

NSW Roads and Maritime Services

WOOLGOOLGA TO BALLINA | PACIFIC HIGHWAY UPGRADE ENVIRONMENTAL IMPACT STATEMENT

MAIN VOLUME 1A

Chapter 5 – Description of the project – operation

Chapter summary

This chapter provides a detailed description of the project.

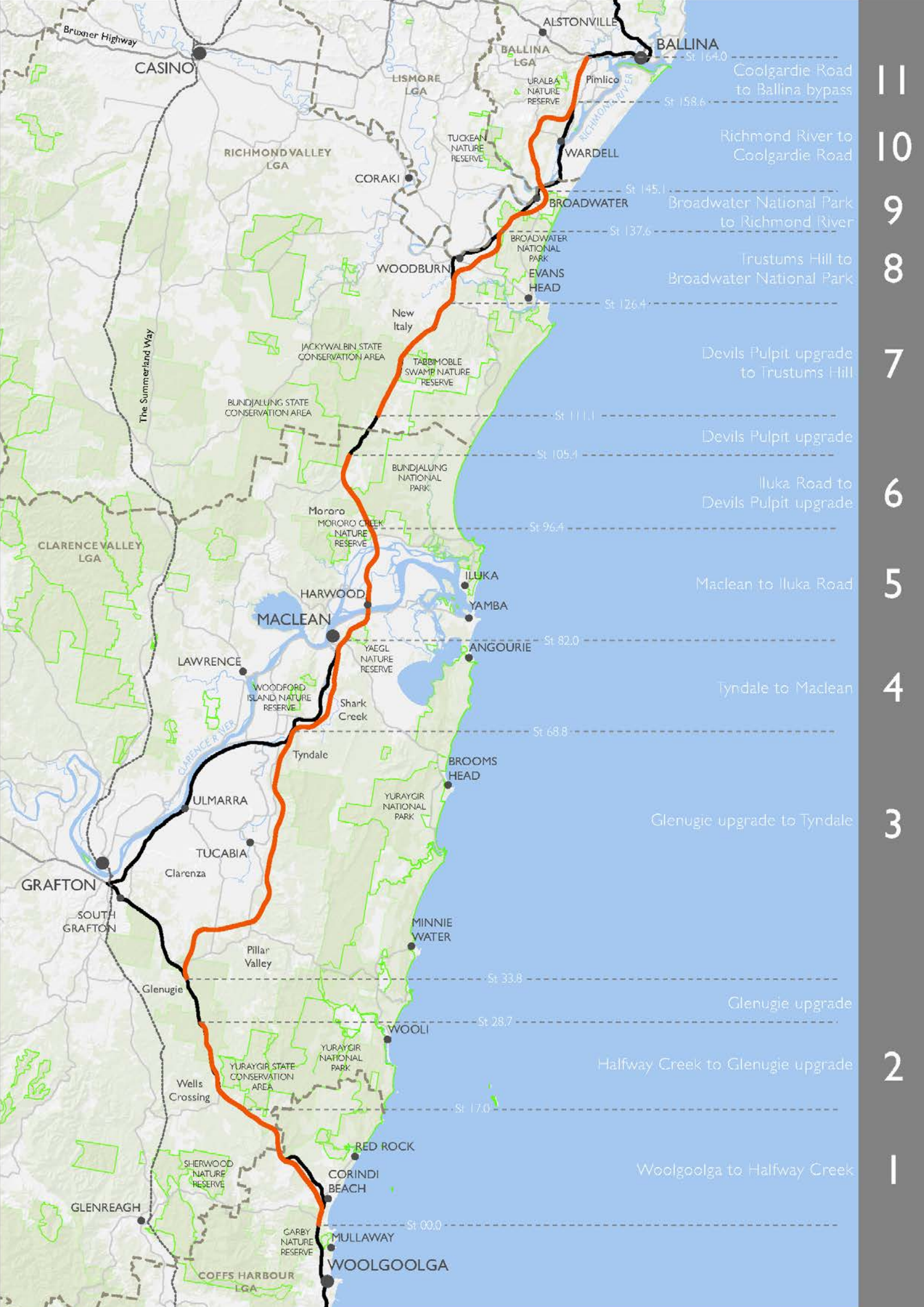
RMS is seeking project approval for a motorway standard highway comprising a four-lane dual carriageway (two lanes in each direction). The project would be staged, built initially to a combination of motorway (called class M) and arterial standard (called class A).

The project would be delivered in stages. This would be subject to funding and project approval. The design allows for the highway to be upgraded to a full motorway style highway in the future when warranted by increased traffic volumes.

For planning and consultation purposes, in addition to consideration of construction staging, the alignment has been divided into 11 sections. In some sections, for about sixty-eight kilometres the project would duplicate the existing highway; in others for about eighty-seven kilometres it would deviate from it.

Key elements of the project would include:

- The bypass of Grafton, South Grafton, Ulmarra, Maclean, Woodburn, Broadwater and Wardell
- Ten interchanges to provide access to and from the project. These would be located at Range Road (south), Corindi; Eight Mile Lane at Glenugie; Sheehys Lane (north), Tyndale; Goodwood Street, Maclean (south); south of Yamba Road, Maclean (north); Watts Lane at Harwood; Iluka Road to the south of Jubilee Street, Woombah; Trustums Hill Road, just south of Woodburn; Evans Head Road at Broadwater; and Coolgardie Road, north of Wardell
- Bridges to cross major waterways. These include major bridges for the crossings of the Clarence River and Richmond River. Bridges would also be required where the project would cross low-lying or flood-prone areas
- Service roads and access roads. These would maintain connections to existing local roads and properties. Overpasses and underpasses would be required to maintain access along local roads crossed by the project
- Five rest areas, located every 50 kilometres or so for both northbound and southbound traffic. These would be located at Pine Brush, Tyndale (north and southbound), north of Mororo Road (southbound), and north of Richmond River (north and southbound)
- Heavy vehicle checking stations for near Halfway Creek and within the Richmond River rest area
- Structures to help wildlife cross above or below the project. These would include four land bridges that would provide connectivity with Tabbimoble Nature Reserve, Broadwater National Park (two crossings), and habitat north of Wardell; and three median crossings for arboreal mammals and eight dedicated culverts.



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5. Description of the project – operation

This chapter provides a detailed description of the project including the alignment of the route, relevant design criteria and the key design features. The construction of the project is described in Chapter 6.

Director-General's Requirements	Where addressed
<p>The Environmental Impact Statement (EIS) must be prepared in accordance with and meet the minimum requirements of Part 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation) and include the following:</p> <ol style="list-style-type: none"> 1. the information required under clause 6 of Schedule 2 of the Regulation; and 2. the content listed in clause 7 of Schedule 2 of the Regulation. 	<p>Chapter 5 Chapter 6: Description of the project – construction</p>

5.1 Overview of the project

This overview presents a summary of the key project features. More details are provided in the subsequent sections of this chapter.

5.1.1 Project scope

NSW Roads and Maritime Services (RMS) is seeking approval to upgrade the Pacific Highway between Woolgoolga and Ballina to a four-lane motorway standard highway (known as a class M highway). This section of the highway is about 155 kilometres long.

The construction of the project would be staged to include both arterial sections (known as class A) and motorway standard sections (known as class M). For sections of the project initially upgraded to arterial standard, the design allows for these sections to be upgraded to motorway standard in the future. Further details on the staging of the project are provided in Section 6.1.3.

At its southern end, the project would tie in to the northern extent of the Sapphire to Woolgoolga upgrade (about five kilometres north of Woolgoolga), which is currently under construction. At its northern end, the project would tie in to the southern extent of the recently opened Ballina bypass. This is about six kilometres to the south-west of Ballina.

The project excludes the highway upgrades at Glenugie and Devils Pulpit, located between Woolgoolga and Ballina. This is because both projects have been approved with the Glenugie upgrade already built and the Devils Pulpit upgrade construction underway. The project also does not include the upgrade of the existing dual carriageways located at Halfway Creek. The project would provide a service road along the length of this section only.

This chapter describes the full motorway standard upgrade. Any part of the project that would initially be upgraded to arterial standard is described by exception. Reference in this project description to the 'initial upgrade', typically describes the project as it would be initially built, which may be an arterial standard or a combination of arterial and motorway standard.

KEY TERM – class M (Motorway standard) / class A (Arterial standard)

Class M: Two lanes in each direction, 110 km per hour posted speed limit, controlled access highway with grade separated interchanges, and a continuous alternative route for local traffic.

Class A: Two lanes in each direction, at least 100 km per hour posted speed limit, limited access highway with at-grade intersections. This may include intersections where right turn movements are permissible. Under class A, local traffic and through traffic could share the highway.

5.1.2 Project features

The project is for a motorway standard highway with the following features:

- A four-lane dual carriageway (that is, two lanes in each direction, with the carriageway separated by a median). There would be sufficient space to accommodate an upgrade to a six-lane dual carriageway in the future
- Bypasses of Grafton, South Grafton, Ulmarra, Woodburn, Broadwater and Wardell
- Interchanges, enabling access to and from the project, at:
 - Range Road, Corindi (full interchange)
 - Eight Mile Lane, Glenugie (two half-interchanges)
 - Sheehys Lane, Tyndale (two half-interchanges)
 - Goodwood Street, Maclean (full interchange)
 - Yamba Road, Harwood (one half-interchange)
 - Watts Lane, Harwood (one half-interchange)
 - Iluka Road, Woombah (full interchange)
 - Trustums Hill Road, Woodburn (full interchange)
 - Evans Head Road, Broadwater (one half-interchange)
 - Coolgardie Road, Wardell (full interchange)
- Ninety-five bridges. These would include major bridge crossings of the Clarence and Richmond rivers. 40 of these bridges would be waterway or floodplain crossings. The bridges would include embankment or viaduct structures where the project would cross low-lying or flood-prone areas. These include across the Corindi River floodplain, Coldstream River, Pillar Valley, Shark Creek, and Emigrant Creek. The remaining 55 bridges would be overpasses and underpasses to maintain access to properties along local roads crossed by the project
- Structures to retain connection for fauna between habitats either over or under the upgrade, including three widened median crossings for arboreal mammals, eight dedicated culverts and four land bridges
- Service roads and access roads to maintain connections to existing local roads and properties
- Rest areas located at around 50-kilometre intervals at:
 - Pine Brush, Tyndale (northbound and southbound lanes)
 - North of Mororo Road (southbound lanes)
 - North of Richmond River (northbound and southbound lanes)
- An inspection station for heavy vehicles near Halfway Creek and at Richmond River rest area
- Tie-ins to connect the project to the local road network and other sections of the Pacific Highway
- Water quality basins (ponds) and surface water drainage
- The realignment of about 500 metres of Picaninny Creek and 200 metres of Eversons Creek
- Emergency stopping facilities, U-turn bays, and bus stops
- The relocation of utilities and provision of roadside furniture, fencing (including fauna exclusion fencing) and lighting.

5.1.3 Project design

This chapter presents a description of the concept design for the project. The concept design confirms the feasibility of the upgrade to a motorway standard and determines the extent of property acquisition required. The design features described are indicative only. Sufficient flexibility has been provided in the design to allow for its refinement during detailed design or in response to any submissions received following exhibition of the EIS or to minimise environmental impacts. The final design may therefore vary from the concept design presented in this chapter.

Road design

The project design follows the draft Pacific Highway Design Guidelines (RTA, October 2009 Version R.2) and the Guide to Road Design (Austroads, 2010).

In general, where the project would duplicate the existing highway (that is, add two lanes to the current alignment), the initial upgrade would be to arterial standard. Where the project deviates along a new alignment, the initial upgrade would be to a motorway standard.

The key features of the arterial standard upgrade compared with the motorway standard upgrade are presented in Table 5-1.

Table 5-1: Comparison of motorway and arterial upgrade features for the project

Feature	Motorway standard	Arterial standard
Highway	A divided road with two lanes in each direction and a median sufficiently wide to allow further upgrade to three lanes in each direction (six lanes in total), when required.	
Access	Controlled access only. No direct public access would be allowed to the carriageways between interchanges. Service road access to the project would be limited to on-ramps and off-ramps at interchanges.	Intersections for initial arterial roads. Left-in, left-out, seagull intersections and U-turn facilities would be provided.
Interchanges	Interchanges would be grade-separated with no cross-carriageway movements. Full acceleration and deceleration lanes would be provided to on-ramps and off-ramps.	Motorway standard interchanges would be provided in view of future conversion of the highway from an arterial road to a motorway standard.
Posted speed limit	110 kilometres per hour.	At least 100 kilometres per hour.
Access	No direct access to the project would be provided between interchanges. Access from service roads to the highway would be limited to on-ramps and off-ramps only at interchanges. (This is referred to as 'controlled access'.)	Property access roads and local roads would join the highway as left-in, left-out intersections. These intersections would be at grade.
Intersections	All entry to, exit from and crossings of the main carriageways would be via interchanges.	Entry to and exit from the main carriageways would be via interchanges. However, intersections would also provide local connections to the highway. Intersections would be built at a common level, but generally no right turns would be allowed.
Alternative routes	A continuous alternative route (service road) would be provided with a desirable design standard of 80 kilometres per hour where possible. RMS would confirm the posted speed limit in consultation with local councils.	A continuous alternative route to the main carriageway would not be provided.
U-turn facilities	No U-turn facilities would be provided. Arterial standard U-turn bays would be closed to the public.	U-turn facilities would be provided on both sides of a property access and local road intersections for use by the public.
Emergency crossover facilities	Combined crossover/U-turn facilities would be provided for emergency use only, every 2.5 kilometres or so.	Combined crossover/U-turn facilities would be provided for emergency use only, every 2.5 kilometres or so.

