway No. 1.

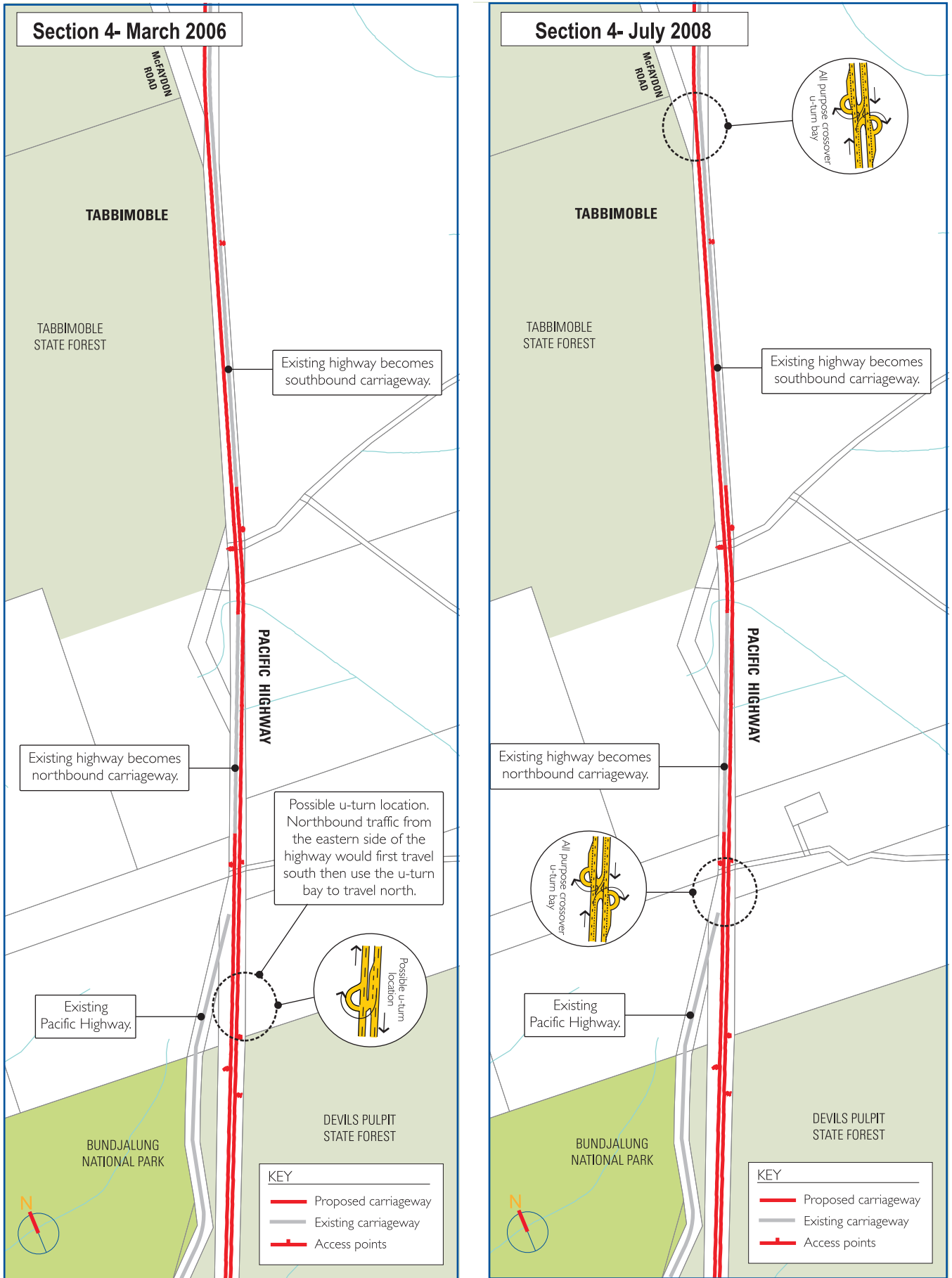


Figure 6.2e

Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

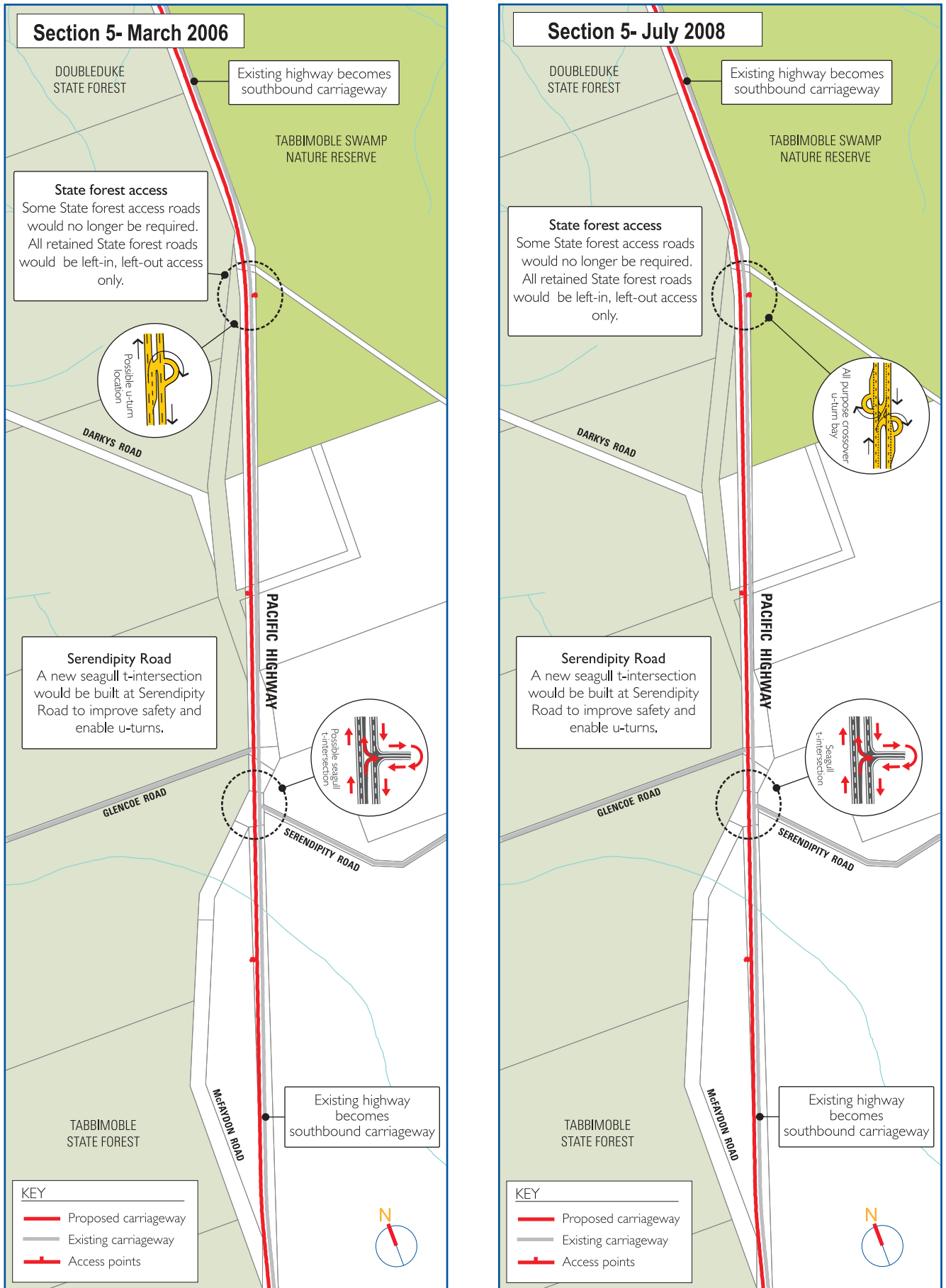
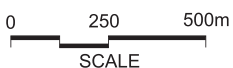


Figure 6.2f



Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

6.6.6 Section 6 – (North of Tabbimoble Floodway 1 to Oakey Flat (Figure 6.2g))

Between Doubleduke State Forest and Tabbimoble Swamp Nature Reserve the Highway is to be duplicated on the western side. This is to avoid impact on the Nature Reserve.

In the Cypress Road area, the preferred concept requires both carriageways of the Highway to be located adjacent to the existing highway on its western side. The proposed new construction would render a 1.4 km section of the existing highway redundant. This section of road would be utilised as a local access road servicing four private properties and the Tabbimoble Swamp Nature Reserve via Minyumai Road, but requiring only a single left-in, left-out access that would be located approximately 200 m north of Cypress Road.