KEY TERM – Intersections/ interchange

Intersection: An intersection where carriageways cross at a common level (at-grade).

Interchange: A grade separation of two or more roads with one or more interconnecting carriageways.

The project has been designed so that it can be upgraded to three lanes in each direction when needed. Key features include:

- A wide central median to allow for the construction of the additional lanes when needed in the future
- Overpasses that have been designed to allow for the construction of the additional lanes.

If it is proposed, at a later date, to widen the highway to six lanes, other features of the project including bridges and culverts would require further widening or lengthening. The provision of additional lanes and associated works would be subject to a separate environmental impact assessment and approval process.

The project design for the main carriageways meets the parameters of the Pacific Highway Design Guidelines, as shown in Table 5-2.

Table 5-2: Project design criteria for main carriageways

Design Element	Motorway and arterial standard criteria
Design speed	110 kilometres per hour (potentially reduced to 100 kilometres per hour at some locations where vertical geometry requires)
Posted speed limit	110 kilometres per hour At least 100 kilometres per hour for initial arterial upgrade
Traffic lane width	3.5 metres
Nearside shoulder widths	2.5 metres (with no safety barrier) 3 metres (with safety barrier)
Offside shoulder widths	0.5 metres
Median width	Typically 12 metres wide where future widening to six lanes would occur in the median. Five metres wide where future six lanes would occur on the outside of the project formation at Woodburn.
Clear zone	11 metres
Minimum horizontal radius	1200 metres desirable 750 metres minimum
Maximum vertical grade	4.5 per cent desirable 6.0 per cent absolute maximum
Vertical clearance of bridges from highway pavement	5.5 metres desirable 5.3 metres minimum
Design vehicle	19.5 metre semi-trailer 25 metre B-double
Stopping sight distance (reaction time) on main carriageway	221 metres (2.5 seconds) for 100 kmh 260 metres (2.5 seconds) for 110 kmh
Pedestrians access	No provision for pedestrian access to the main carriageways. Pedestrian footways 1.5 metres wide would be provided on bridges where required.

Design Element	Motorway and arterial standard criteria
Cyclist access	Provision for cyclists to use the road shoulders (2.5 to 3 metres wide), including across bridges.
Flood immunity	Carriageways flood-free for the 1 in 20-year flood event on the Clarence and Richmond River floodplains and the 1 in 100-year flood event elsewhere.

Service and access roads

The project includes a continuous alternative route, comprising 'service roads', for local and regional traffic. Service roads are suitable for all classes of vehicles except oversized vehicles and B-double trucks.

Access roads would be built to maintain access to local roads and properties that currently have direct access to the existing Pacific Highway. These access roads would connect to a service road or local road, and would be provided as part of the project. Table 5-3 lists the design criteria for service and access roads.

Table 5-3: Design criteria for service and access roads

Design element	Service road*	Access road
Horizontal alignment	80 kilometres per hour	60 kilometres per hour or greater to match existing
Vertical alignment	80 kilometres per hour	60 kilometres per hour or greater to match existing
Posted speed limit	80 kilometres per hour typically or to match existing speed	60 kilometres per hour typically or to match existing speed
Stopping sight distance (reaction time)	100 metres (1.5 seconds)	45 metres (1.5 seconds)
Lane width	3.5 metres	3 metres or more to match existing width
Shoulder width	2 metres	0.5 metres minimum, or greater to match existing width
Flood immunity	1 in 20-year flood event	1 in 10-year flood event

* Service roads would be either parts of the existing highway (if available), upgraded local roads or new roads.

Landscape design

The concept design for the project has been developed using RMS' Pacific Highway Urban Design Framework (RTA, 2005), which sets the following urban design objectives for the Pacific Highway Upgrade Program:

- Provide a flowing road alignment that is responsive and integrated with the landscape
- Provide a well vegetated, natural road reserve
- Provide an enjoyable, interesting highway
- Value the communities and towns along the road
- Provide consistency-with-variety in road elements
- Provide a simplified and unobtrusive road design.

The urban design and landscape strategy responds to the landscape character and setting of the NSW North Coast region, while minimising adverse visual impacts. The landscape strategy for the project is to:

- Retain the strong contrasting experience of driving through forest and open agricultural land as a feature of the Pacific Highway experience

- Acknowledge and highlight the small and medium sized coastal towns that mark progress along the coastal Pacific Highway journey
- Highlight numerous minor and major creek and river crossings across the Pacific Highway journey over the coastal floodplains
- Acknowledge and preserve the natural and cultural landscapes and landmarks identified along the full length of the Pacific Highway journey.

To achieve these strategies, the project would incorporate urban design and landscape key objectives and design principles that are consistent with the Beyond the Pavement (RTA, 2009) and Pacific Highway Urban Design Framework (RTA, 2005) guidance documents. These are provided in Working paper – Urban design, landscape character and visual impact.

The cross-sections of a typical motorway standard road and an arterial standard road are shown in Figure 5-1 and Figure 5-2.

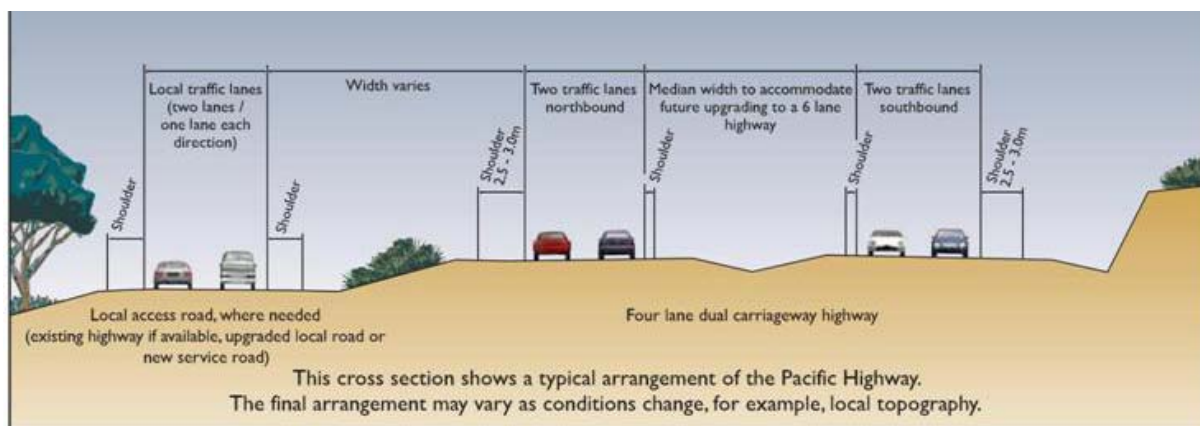


Figure 5-1: Typical cross-section of a motorway standard road (Class M) (indicative only)

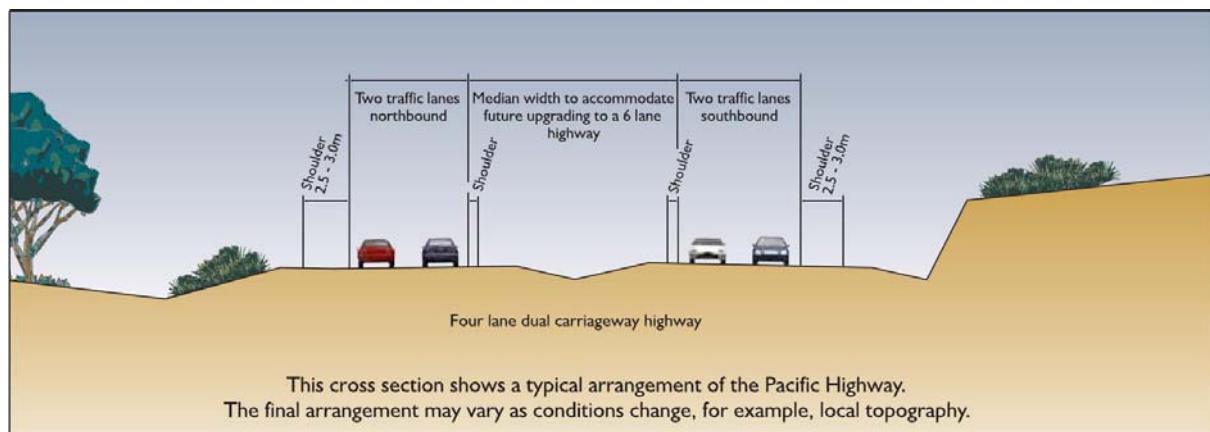


Figure 5-2 Typical cross section of an arterial standard road (Class A) (indicative only)

5.1.4 Project sections

For planning and consultation purposes, in addition to consideration of construction staging, the alignment has been divided into 11 sections, as shown in Table 5-4. These sections are divided between tie-ins with the existing Pacific Highway. The sections are numbered sequentially from south to north. An overview of the project alignment and the locations of the 11 project sections are shown in Table 5-4.

Table 5-4: Project sections

Project section	Location	Station		Length (kilometres)
		Start	Finish	
1	Woolgoolga to Halfway Creek*	0	17.0	17.0
2	Halfway Creek to Glenugie upgrade	17.0	28.7	11.7
3	Glenugie upgrade to Tyndale	33.8	68.8	35.0
4	Tyndale to Maclean	68.8	82.0	13.2
5	Maclean to Iluka Road, Mororo	82.0	96.4	14.4
6	Iluka Road to Devils Pulpit upgrade	96.4	105.6	9.2
7	Devils Pulpit upgrade to Trustums Hill	111.1	126.4	15.3
8	Trustums Hill to Broadwater National Park	126.4	137.6	11.2
9	Broadwater National Park to Richmond River	137.6	145.1	7.5
10	Richmond River to Coolgardie Road	145.1	158.6	13.5
11	Coolgardie Road to Ballina bypass	158.6	164.0	5.4

*This section includes 2.5 kilometres of existing dual carriageway (previously completed Halfway Creek Duplication).

KEY TERM – Station

Station refers to a fixed point. The station is expressed as a number when indicating the location and distance of a station from a starting point. In this EIS, the station is the distance (in kilometres) from the start of the project.

Further information on construction staging and delivery is provided in Chapter 6 (Description of the project – construction).

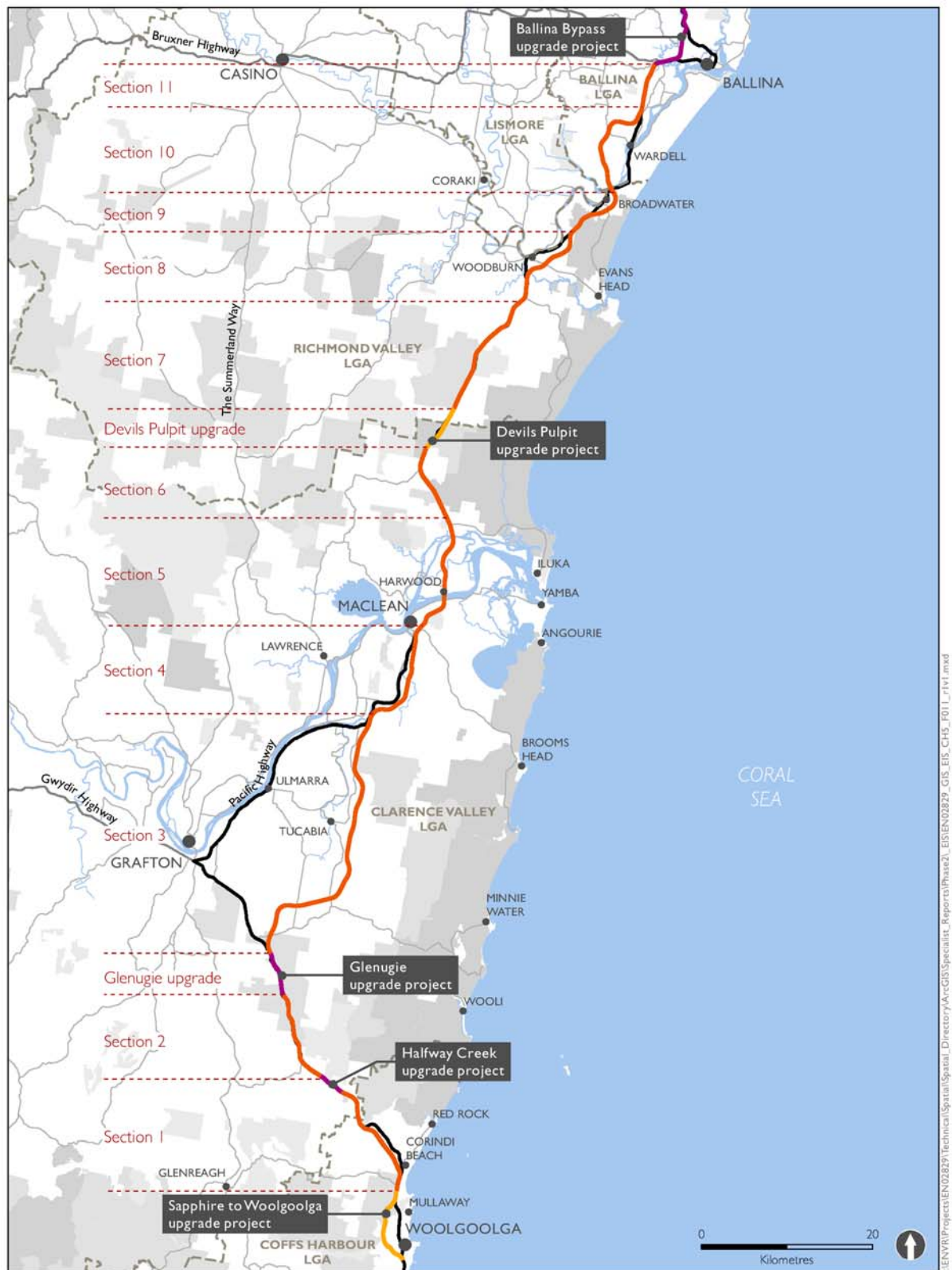


Figure 5-3: Project alignment and project sections

5.2 Description of the alignment

The project would either duplicate or deviate from the existing Pacific Highway. Typically, where the project duplicates the highway, only one new carriageway would be constructed. The existing highway would become either the northbound or southbound carriageway of the project. In these locations there would be minor adjustments to the grade and alignment of the road. The upgrade of existing carriageways would ensure the re-used carriageway meets current design standards. Where the project deviates from the existing highway, two new carriageways would be constructed. The existing highway would then become a service road.