A bus stopping bay would be located at the entrance to the new service road at Tick Gates.

Cypress Road may be accessed from the north by a u-turn facility and right turn lane within the median. This u-turn facility also enables residents south of the tick gates to head north after travelling south.

Cypress Road adjoins a straight section of existing highway that has an acceptable gradient, however, new construction of a dual carriageway to the existing alignment for 1.1 km is required because of:

- The need to avoid encroachment into Tabbimoble Swamp Nature Reserve.
- The need to avoid undesirable reverse curves in the new road alignment (ie S-shaped curves).
- The need to realign with the existing highway at New Italy, which is tightly constrained by land use and heritage issues, on both sides of the highway.

Since the publication of the Concept Design Report, the bend in the Cypress Road area (to the north of the tick gates) has been refined as part of the preferred concept design, resulting in a slight shift to the east of in order to utilise the existing road corridor more effectively and reduce impact to well and mango trees on the western side of the Highway.

A double u-turn bay incorporating a maintenance cross-over is located halfway between Swan Bay New Italy Road and Cypress Road.

Approaching New Italy, the preferred concept design again adopts the existing highway as the northbound carriageway and duplicates on the eastern side. Adjacent to the Swan Bay New Italy Road intersection which is currently situated on a crest with poor visibility to the south, the formation would be cut deeper, improving sight distances and gaining further fill materials.

The existing Swan Bay New Italy Road intersection is one of the busier intersections in the study area and has poor visibility to the south. The current intersection is close to the adjacent New Italy Museum Complex buildings, and duplication of the existing traffic lanes would not facilitate an improved intersection with better visibility. It has been identified that four new traffic lanes would need to be constructed in a deeper cutting on a new vertical alignment, (though similar horizontal alignment as the existing roadway). A 'Seagull' type intersection is proposed to be constructed to provide safe movements to and from the Pacific Highway. The design for the new intersection includes an improved vertical alignment, flattening the highway gradient to the north and south of the Swan Bay New Italy Road turnoff, to improve visibility in both directions and maximise safety.

A bus stopping bay would be located at Swan Bay New Italy Road.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Bus stops added to egress side of side roads.
- A southbound to northbound u-turn bay is located at Cypress Road.
Combined u-turn, crossover facilities located halfway between Swan Bay New Italy Road and Cypress Road.

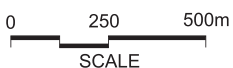
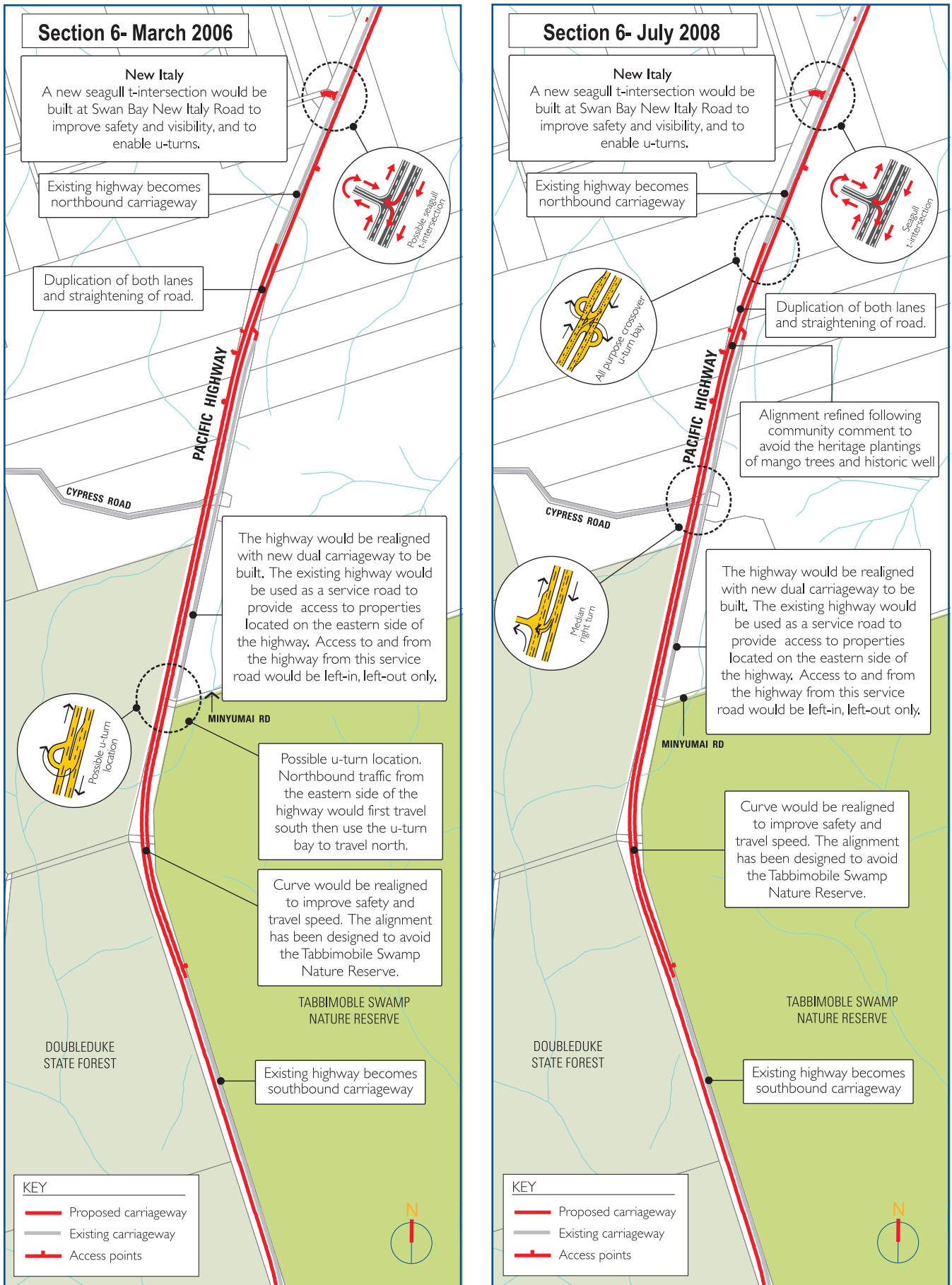


Figure 6.2g

Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

6.6.7 Section 7 – Oakey Creek to Nortons Road (Figure 6.2h)

From New Italy to Whites Road the new alignment switches sides, with the existing highway becoming the southbound carriageway. Between New Italy and Whites Road at Oakey Creek, the highway reaches its lowest point, with the existing road surface being at an elevation of less than 2 m AHD. Therefore, this length of road (approximately 1.25 km) would require additional fill material to achieve the desired flood immunity of a 1:20 flood event on at least one carriageway. Some additional culverts or upgrading of the existing structures may be required.

The existing curve adjacent to Whites Road has too small a radius for the required design speed of 110 km/h (see Figure 6.2e). A 1.1 km length of new four-lane road would therefore be required to increase the curve radius and meet the RTA's design standards. The new section of road would be located up to a maximum 100 m west of the existing two-lane highway. It is also anticipated that it can be constructed in a cutting, reducing the level of the road significantly, thus reducing the visual and acoustic impact on the surrounding area. It is anticipated that the redundant piece of existing highway would then be used to provide local access for Redgates Road and Turners Road.

Whites Road would be left-in left-out plus a right turn lane into it contained within the median. A u-turn facility would be located at Whites Road would enable residents from Redgates Road and Turners Road to head north.

Bus stopping bays would be located at both accesses.

Between the Whites Road bend and Nortons Road, the existing highway would become the southbound lanes, with new construction on the western side to create the northbound lanes (see Figure 6.2e).

The section between Whites Road and Nortons Road is low-lying, and would require fill material to improve flood immunity.

Two u-turn bays are proposed north of the Whites Road bend, to enable safe turn movements from each of the north and southbound carriageways. Nortons Road would become left-in, left-out only.

A northbound to southbound u-turn bay incorporating a maintenance cross-over is located Just north of Turners Road.

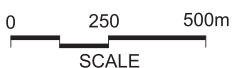
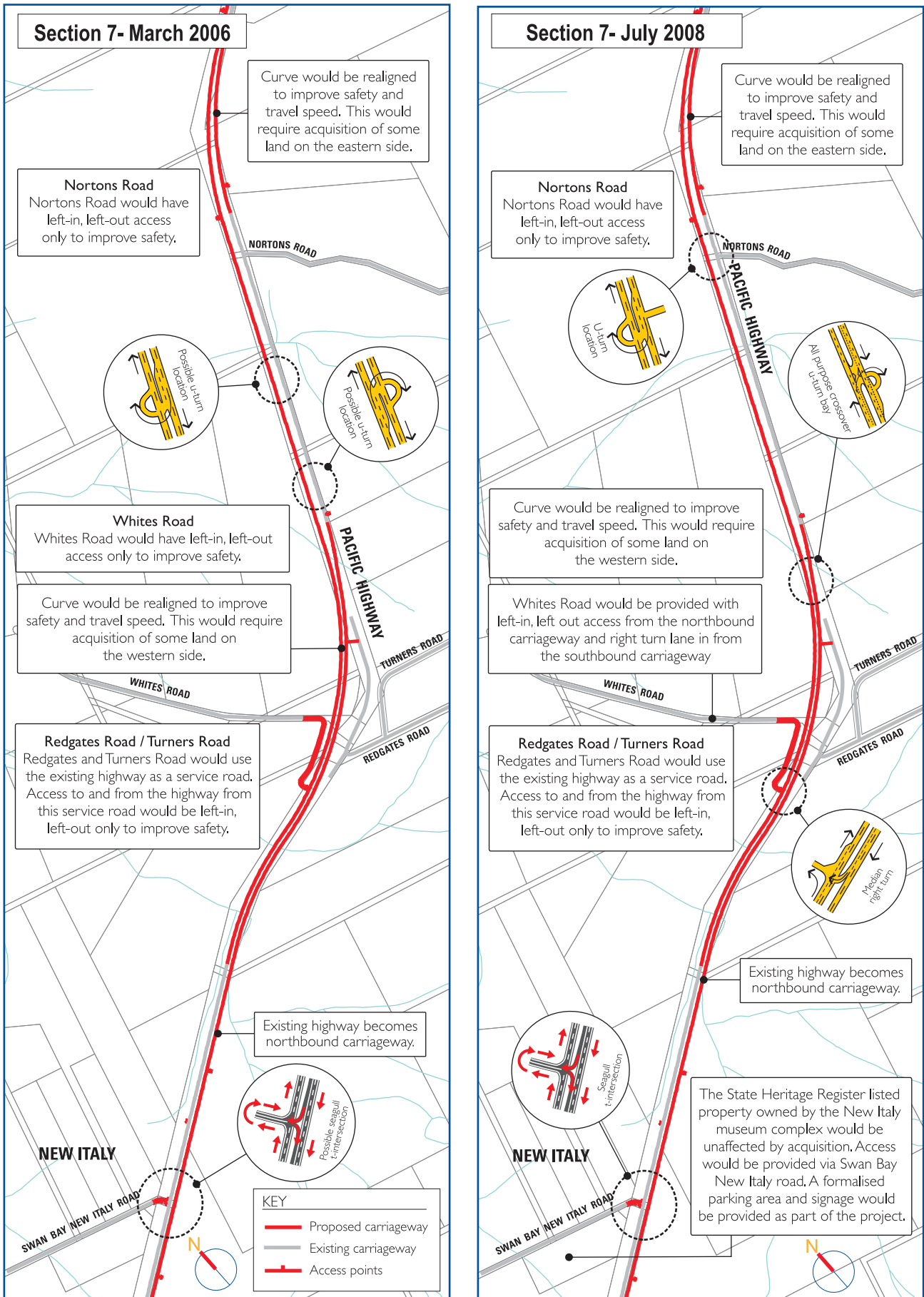
A southbound to northbound u-turn bay is located at Nortons Road.

The median has additional width on this section to enable the existing Pacific Highway/proposed southbound carriageway to be converted to a service road and a new southbound carriageway to be constructed in the median under a future Class M arrangement. Building the northbound carriageway in its ultimate Class M position allows the carriageway to continue to be used when converting from Class A to M in the future.

A bus stopping bay would be located at Nortons Road.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- Bus stops added to egress side of side roads.
- U-turn bay incorporating a maintenance cross-over is located just north of Turners Road.
- U-turn bay is located at Nortons Road.



Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

Figure 6.2h

6.6.8 Section 8 – North of Nortons Road to Trustums Hill Road (Figure 6.2i)

Between Nortons Road and The Gap Road, the proposed concept design has a new northbound carriageway on the western side with the existing road forming the southbound carriageway.

A further double u-turn bay incorporating a maintenance cross-over is located 600m south of The Gap Road

Between The Gap Road and Trustums Hill Road the preferred concept design has changed substantially between following publication of the Concept Design Report in March 2006 and subsequent community feedback.

Within the concept design published in March 2006, a possible location for grade separated interchange was indicated north of Trustums Hill Road as part of the Woodburn to Ballina project, however following concerns regarding access to Woodburn and opportunity to reduce net cut and fill balance of materials for both schemes, the grade separated interchange has been located further south between The Gap Road and Trustums Hill Road. This would also provide a connection between Woodburn, Trustums Hill, Wondawee Way and The Gap Road without traversing the Pacific Highway Upgrade. At this stage the interchange is envisaged to be a dumbbell type double roundabout connected by a two lane bridge over the highway with south facing ramps. North facing ramps could be provided when warranted by traffic demand.

Tuckombil Road would remain as a local access road, but the existing intersection at The Gap Road would be closed. Access from The Gap Road to the Pacific Highway would be via the interchange.

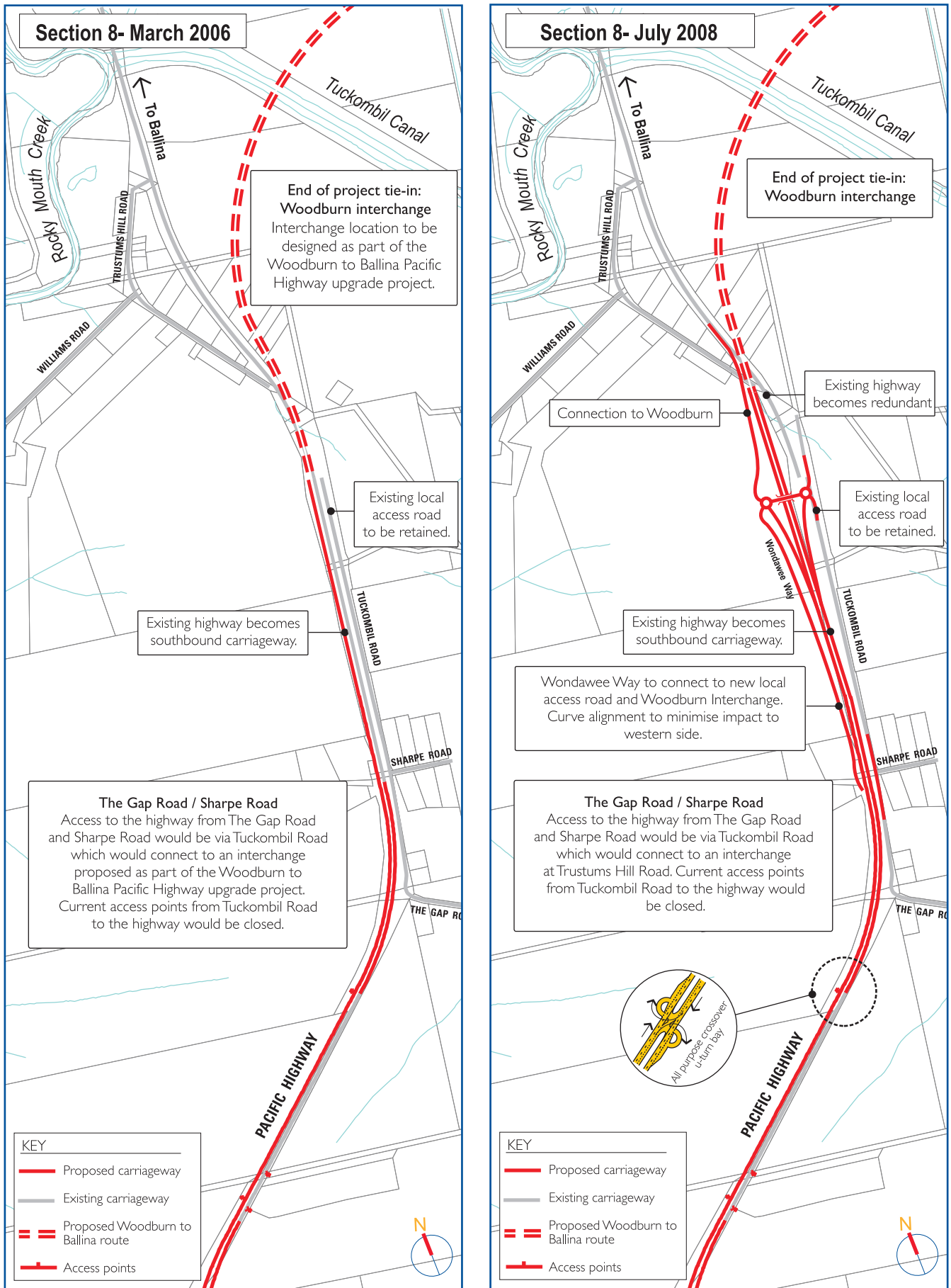
The existing access from the highway into the northern end of Tuckombil Road would also be closed, with traffic diverted to the connection referred to above.