KEY TERM – Duplication

Conversion of a single carriageway highway to dual carriageway on the existing alignment

As part of the upgrade to motorway standard, the project would remove direct property access to the highway for properties currently located adjacent to it. In those areas where the project deviates from the existing highway, property access would be maintained to the existing highway (which would become a service road). In those areas where the existing highway would be duplicated, property access would be provided to new service roads adjacent to the highway.

KEY TERM – Deviation

Construction of a dual carriageway highway away from the existing highway alignment

The project sections are described in the following sections, based on a direction of travel from south to north.

5.2.1 Woolgoolga to Halfway Creek (Section 1)

The section between Woolgoolga to Halfway Creek (Section 1) would be about 17 kilometres long. It would extend from Arrawarra Beach Road, Arrawarra (about six kilometres north of Woolgoolga) to the northern end of the completed Halfway Creek upgrade at Lemon Tree Road, Halfway Creek.

Section 1 is described below and shown in Figure 5-4 to Figure 5-12.

Motorway standard

Between Arrawarra Beach Road and Eggins Drive, the project would duplicate the existing highway for about 9.6 kilometres. A northbound carriageway would be constructed on the western side of the existing highway adjacent to Wedding Bells State Forest and the existing highway would become the new southbound carriageway.

Between Eggins Drive and Range Road, the project would deviate about 600 metres to the west of the existing highway, west from the village of Corindi Beach, through the Corindi River floodplain. The project would rejoin the existing highway just before Range Road. The deviation would be about 7.7 kilometres long.

Access to the project would be via two interchanges located at:

- Arrawarra Beach Road (to be constructed as part of the Sapphire to Woolgoolga project) at the southern end of the project
- Range Road, Corindi. Access to the highway would be via two roundabouts and on-load and off-load ramps, with an access road below the main carriageways linking Kathleen Drive and Range Road to the existing Pacific Highway.

Existing roads would be altered as follows:

- A service road would be provided on the eastern side of the project between Arrawarra Beach Road and Eggins Drive, and between Range Road and Halfway Creek. The service road would connect with the local road network to provide access to Arrawarra via Arrawarra Beach Road. Motorists using the existing highway would access the service road to the west of the project, via a new local access road at Corindi (station 6.15). At McPhillips Road, an access road would provide access between properties to the east of the project and the proposed service road. Sherwood Creek Road, Arrawarra (station 1.1) would be realigned north and pass over the upgraded highway to connect with the proposed service road. Overbridges would retain local road connections for Sherwood Creek Road, Kangaroo Trail Road (station 2.5), McPhillips Road (station 13.5) and Grays Road (station 15.7)
- The current intersection with the existing highway at Eggins Drive, near Eggins Close, would be closed. Eggins Drive would become part of the service road network, providing access to the project via the interchanges at Arrawarra Beach Road and at Range Road, Corindi.

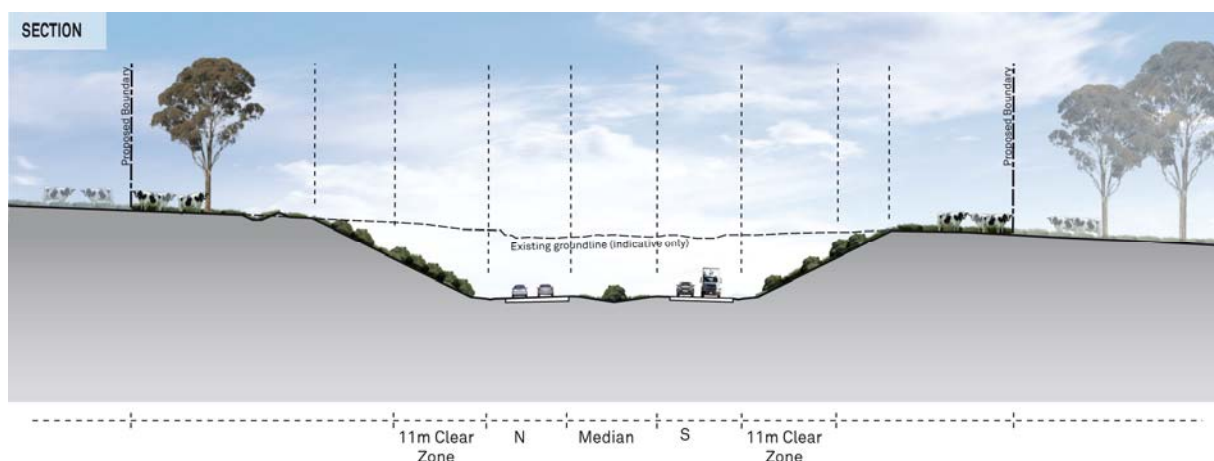
Twin bridges on the main carriageway would be provided across Corindi Creek, Corindi floodplain and Cassons Creek.

Section 1 includes the 2.5-kilometre section of recently completed upgrade at Halfway Creek. No changes would be required to the main carriageways at Halfway Creek. However, this section would require a service road to the west of the current dual-lane section from north of Dunmar Lane to the existing rest area south of Lemon Tree Road.

Initial upgrade to arterial standard

A number of intersections would provide left-in, left-out access to and from local roads and properties as part of an initial upgrade to arterial standard. These include intersections at Falconers Lane (northbound), McPhillips Road (southbound), a property access (northbound) about 200 metres west of McPhillips Road (station 14.0), and Dunmar Lane (northbound). These would be closed as part of the upgrade to motorway standard.

An indicative cross section of the alignment within Section 1 is shown below.



Typical cross section through rural land with 5 – 10 metre deep cuttings

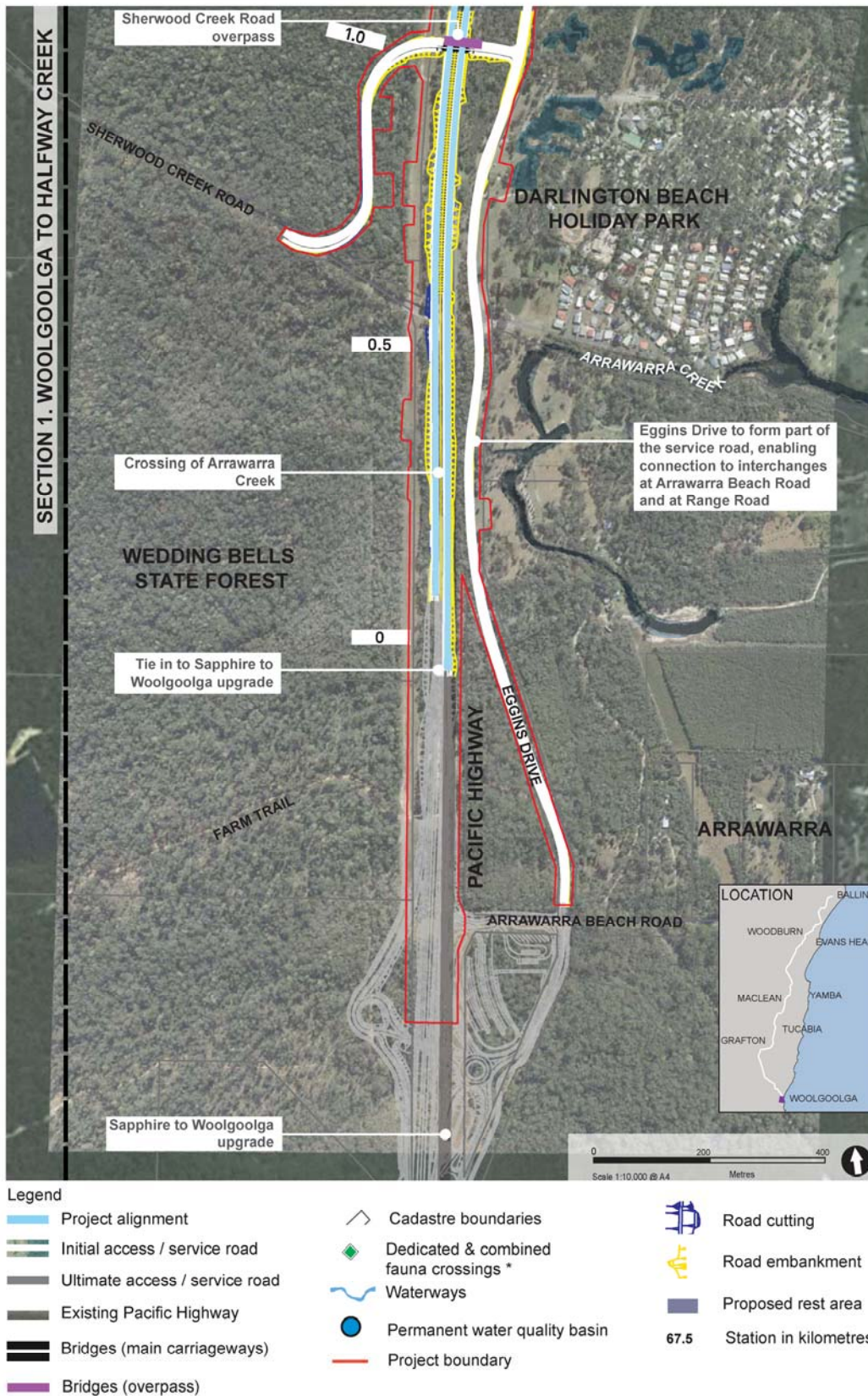


Figure 5-4: The project: Section 1 (Station 0 to 1.0)

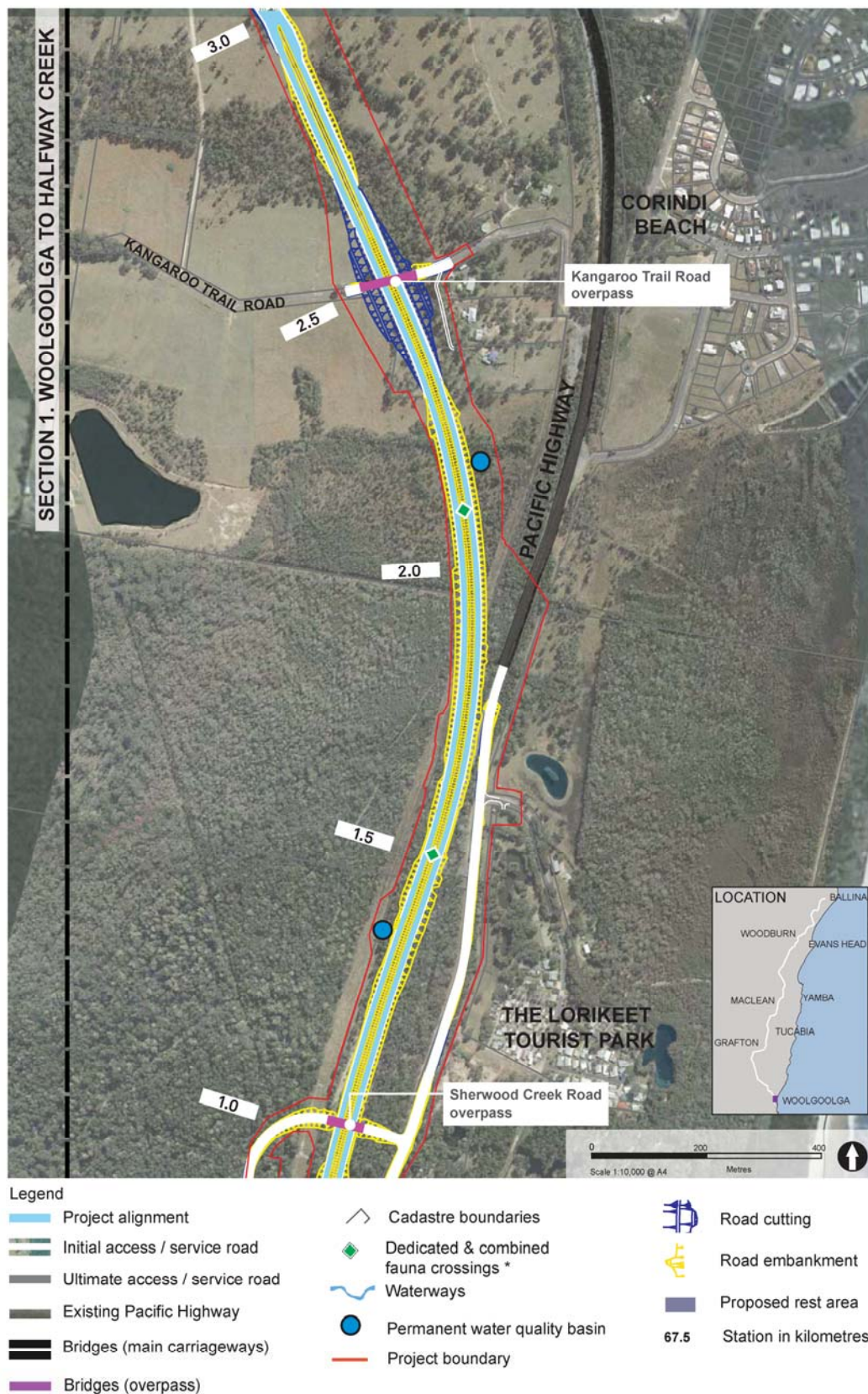


Figure 5-5: The project: Section 1 (Station 1.0 to 3.0)