Following consultation after the publication of the Concept Design Report in March 2006, changes made at Wondawee Way and the curve at The Gap Road seek to minimise the impact on properties on the western side of the highway without compromising the design standards of the mainline carriageway.

The project terminates approximately 700m south of the Tuckombil Canal.

Summary of Changes since publication of Concept Design in March 2006.

- Emergency stopping bays, emergency u-turns and maintenance crossovers removed and replaced with combined facilities.
- U-turn bay incorporating a maintenance cross-over is located south of The Gap Road.
- Highway shifted west to incorporate grade separated interchange with direct links to Woodburn, The Gap Road and new connection to Wondawee Way.



Preferred Concept Design Arterial (class A) compared to March 2006 Concept Design

Figure 6.2i

6.7 Key design features Iluka Road to Woodburn project Class A

6.7.1 Access strategy

Analysis of local access needs and patterns

A key stage in the planning process has been an assessment of access needs for all private and public properties, and development of a strategy to ensure that access needs are safely met without compromising other important highway design standards.

Accesses and u-turn facilities

Access onto and off the upgraded highway for private properties and minor local roads would be achieved through provision of left-in and left-out turning facilities, coupled with strategically placed u-turn facilities (see **Figure 6.3**). For reasons of safety, right-hand turns would not be permitted onto the highway from private properties and some local roads. Motorists wishing to turn right onto the highway from minor roads and private properties would be required to first turn left, and then travel to the nearest u-turn facility before continuing their journey in the desired direction. It is anticipated that the delay and the extra distance travelled would be off-set by overall reduced journey times, reduced delays and improved safety through eliminating right-turn movements. A summary of Access and u-turn facilities is listed in **Table 6.1**.

Table 6.1 At-grade intersections with public roads and u-turn facilities

Chainage	Road	Side/direction	Treatment
56980	Banana Road*	West	Left in & Left out
58170	N/A	Bi-directional	Combined u-turn & Crossover
59340	Mororo Road	West	Left in & Left out
59400	Nr Mororo Road	North to South	All purposed u-turn
61800	N/A	Bi-directional	Combined u-turn & Crossover
63500	Old Pacific Highway	East	Left in & Left Out
63680	Jacky Bulbin Road	West	Full Seagull intersection
65000	N/A	Bi-directional	Combined u-turn & Crossover
65650	N/A	North to South	All purpose u-turn
67200	Pine Road	West	Left in & Left Out
68500	N/A	Bi-directional	Combined u-turn & Crossover
70800	N/A	Bi-directional	Combined u-turn & Crossover
73600	N/A	Bi-directional	Combined u-turn & Crossover
75280	Serendipity Road	East	Full Seagull intersection
75500	Glencoe Road	West	Left in & Left Out
77300	N/A	Bi-directional	Combined u-turn & Crossover
85100	Cypress Road	West	Combined u-turn & right turn, with Left in & Left out to side road
81010	Service Road	East	Left in & Left out
81400	N/A	Bi-directional	Combined u-turn & Crossover
82130	New Italy – Swan Bay Road	West	Full Seagull intersection
83770	Whites Road	West	Combined u-turn & right turn, with Left in & Left out to side road
84370	Turners and Redgates Road	East	Left in & Left out
84620	N/A	North to South	Combined u-turn & Crossover
85740	N/A	South to North	All purpose u-turn
85810	Nortons Road	East	Left in & Left out
87560	N/A	Bi-directional	Combined u-turn & Crossover

*Note: To be connected to interchange at Iluka Road under Wells Crossing to Iluka Road scheme

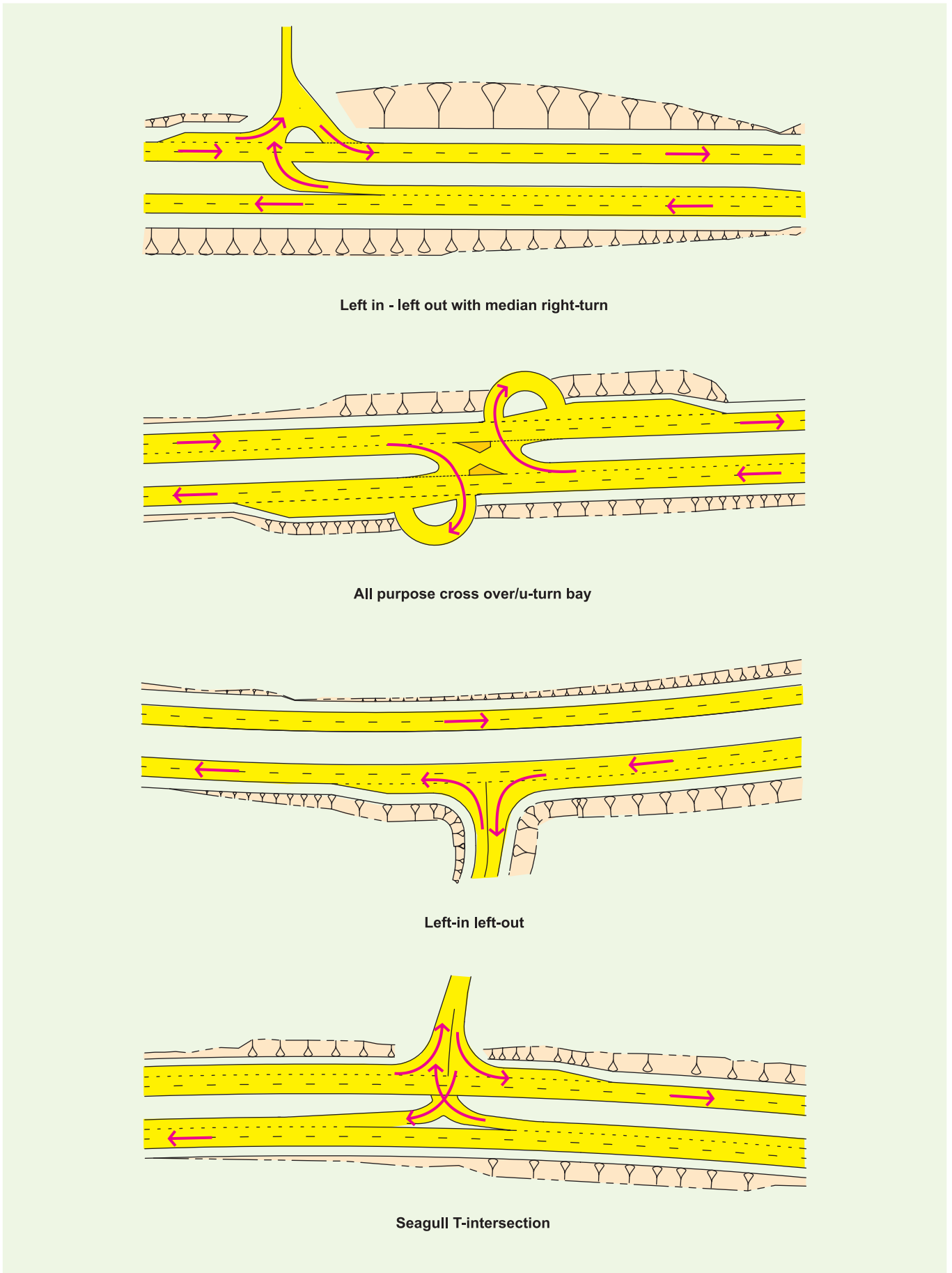


Figure 6.3

Typical Intersections

The maximum distance from a side road or private property entrance to the nearest u-turn bay would be on average 3 km, though typically the diversion would be much less than this. Some traffic may therefore need to travel this distance to the north before making a u-turn to travel south, or vice versa. The u-turn bays would be designed to cater for all vehicles using the highway including B-Double semi-trailers, buses and cane haulage vehicles.

Three intersections have been identified as requiring direct access onto the highway in each direction. The higher standard of intersection is considered justified by the relatively higher numbers of turning movements. 'Seagull' type T-intersections with protected turning lanes are proposed in these cases which are Jacky Bulbin Road, Serendipity Road and Swan Bay New Italy Road. Intersection layouts are illustrated schematically in **Figure 6.3**.

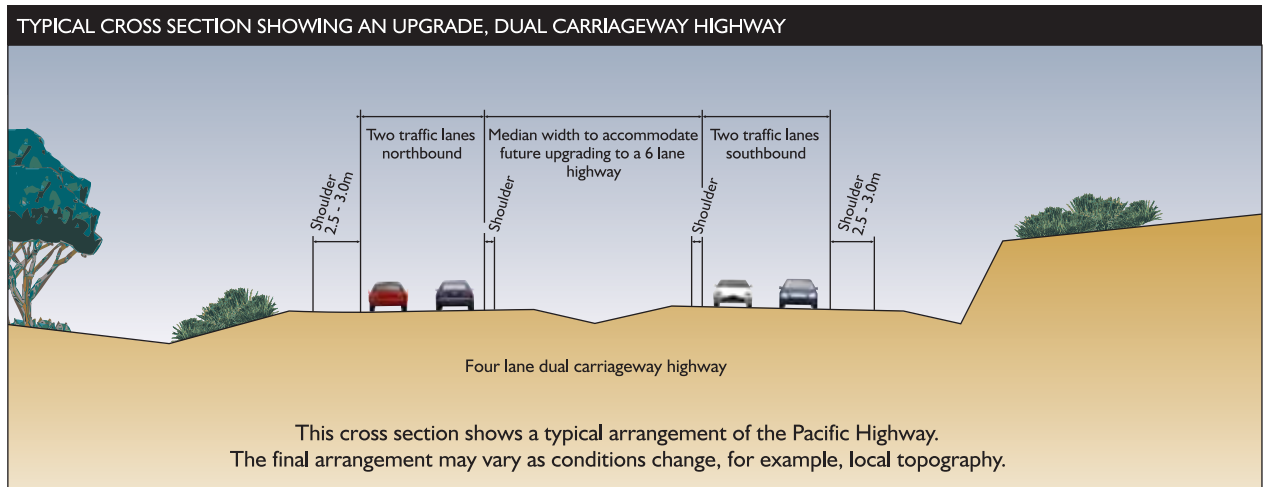
The traffic volumes on these side roads do not require the provision of grade-separated interchanges (flyover type).

There are four locations where direct access points to the highway can be rationalised by using parallel service roads, either newly constructed or created through the use of residual sections of the existing highway, where new sections of four-lane highway are proposed. The sites include:

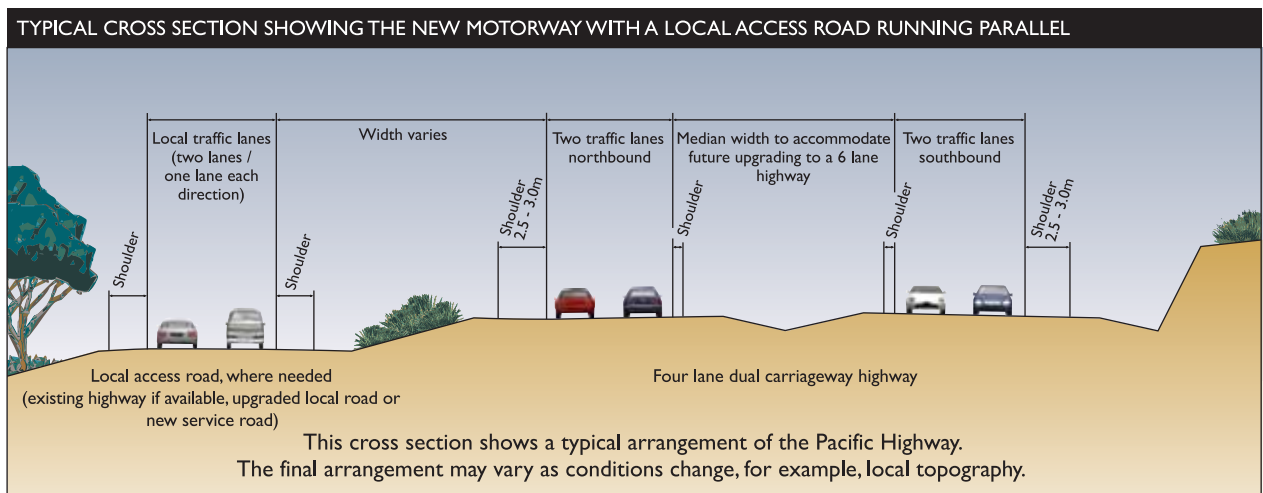
- 600 m either side of Cypress Road.
- The curve at Turners/Redgates Road.
- The Gap Road.
- Wondawee Way.

Interchanges

Within the concept design published in March 2006, a grade separated interchange was located north of Trustums Hill Road as part of the Woodburn to Ballina project. Following concerns regarding access to Woodburn and an opportunity to reduce net cut and fill balance of materials for both schemes, the grade separated interchange has been located further south between The Gap Road and Trustums Hill Road. At this stage the interchange is envisaged to be a dumbbell type double roundabout connected by a two lane bridge over the highway with south facing ramps only. North facing ramps will be constructed when traffic levels warrant it in the future.



A new carriageway is to be constructed along side the existing highway for much of this project. Which side of the existing highway the new carriageway will be built on may vary from location to location depending on environmental, engineering or other constraints.



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Figure 6.4

Typical Cross Sections

6.7.2 *Bridges*

The preferred concept design contains a number of structures either adjacent to existing structures (duplication) or stand alone on the project. These will typically be precast prestressed RTA deck planks and range between 39 m to 155 m with a width of 11.0 m comprised as follows;

- 3.0 m nearside shoulder
- 2 x 3.5 m traffic lanes
- 1.0 m offside shoulder

With exception to this is a structure proposed as part of the dumbbell interchange between The Gap Road and Woodburn. This is likely to comprise of two 3.5m traffic lanes and 2.0 m shoulders, thus, no change in overall width to above. The position of the central stanchion in the median below will enable the mainline to be widened under a future 6 lane arrangement. A summary of structures is listed in **Table 6.2** below.

Table 6.2 Proposed structures

Chainage	Description	Type	No. of Spans	Length	Width
62600	Duplication to Bridge over Tabbimoble Creek	Precast Prestressed RTA deck Planks	9	155	11
63850	Duplication to Bridge over Tabbimoble Overflow	Precast Prestressed RTA deck Planks	3	53	11
71450	Duplication to Bridge over Tabbimoble Floodway 3	Precast Prestressed RTA deck Planks	4	66	11
71840	Duplication to Bridge over Tabbimoble Floodway 2	Precast Prestressed RTA deck Planks	3	42	11
76300	Duplication to Bridge over Tabbimoble Floodway 1	Precast Prestressed RTA deck Planks	5	80	11
89540	South Woodburn Interchange	TBC	2	90	11

6.7.3 *Pavements*

Although full pavement designs have not been conducted to date, It has been assumed that the design of the mainline may form that of a Plain Concrete Pavement with rationalisation of existing pavements where the Class A dual carriageway utilises the existing road and is to be relocated under a Class M scenario. This occurs at two locations, Pine Road and Nortons Road.

Service roads will be typically two coat seals over base materials with exception to the link to Woodburn and interchange and off ramps. This is likely to be constructed from heavier duty asphalt as opposed to two coat seal.

6.7.4 *Rest areas*

Major rest areas are proposed with appropriate facilities on both sides of the highway. For northbound traffic a major rest area is proposed approximately 2 km north of Pine Road, on the western side of the proposed highway deviation adjoining Devils Pulpit State Forest. For southbound traffic a major rest area is proposed approximately 1 km north of Mororo Road on the eastern side of the highway.

The proposed major rest areas would ensure meet the objectives of the RTA rest area strategy, which requires a typical spacing of 50 km between major rest areas. The existing parking facility at New Italy rest area and driver reviver would remain, but would be reduced in size. This would be addressed by formalising and marking the car park area to ensure more efficient use of the limited space. Approximately 50 car parking spaces would be provided. The remainder of the existing lay-bys and stopping areas are located at sporadic intervals, and vary widely in size

and in terms of the facilities offered. The Mororo Road rest area would be retained under the current Class A arterial standard road. The rest of the existing stopping areas will not be retained within the proposed concept design.