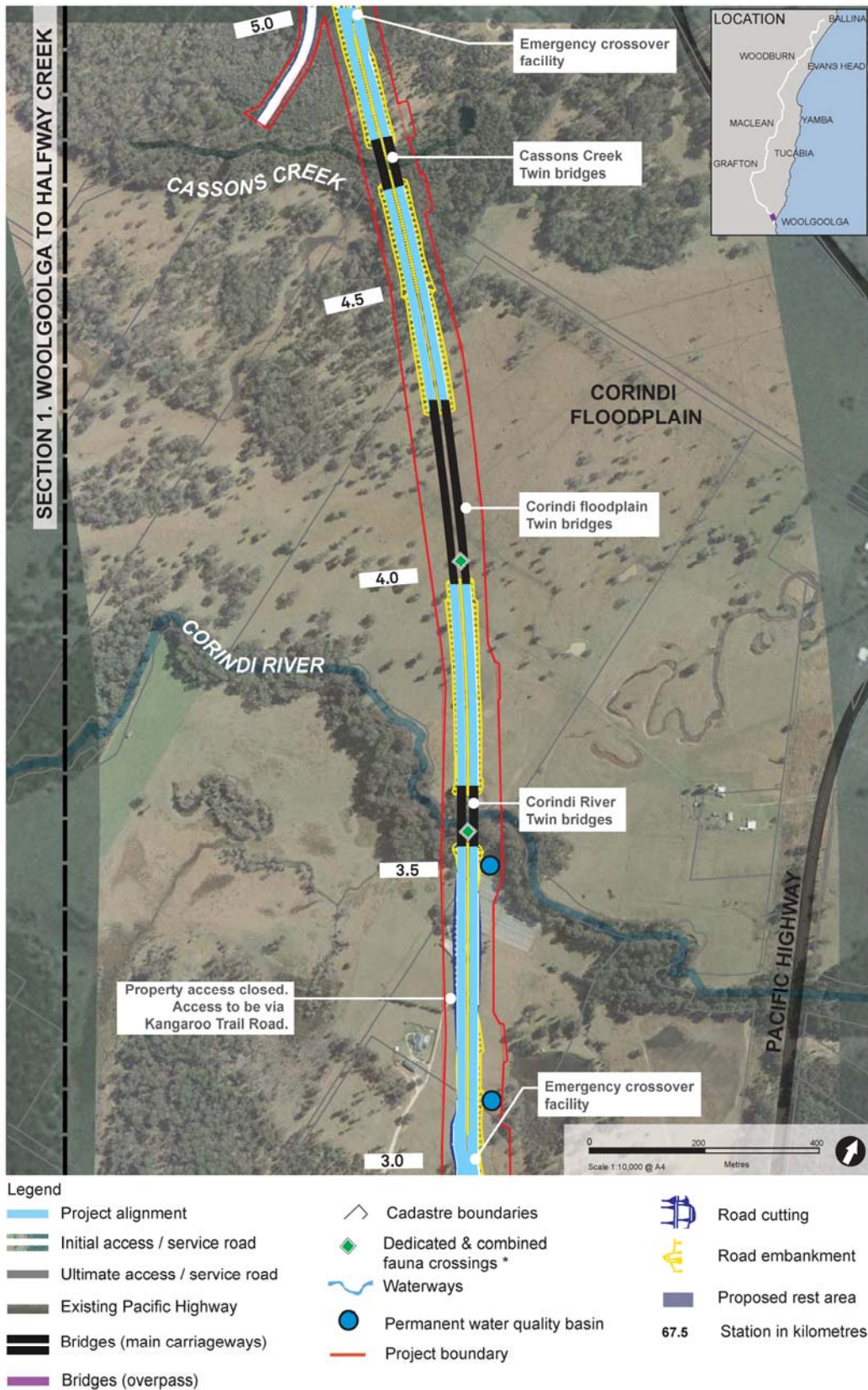


Figure 5-6: The project: Section 1 (Station 3.0 to 5.0)

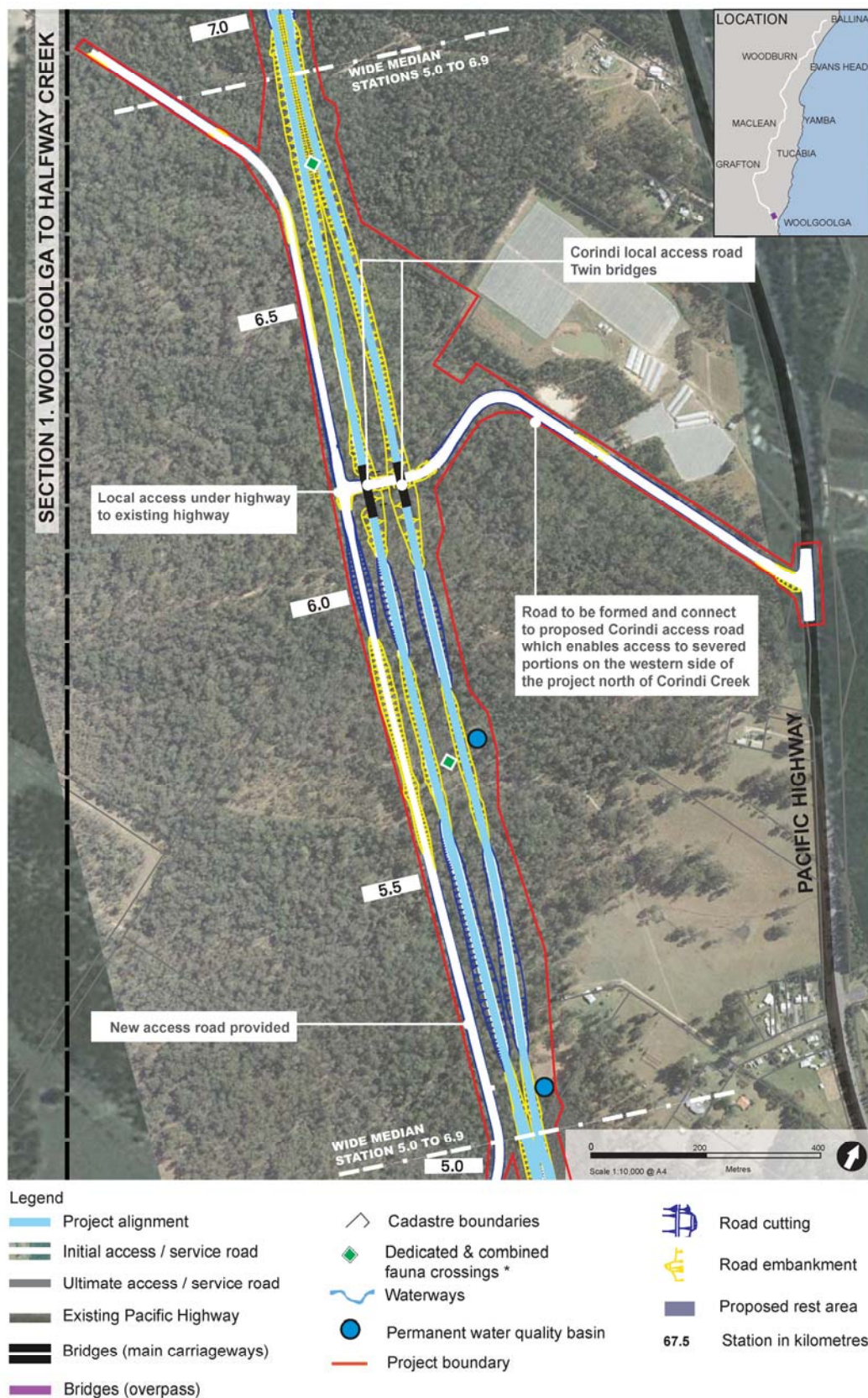


Figure 5-7: The project: Section 1(Station 5.0 to 7.0)

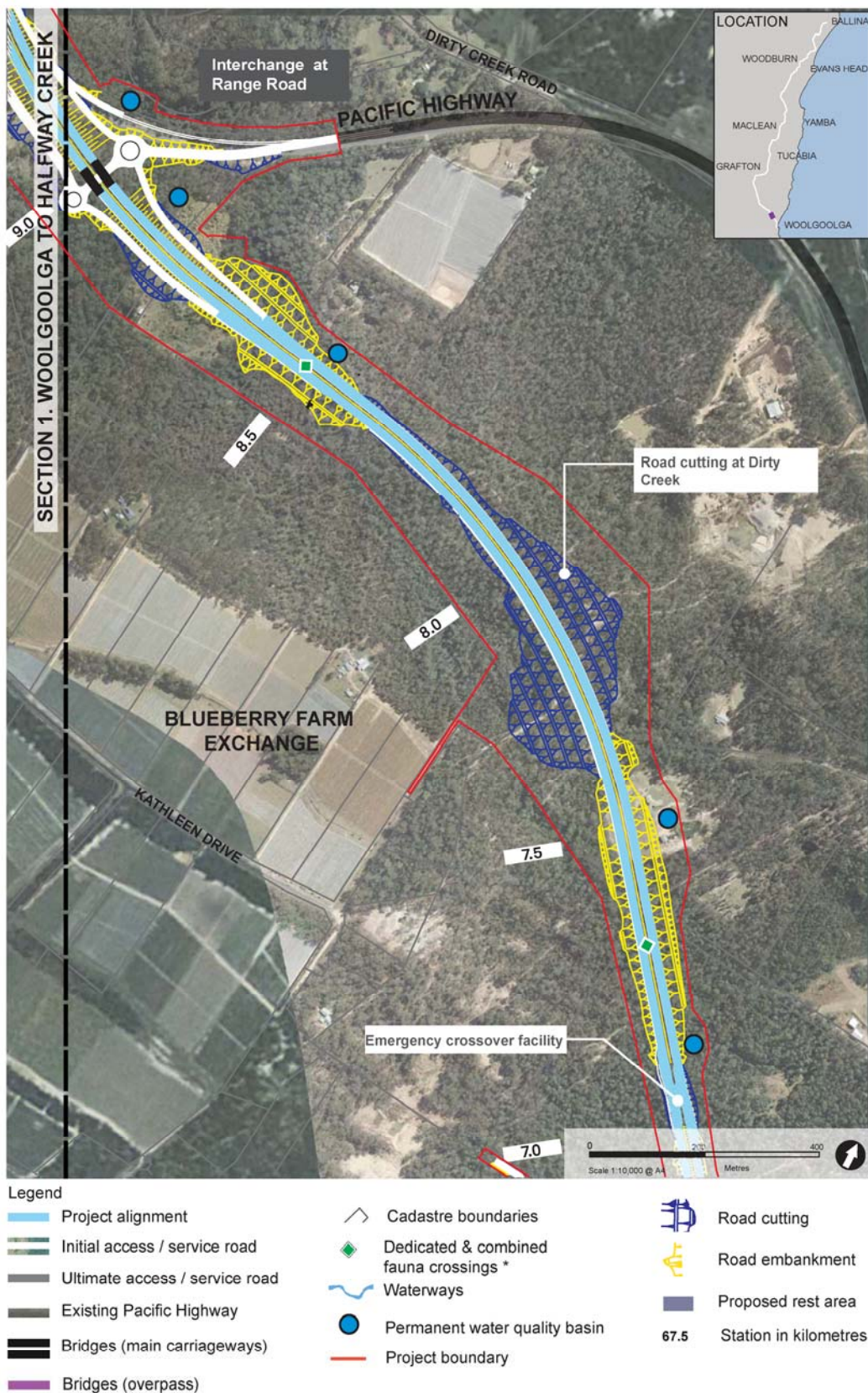


Figure 5-8: The project: Section 1 (Station 7.0 to 9.0)

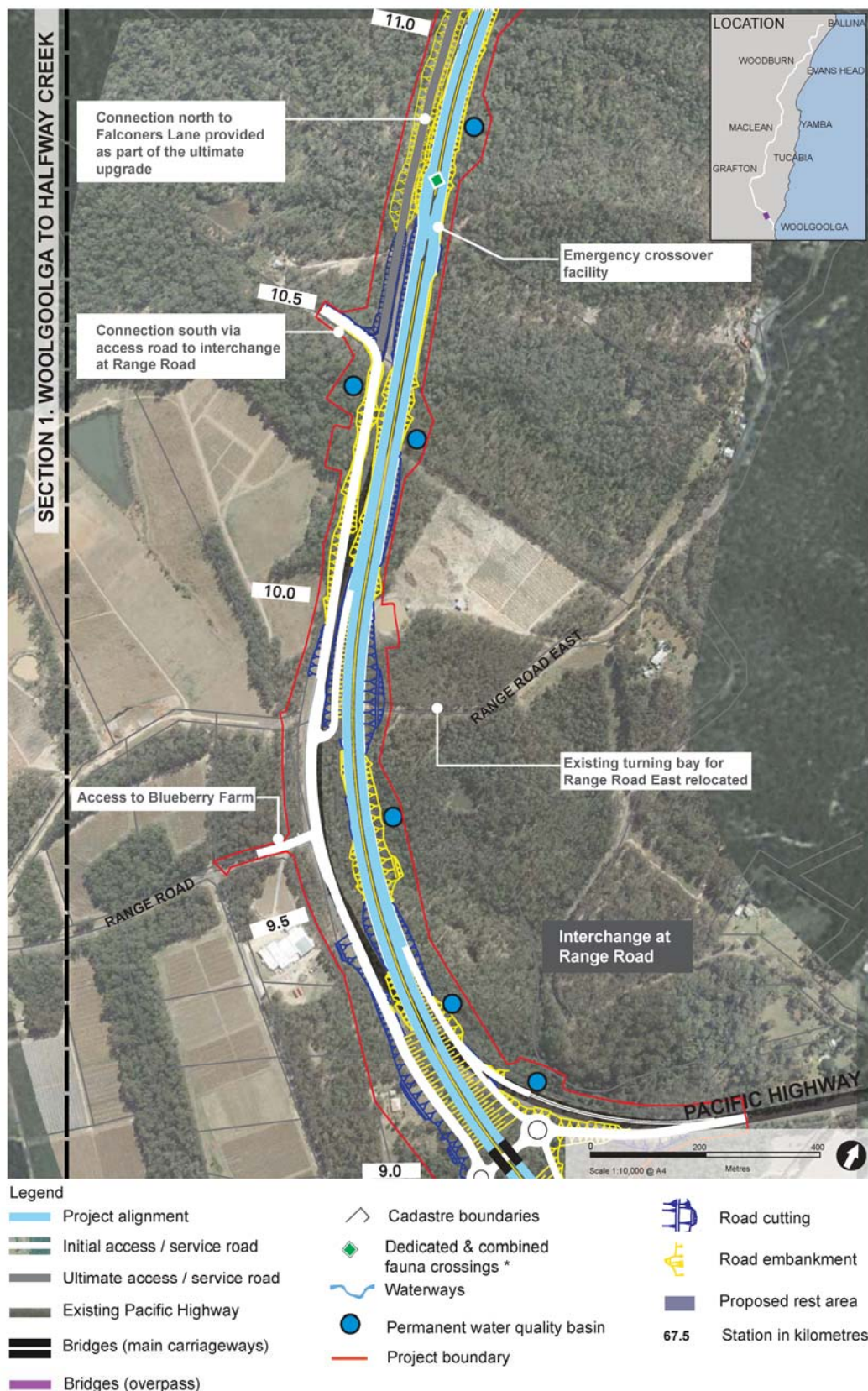


Figure 5-9: The project: Section 1 (Station 9.0 to 11.0)

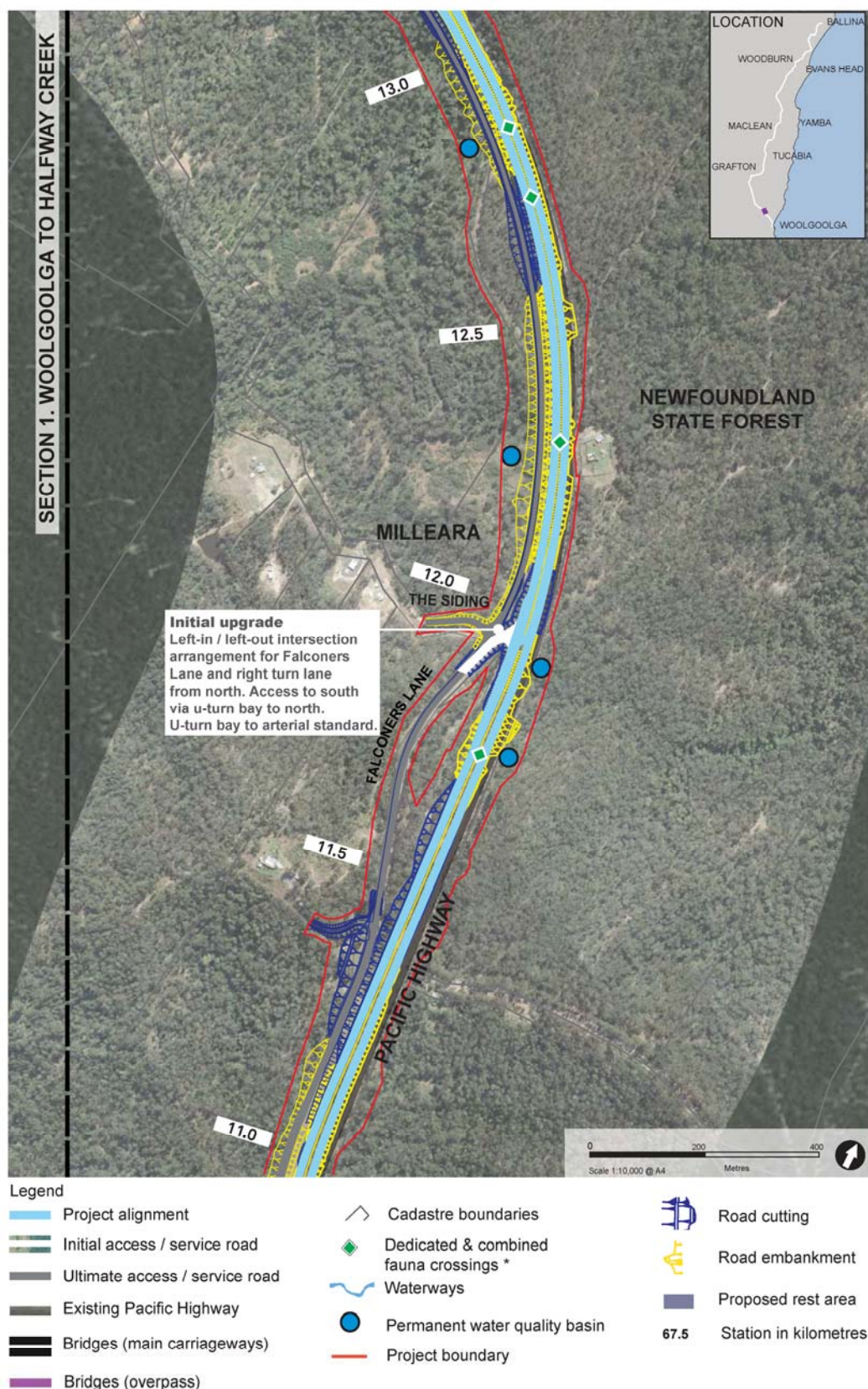


Figure 5-10: The project: Section 1(Station 11.0 to 13.0)

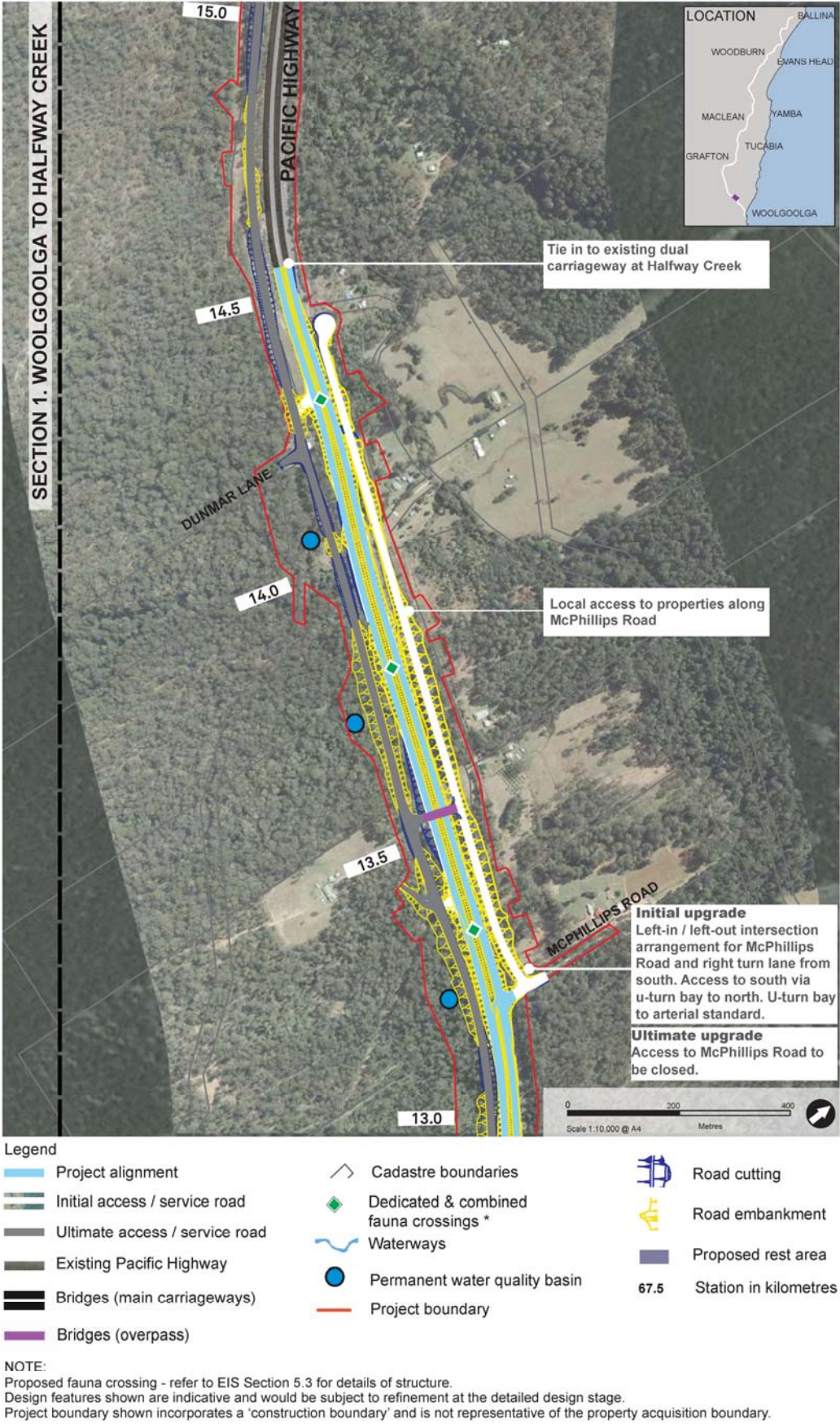


Figure 5-11: The project: Section 1 (Station 13.0 to 15.0)

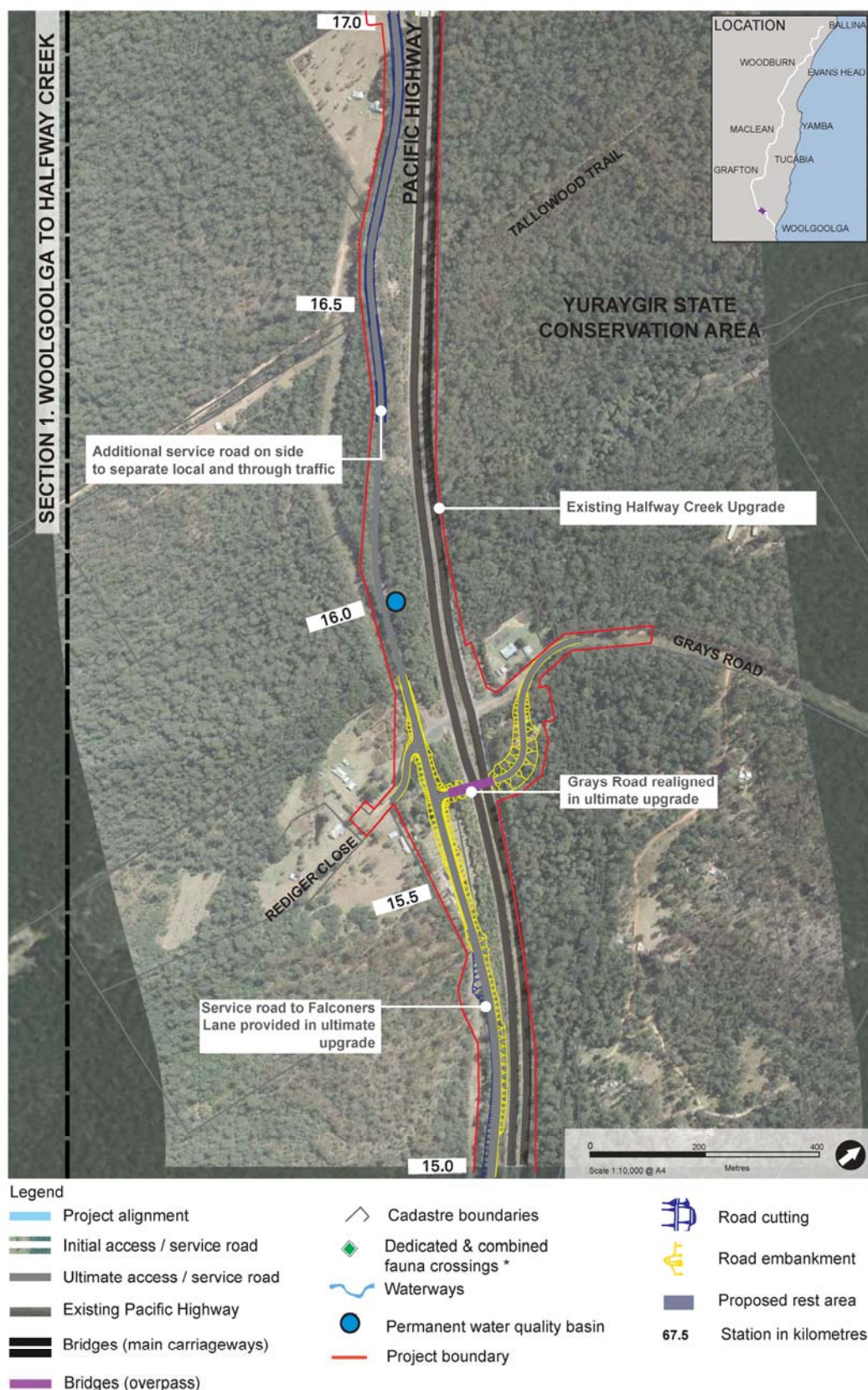


Figure 5-12: The project: Section 1 (Station 15.0 to 17.0)

5.2.2 Halfway Creek to Glenugie upgrade (Section 2)

The section between Halfway Creek to the Glenugie upgrade (Section 2) would be about 11.7 kilometres long. It would extend from the northern end of the current dual-lane section at Halfway Creek at Lemon Tree Road, to the southern end of the Glenugie upgrade at Franklins Road.