6.7.5 *Emergency stopping bays*

In addition to the emergency shoulders, the concept design includes emergency stopping bays at an average of 3 km intervals throughout the scheme. For emergency purposes only, these stopping bays will provide safe emergency stopping off the shoulder. They are located at all purposed u-turn bays and indicated in **Figure 6.3**.

6.7.6 *Improving flood immunity*

The RTA's Pacific Highway design standards require that, if feasible, at least one carriageway should be constructed at or above the 1-in-100 year flood level. If this is not feasible, the design standards require a minimum flood immunity of the 1-in-20 year flood level. The following key locations have been identified (see **Figure 6.1**) as being flood-prone and requiring road levels to be raised:

- Tabbimoble Creek.
- Tabbimoble Floodways 2 and 3.
- Tabbimoble Floodway 1.
- New Italy to Redgates Road.
- Turners Road to Nortons Road.

6.8 **Staging of works**

It is likely that the project will be staged, in the development of the initial upgrade to allow for appropriate consideration of funding, road user safety and construction constraints.

Staging possibilities includes the following:

- Construction of the 2 km deviation in the Pine Road area to improve the safety and alignment of the highway.
- Construction of the 3 km deviation in the Devils Pulpit area to improve the safety and alignment of the highway.
- Construction of the interchange at Trustums Hill as part of the Woodburn to Ballina Upgrade project in order to provide a source of fill material.

6.9 **Construction issues and road user management**

6.9.1 *Earthworks, cut and fill*

Earthworks are a construction issue for this project, with the cut and fill balance comprising a substantial part of project costs. Large sections of the proposed concept design are flood prone, where the upgraded highway would have to be constructed on embankment at a slightly higher level than the existing carriageway. A majority of suitable fill material would be gained from proposed new cuttings and from the short deviation sections of the project, thus reducing the amount of imported material required.

The preferred concept design incorporates substantial cutting at the following locations, to achieve a suitable road profile and, of equal importance, to reduce the amount of imported fill material required:

- Devils Pulpit deviation.
- Whites Road.
- New Italy.
- Between Wondawee Way and Trustums Hill Road.

Further refinement of the design has resulted in opportunity to provide win material for projects to the north and south which are experiencing deficits. In particular, the Woodburn to Ballina

project has a 1 km section south of the Tuckombil Canal and opportunities arose not only to reduce the material required on that scheme, but to enable that material to be sourced locally to prevent haulage through Woodburn from further afield. This resulted in the relocation of the grade separated intersection proposed under the Woodburn to Ballina Project to the south of Trustums Hill Road within this project.

6.9.2 Contaminated soils

A Phase 1 preliminary contamination assessment was conducted by GHD Pty Ltd in April 2007 to identify potential contaminant sources along the alignment and assess the risk associated due to the proposed upgrading of the highway. It indicated that in general, no significant or gross potential sources of industrial contamination were identified along the proposed route such as service stations or major industrial facilities. A number of potential sources of contamination were identified in the vicinity of the proposed route and included.

- Seven Cattle Dip sites located outside the works zone
- Heavy timber industries located east of the highway at Tabbimoble Floodways 2 and 3.
- Disused quarry east of Tuckombil Road
- Former Mororo landfill off Lewis Lane
- Electricity sub-station at Tuckombil Road

6.10 Class M design layout

The Iluka Road to Woodburn project would be initially constructed to a Class A arterial standard. The proposed design discussed to this point relates to a Class A upgrade. In addition to the development of a Class A proposal, the RTA is also planning for a possible future upgrade to a 'Class M' or motorway standard road. Class M refers to a motorway-standard road, where access is restricted to grade-separated (flyover-type) interchanges, and there is no direct access on or off the highway to local roads or private property.

A Class M road would have 110 km/h posted speed and controlled access, with local traffic diverted to a parallel service road that would run the length of the project which would have two lanes and with a posted speed limit of less than 100 km/h.

A Class M upgrade would provide two lanes in each direction but with the capability of being upgraded to three lanes in each direction when warranted.

The Class M scenario has not been subject to any detailed design beyond a conceptual, schematic layout as depicted in **Figures 6.5a to 6.5e**. This schematic layout indicates the likely potential extent of land acquisition that would be required in order to implement the ultimate Class M scheme. This 'footprint' for the Class M layout has been adopted to provide planning certainty and allow for acquisition. The intention behind this strategy is that, should the Class M strategy be implemented at some future time, no further land would be required in addition to that identified on the maps in **Figures 6.5a to 6.5e**.

The Class M strategy includes a possible grade-separated interchange at New Italy, when warranted. An interchange at New Italy would further improve safety at this location, and would also continue to support and promote the cultural heritage values and economic viability of the New Italy Museum complex. Grade separated interchanges are currently proposed at Iluka Road, and south of Trustums Hill Road as part of the adjoining Wells Crossing to Iluka Road and Woodburn to Ballina projects, respectively. A Class M scheme would require construction of a 33 km parallel local service road to provide access to communities between these two interchange locations.

All of the u-turn facilities, left-in and left-out turn facilities, and T-intersections proposed under the Class A concept design would be removed under a Class M scheme. The combined cross-over facilities incorporating emergency u-turn bays would also remain but be converted for emergency and maintenance use only.

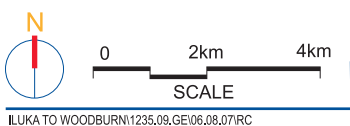
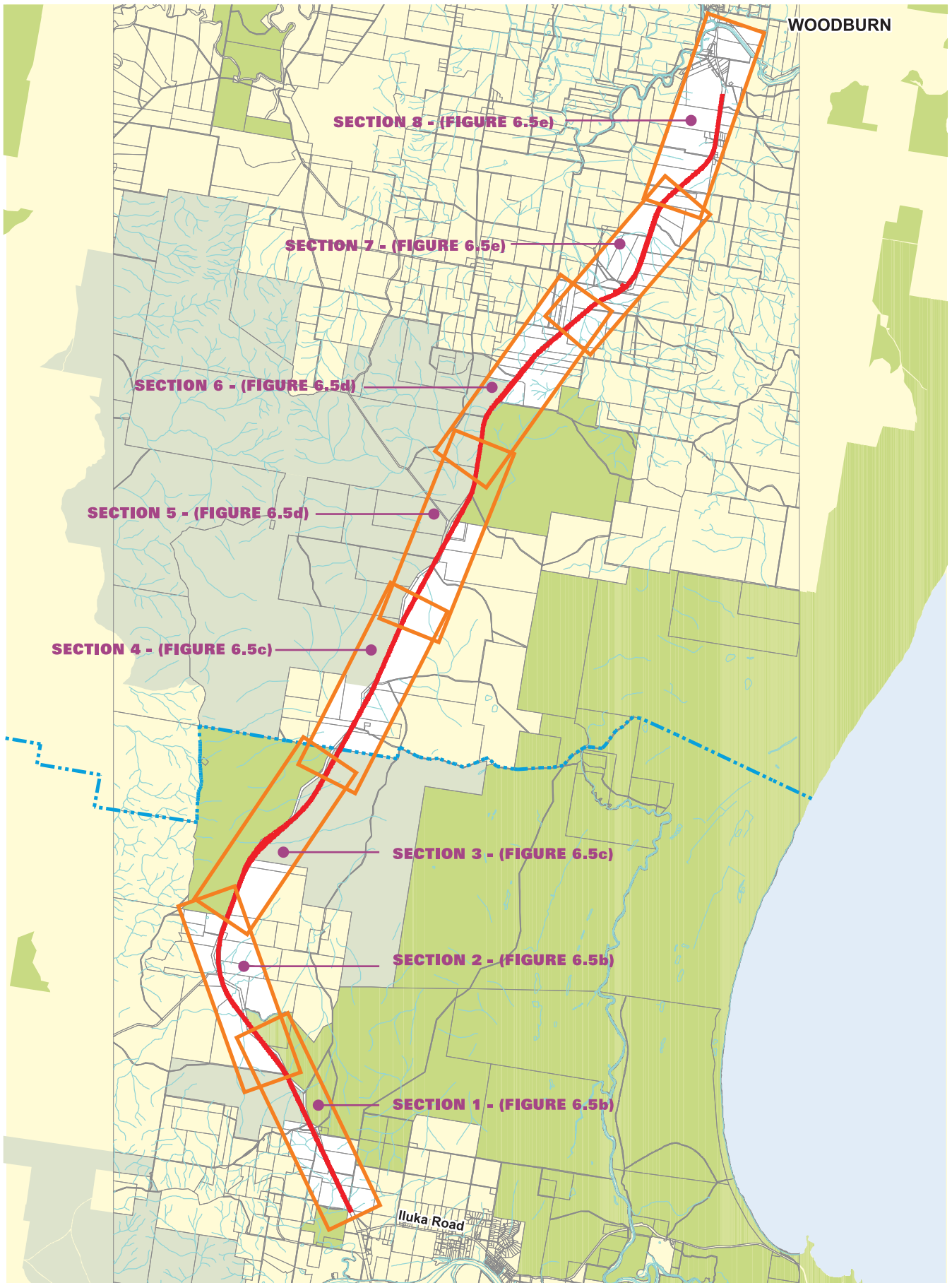