The entire length of Section 2 would be a duplication of the existing Pacific Highway alignment. It is described below and shown in Figure 5-13 to Figure 5-18.

Motorway standard

A service road would be constructed on the western side of the existing highway between Lemon Tree Road and Wells Crossing. North of Wells Crossing, the existing highway would be used as an access road. Properties to the east of the project would have access to the service road via overbridges at Lemon Tree Road and Luthers Road.

From Lemon Tree Road to Kungala Road, the project would duplicate the existing highway. A northbound carriageway would be constructed on the western side of the existing highway and the existing highway would become the southbound carriageway. From Kungala Road to Newfoundland State Forest, northbound and southbound carriageways would be constructed. The proposed carriageways would closely follow the existing highway. From Newfoundland State Forest to Franklins Road, the project would deviate to the east of the existing highway. This would be within areas currently forming part of the State forest estate: Wells Crossing Flora Reserve and Glenugie State Forest.

Alterations to local roads would include:

- Lemon Tree Road and Luthers Road, Halfway Creek would have access to the upgraded highway via an overpass to the service road
- Realignment of Bald Knob Tick Gate Road south and east of the current position. Access to the upgraded highway from Bald Knob Tick Gate Road would be via an overpass to the service road
- Realignment of Franklins Road to the east with access to the upgraded highway via an overpass to the service road. A connection to the service road would be provided for vehicles using Parker Road
- An underpass at Luthers Road to provide access across the upgraded highway.

In addition, twin bridges on the main carriageway would be provided over Halfway Creek (station 20.7) and over Wells Crossing Creek (station 23.4).

A dedicated aerial rope crossing at station 17.2 would be provided for arboreal mammals.

A checking station for heavy vehicles would be provided on the southbound carriageway at station 19.0 to the west of Halfway Creek and Sanctuary Drive. It would replace the existing southbound facility located about seven kilometres to the north at Glenugie.

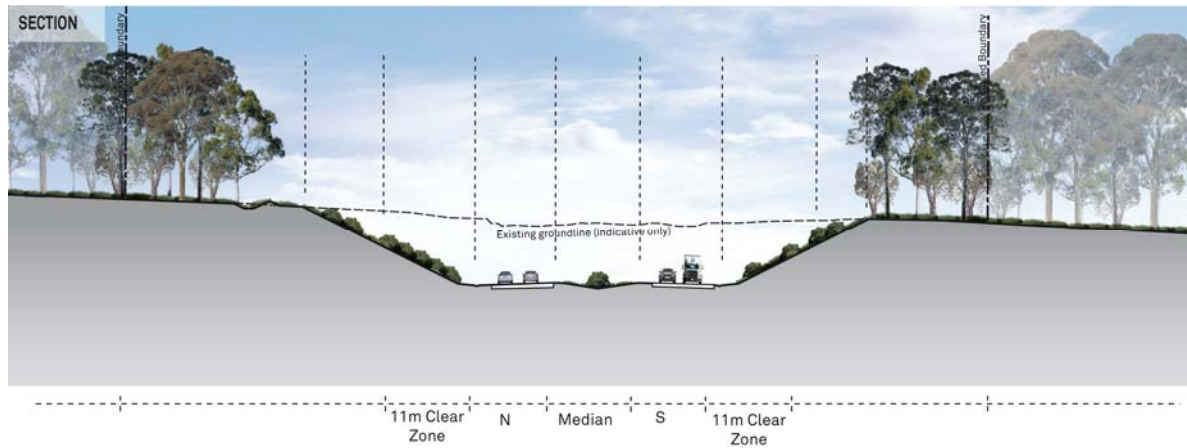
A wide median (about 30 metres) would be provided between station 22.5 and station 23.8. Two dedicated fauna crossings would be provided in this part of the project (an aerial crossing and a fauna underpass) to the north and south of Parker Road.

Initial upgrade to arterial standard

A number of intersections would be provided as part of the initial upgrade to arterial standard to allow direct access to the project. These would include intersections at Lemon Tree Road (southbound), Lemon Tree Access Road (southbound), Kungala Road (northbound), Luthers Road (southbound), Parker Road (northbound), Bald Knob Tick Gate Road (southbound), and Franklins Road (southbound). These would connect the upgraded highway to the local road network. These would be closed as part of the upgrade to motorway standard.

The intersection at Lemon Tree Road would accommodate turning movements for B-double trucks as Lemon Tree Road is a declared B-double route for a short length. There would be no change to the operation of the existing service station on the current southbound carriageway.

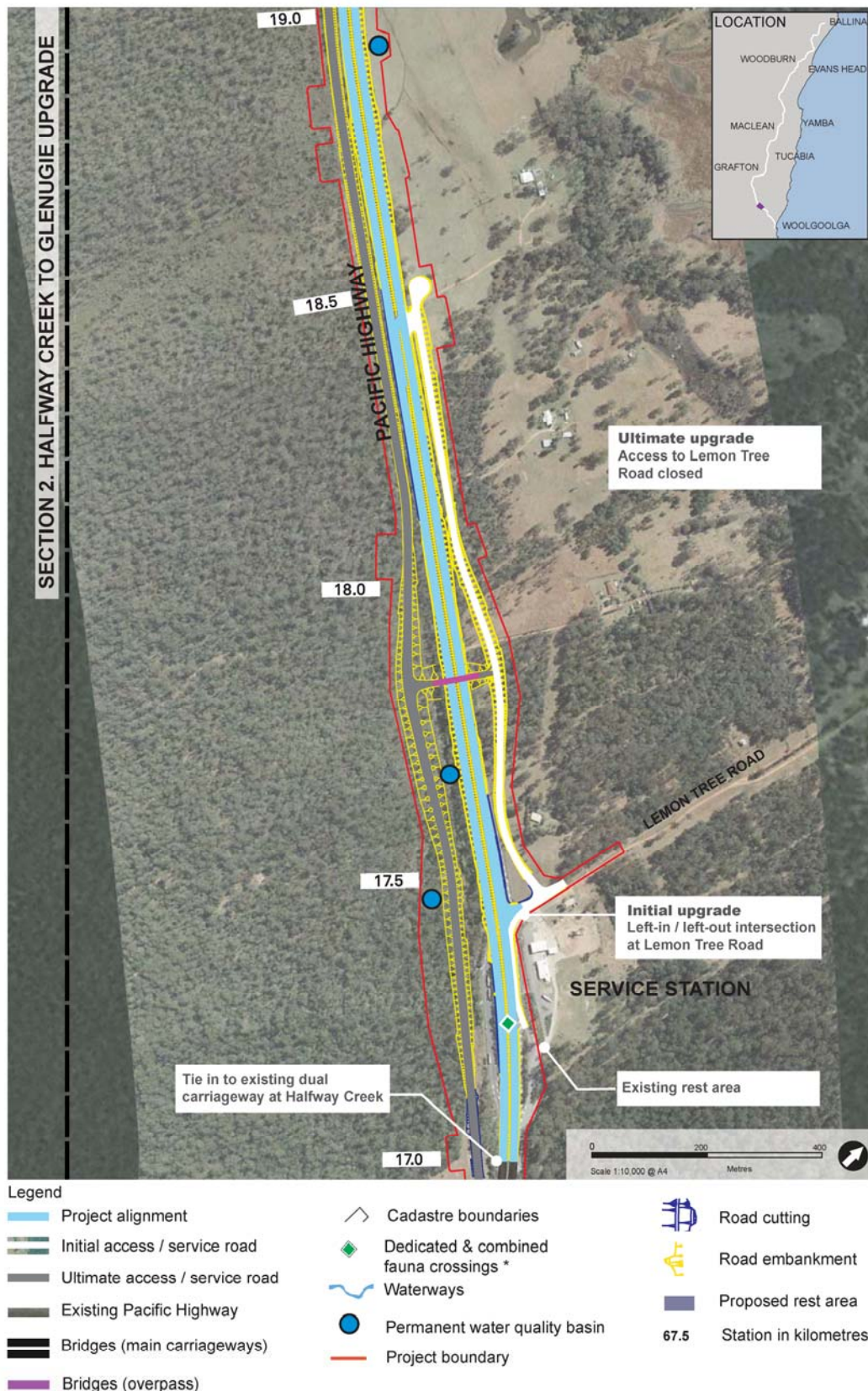
Indicative cross section of the alignment within Section 2 is shown below.



Typical cross section through forest with two to five metre deep cuttings



Photo 1: Existing Pacific Highway bridge over Halfway Creek



NOTE:
Proposed fauna crossing - refer to EIS Section 5.3 for details of structure.
Design features shown are indicative and would be subject to refinement at the detailed design stage.
Project boundary shown incorporates a 'construction boundary' and is not representative of the property acquisition boundary.

Figure 5-13: The project - Section 2 (Station 17.0 to 19.0)

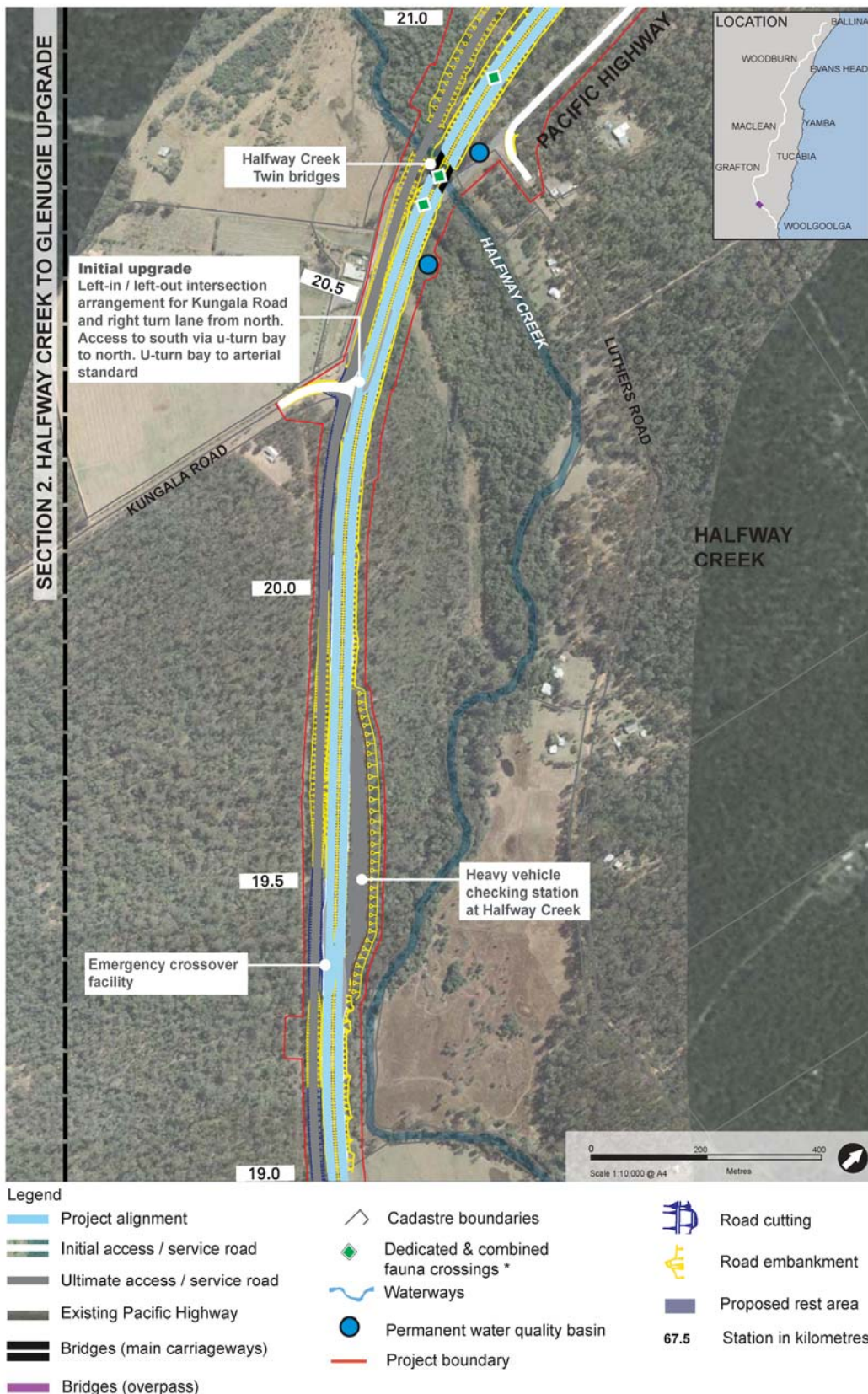


Figure 5-14: The project - Section 2 (Station 19.0 to 21.0)

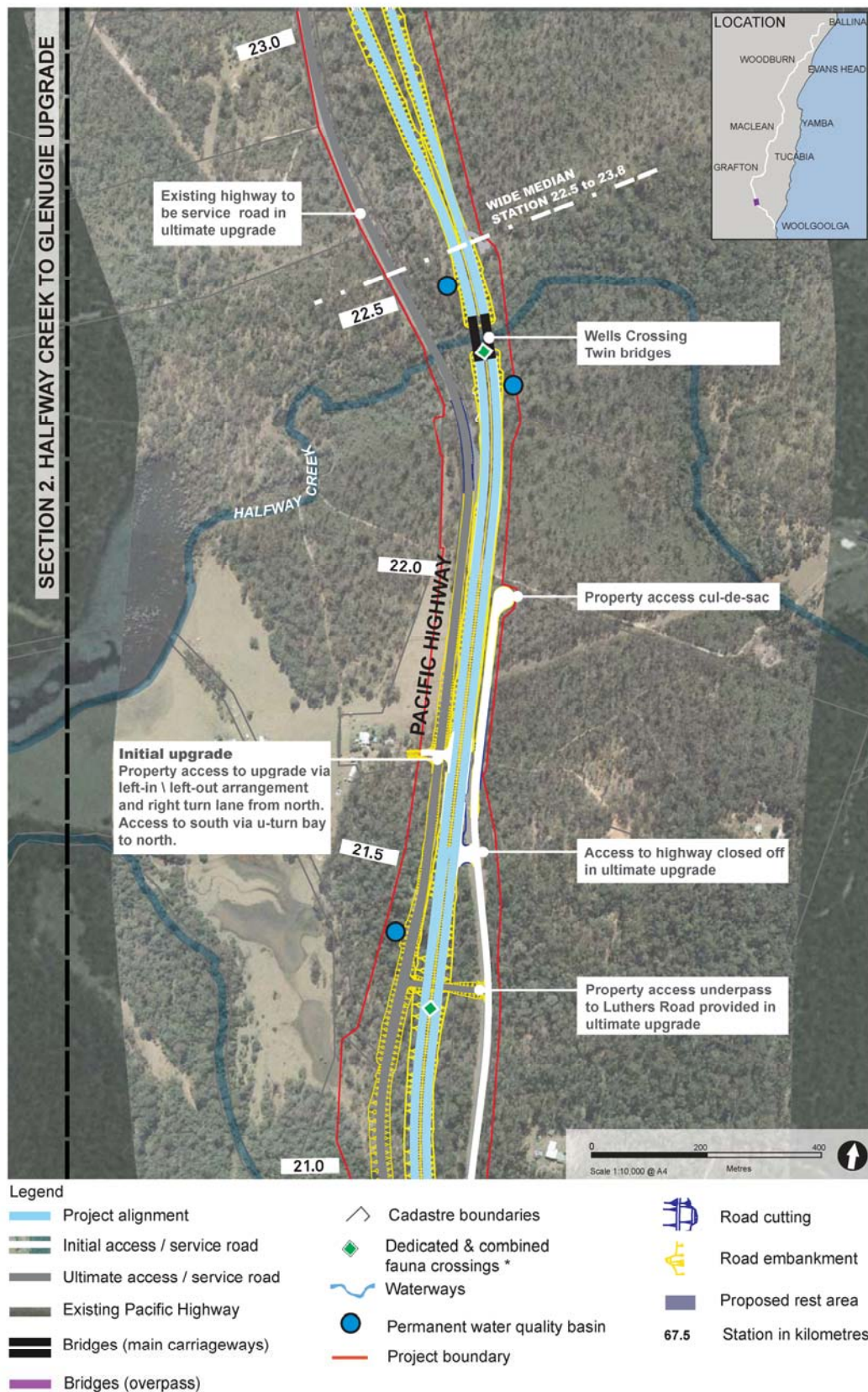


Figure 5-15: The project - Section 2 (Station 21.0 to 23.0)

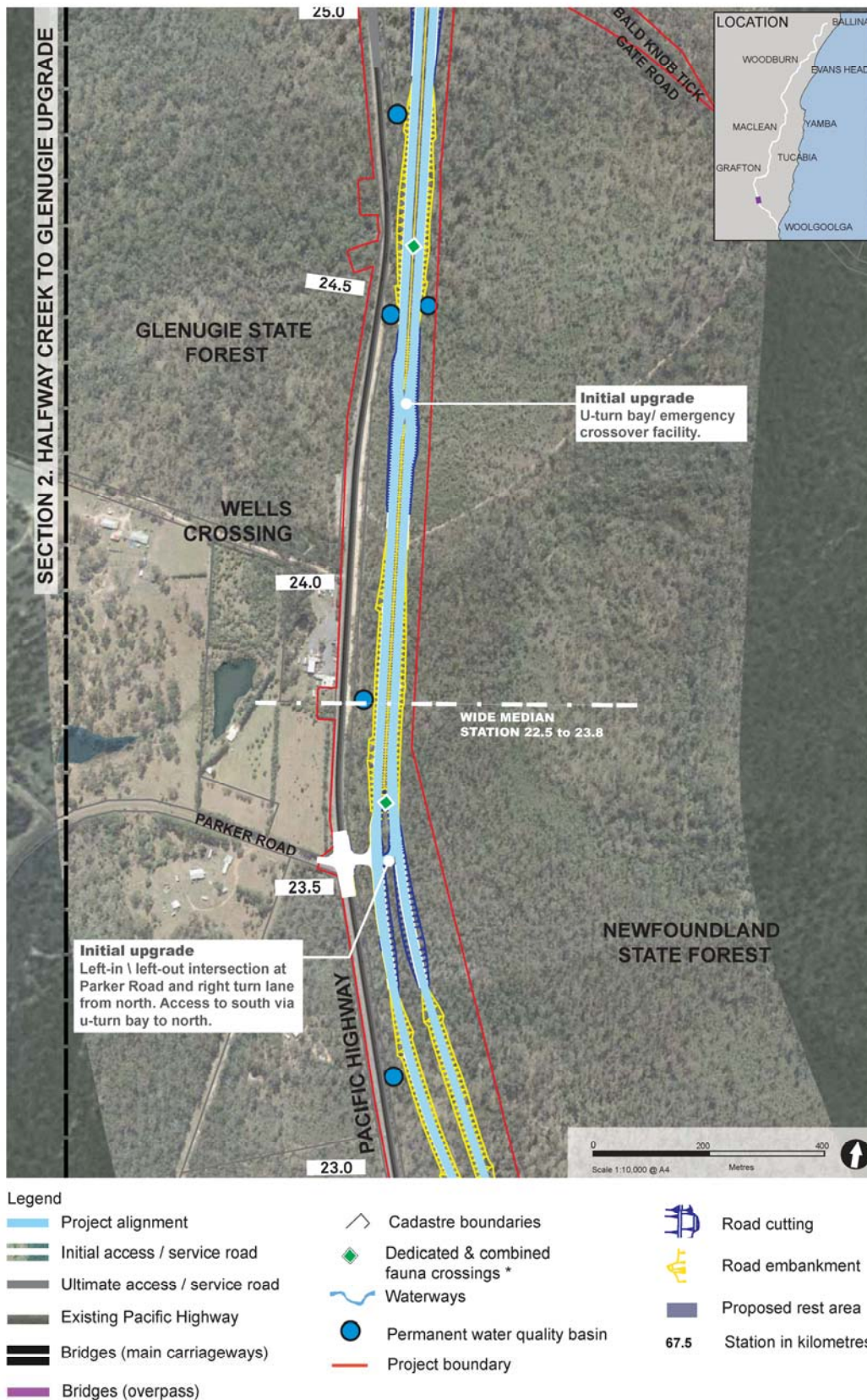


Figure 5-16: The project - Section 2 (Station 23.0 to 25.0)

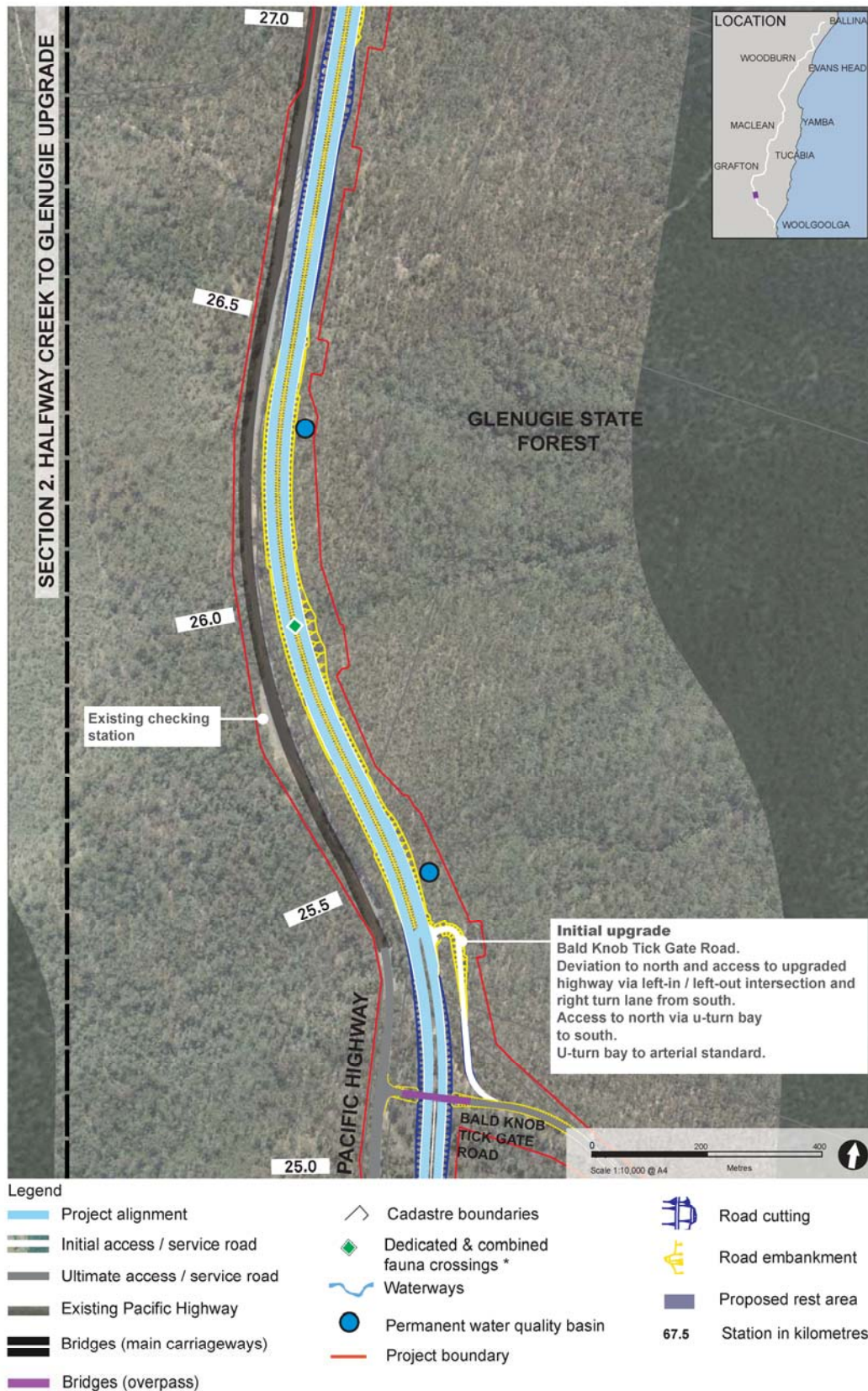


Figure 5-17: The project - Section 2 (Station 25.0 to 27.0)

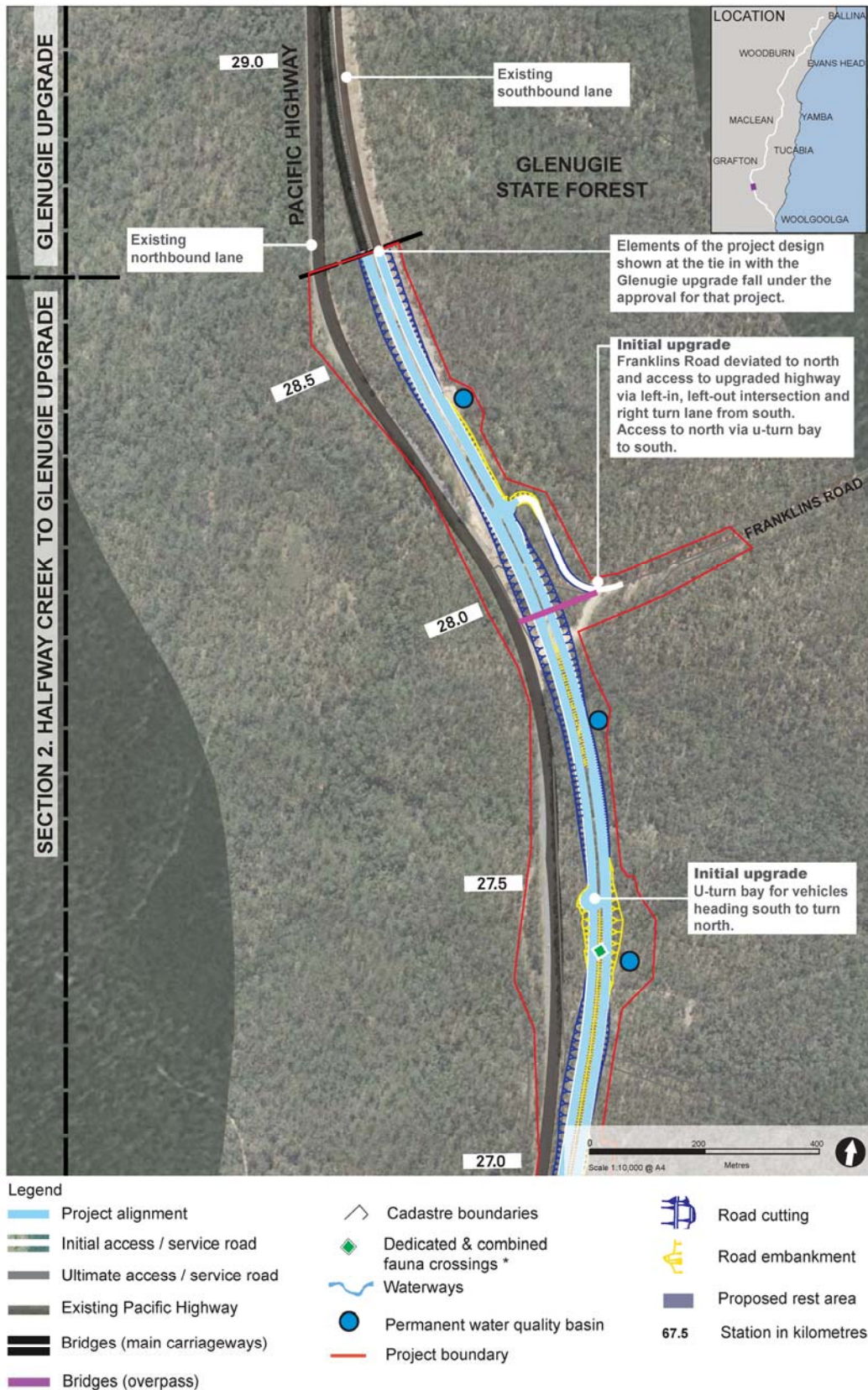


Figure 5-18: The project - Section 2 (Station 27.0 to 28.7)

5.2.3 Glenugie upgrade to Tyndale (Section 3)

The Glenugie upgrade to Tyndale (Section 3) would be about 35 kilometres long. It would tie in with the northern end of the Glenugie upgrade located just south of Eight Mile Lane, within Glenugie State Forest. It is shown in Figure 5-19 to Figure 5-36.