Figure 6.5a

Preferred Concept Design Sections Map - Proposed Motorway (class M)

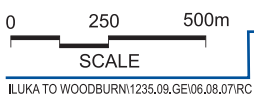
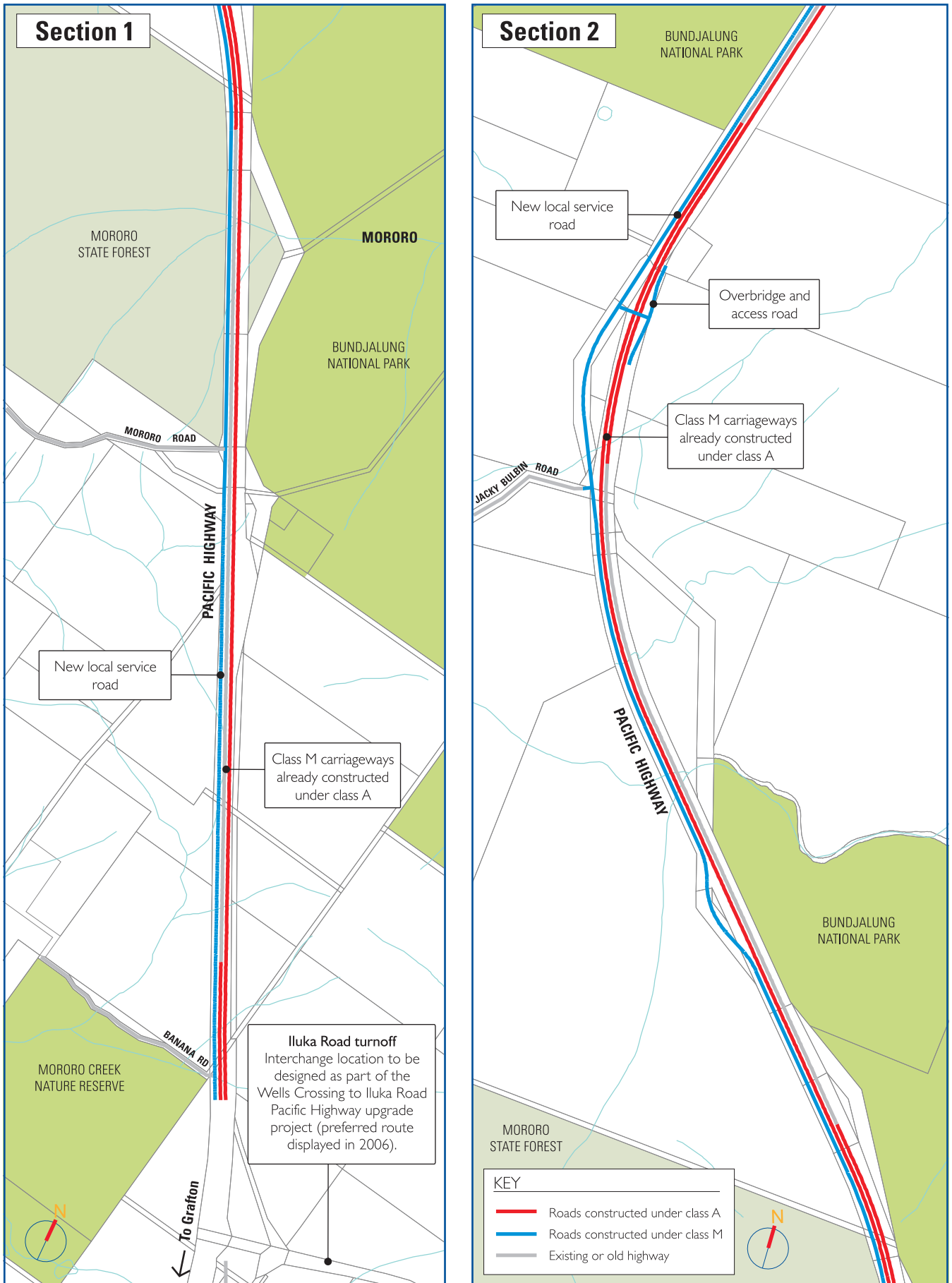


Figure 6.5b

Preferred Concept Design - Proposed Motorway (class M)

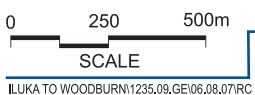
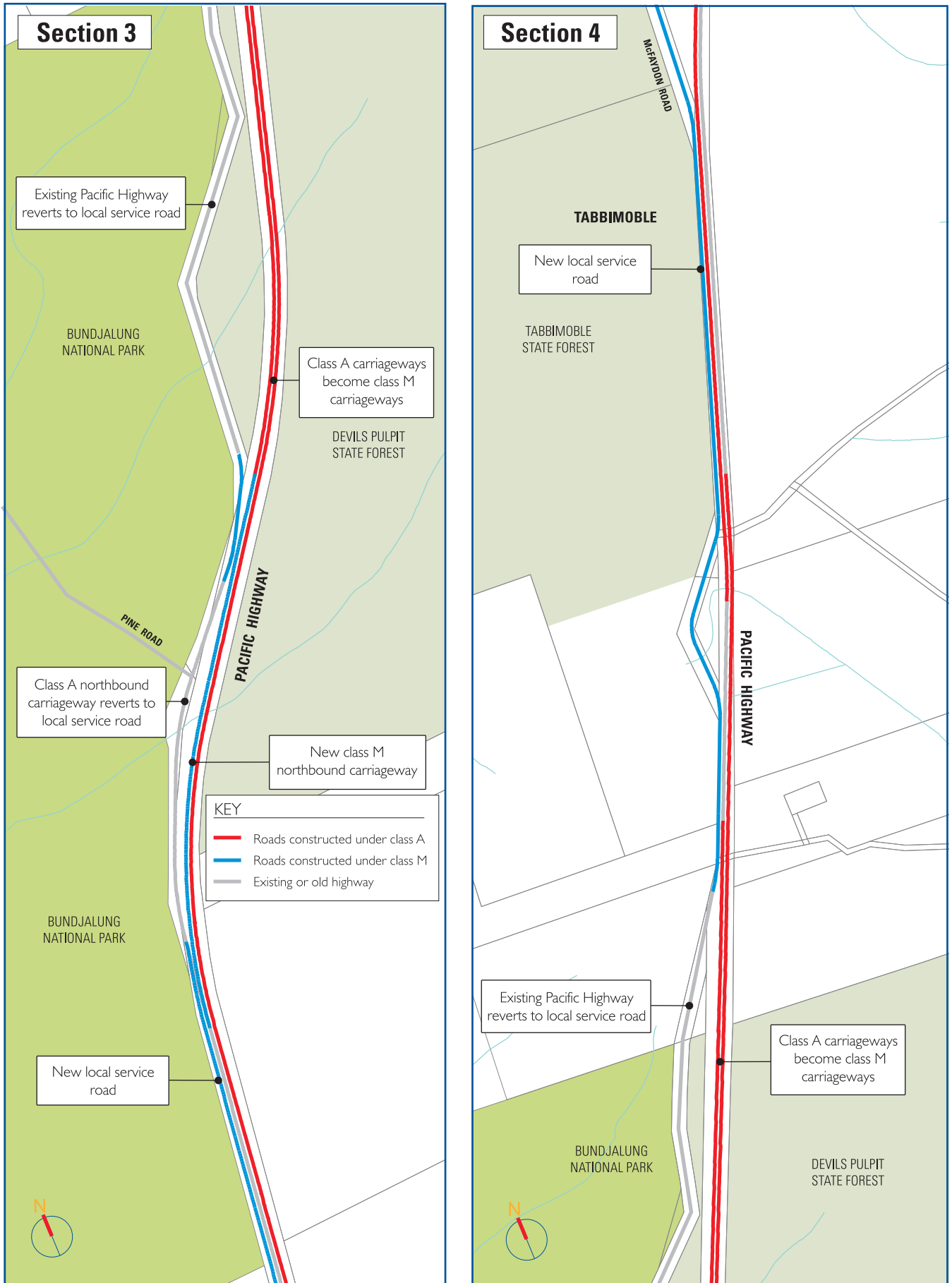


Figure 6.5c

Preferred Concept Design - Proposed Motorway (class M)

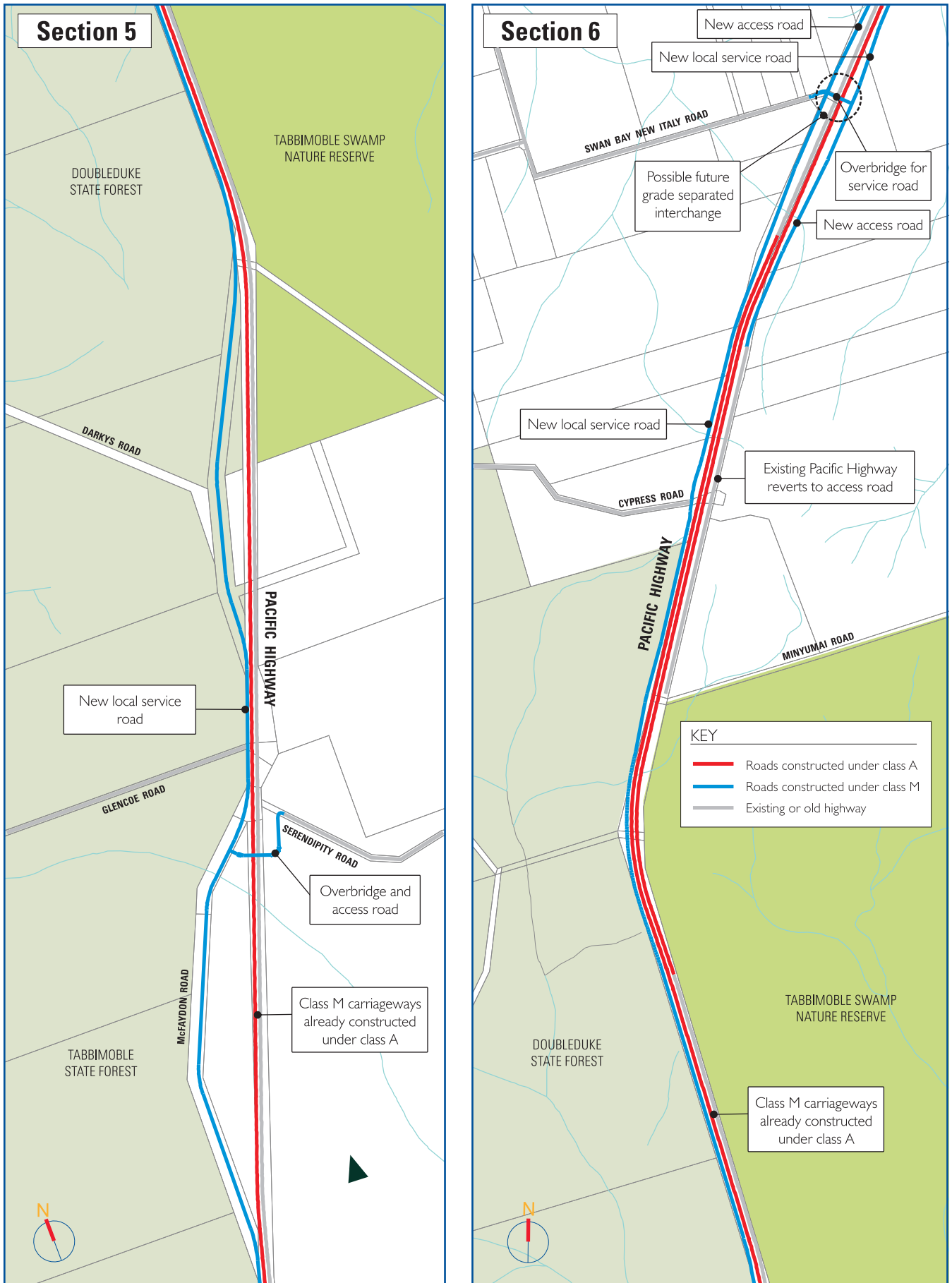


Figure 6.5d

Preferred Concept Design - Proposed Motorway (class M)

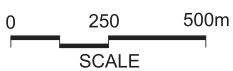
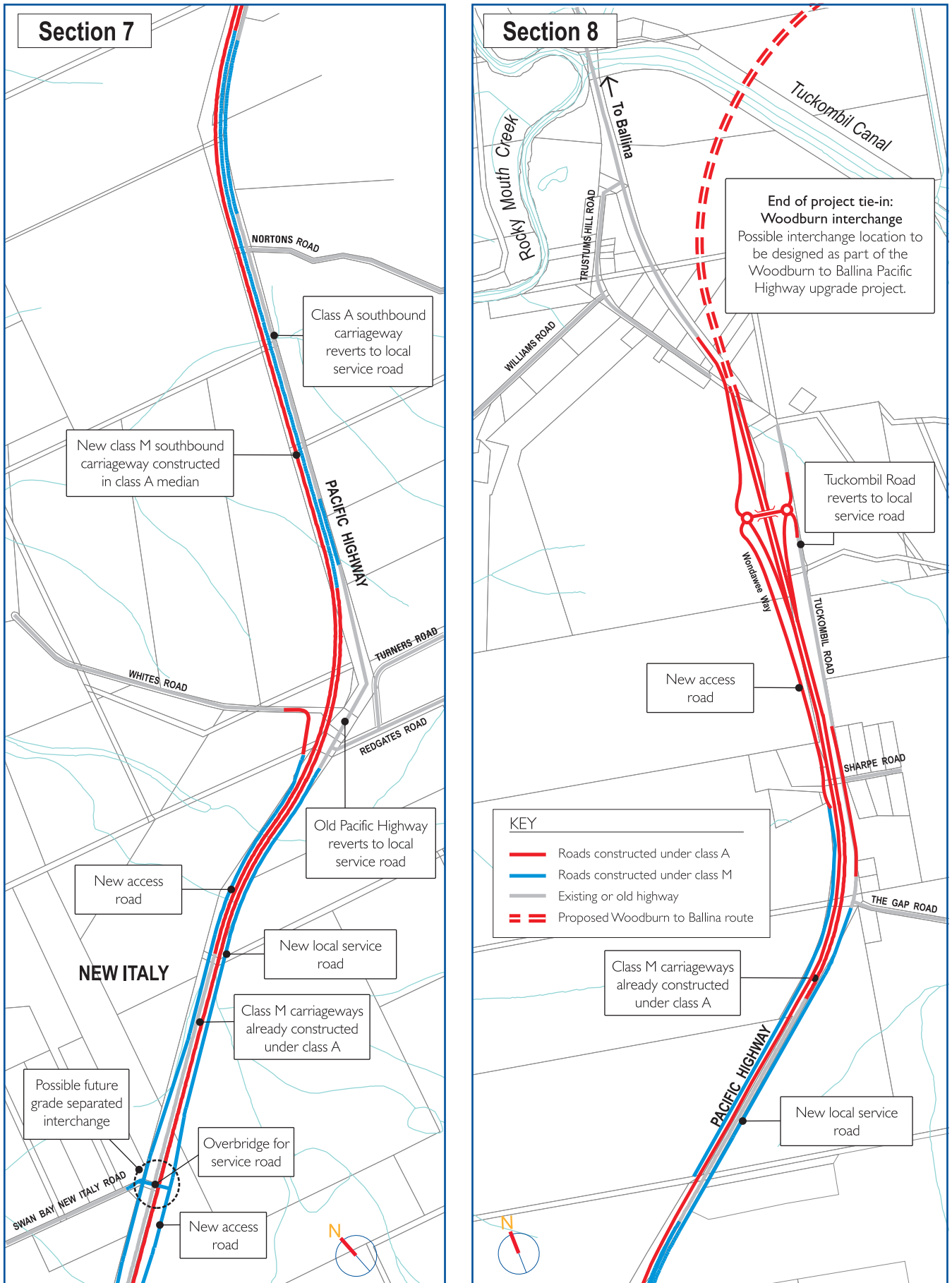


Figure 6.5e

Preferred Concept Design - Proposed Motorway (class M)