Motorway standard

Section 3 would be a direct upgrade to full motorway standard that would involve constructing a new section of highway to the east of the existing highway. This part of the project would bypass South Grafton, Grafton and Ulmarra. The alignment would pass through a mix of open grazing land and remnant bushland on the eastern side of the Coldstream River basin. It would cross Pillar Valley and be located about two kilometres east of Tucabia.

Two interchanges would be constructed in Section 3:

- Southern end: A full interchange at Glenugie (Eight Mile Lane) would provide access to and from Grafton and the Gwydir Highway. The interchange would include north-facing ramps (providing access to the north). An overpass at Eight Mile Lane would cross the upgraded highway. Access would be provided to the south via south-facing ramps at Glenugie. This would provide access between the project and Grafton via the local and regional road network
- Northern end: A full interchange at Tyndale (north of Sheehys Lane) would provide access to the project from the existing highway, in particular for traffic heading to and from Grafton. The interchange would include ramps to provide access to and from the project north and south (at the interchange at Tyndale south and interchange at Tyndale north). Access would be via connecting roads from the existing Pacific Highway north of Sheehys Lane at Bondi Hill.

The existing Pacific Highway would become the service road, providing access to the interchanges at Glenugie and Tyndale as an alternative route for local traffic.

In Section 3, the project would cross several roads that would be routed either under or over the project. These include:

- Overpasses at Eight Mile Lane, Old Six Mile Lane (providing a connection to Aerodrome Road), Avenue Road, Woolli Road, Firth Heinz Road, Bostock Road
- An underpass at Somervale Road
- Realignment of Old Six Mile Lane, Lavidia, to the south, which would be connected to an overpass to cross the upgraded highway, and an access road provided to the west of Avenue Road
- An overpass to connect Coldstream Road and Avenue Road, currently located either side of the project
- An overpass to provide access for vehicles using Woolli Road to pass over the project
- An overpass to provide property access for users of Crowleys Road
- A new connection at Bensons Lane to provide access to the existing highway and the project via the interchange north of Sheehys Lane at Tyndale.

Section 3 would cross several waterways and require long-span bridge crossings over the Coldstream River, Pillar Valley Creek, Chaffin Creek and Champions Creek. Twin bridges would also be provided as part of the main carriageways to cross Pheasant Creek at station 36.4. The bridge crossings of Coldstream River would occur at three separate locations, with each bridge over 100 metres long and one of those bridges over 300 metres long (station 43.1).

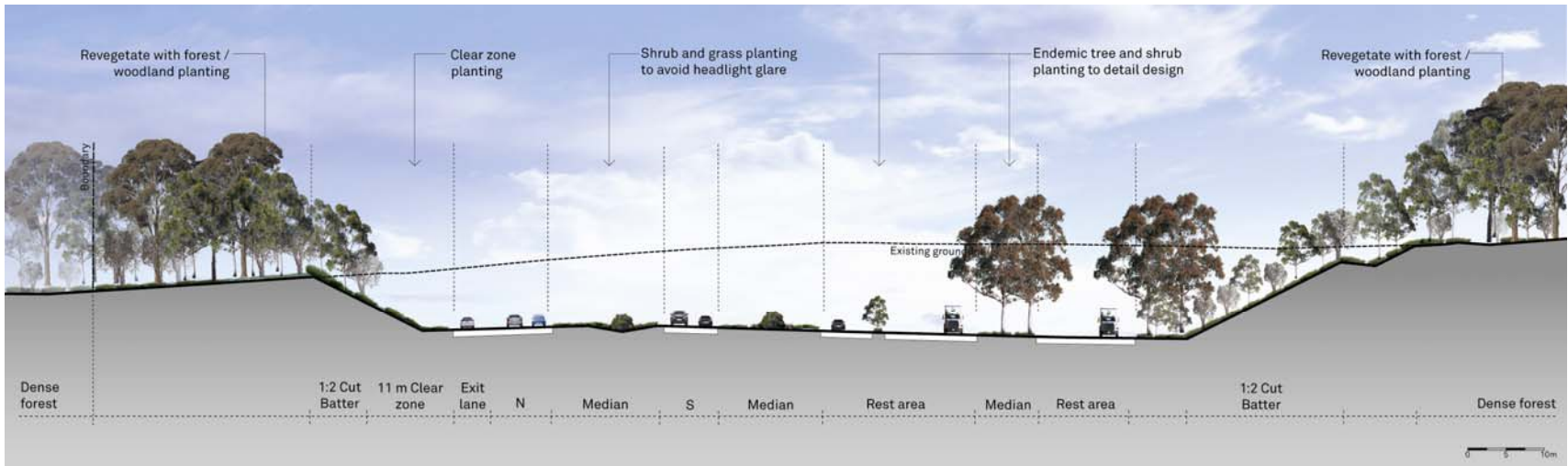
About 25 combined drainage and fauna connectivity structures would be provided with a clearance of over 3.6 metres in height beneath the bridges over:

- Coldstream River
- Pillar Valley Creek
- North of Pillar Valley
- Chaffin Creek
- Champions Creek.

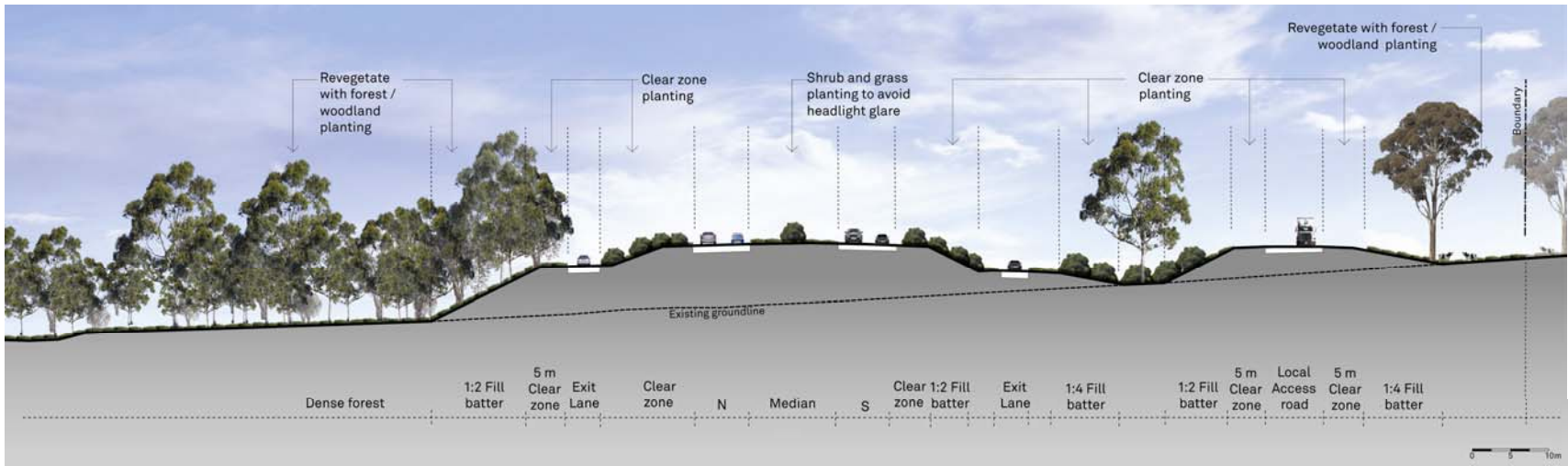
A realignment of about 500 metres of Picaninny Creek would also be required to ensure appropriate hydraulic passage of the Pheasants and Picaninny Creek at the interchange at Eight Mile Lane (station 35.9). Further details of this creek realignment are provided in Section 5.3.10.

A rest area located northbound and southbound either side of the upgraded highway at station 63.3 to station 64.3 near Pine Brush State Forest would provide passenger car, heavy vehicle and layover facilities.

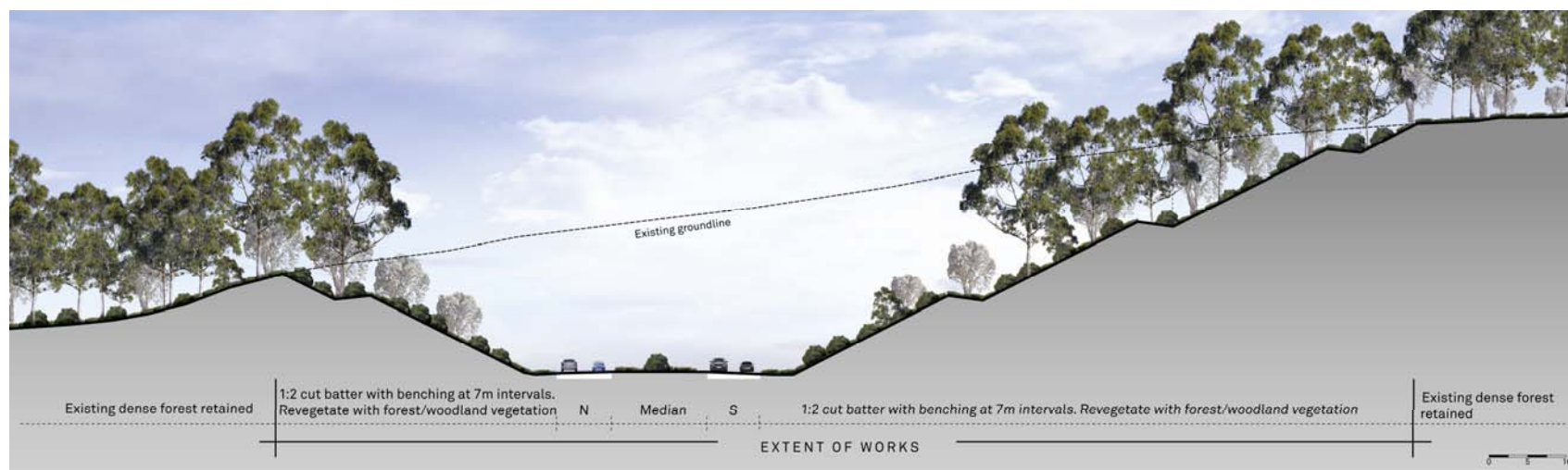
Indicative cross sections of the alignment at station 63.4 and 67.7 within Section 3 is shown below.



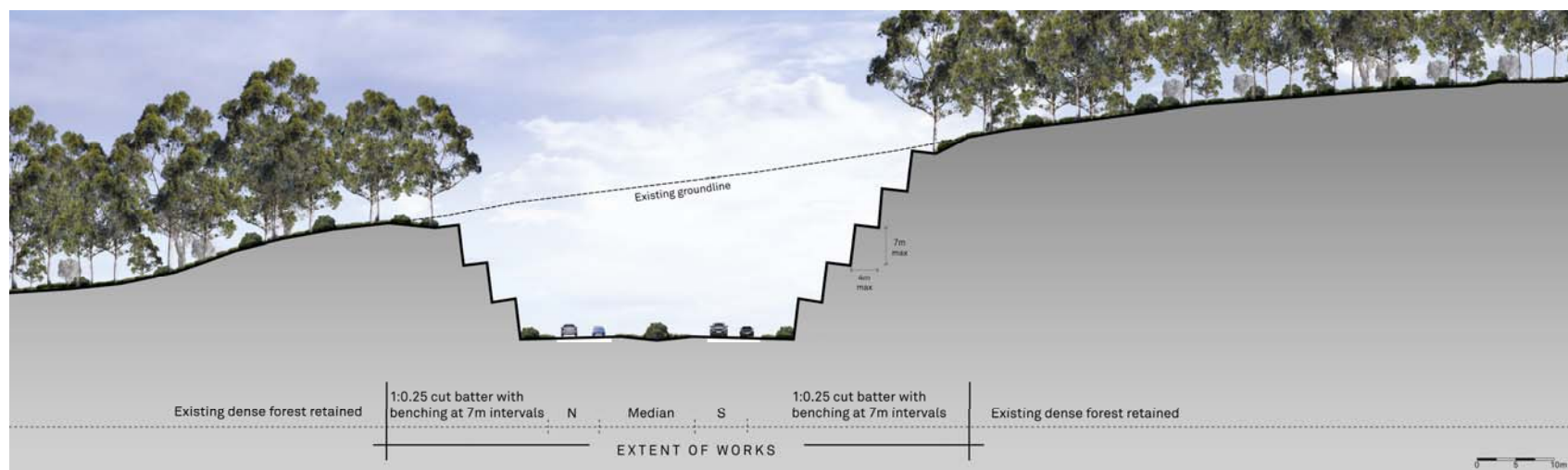
Cross section at station 63.4 showing Pine Brush rest area (indicative only)



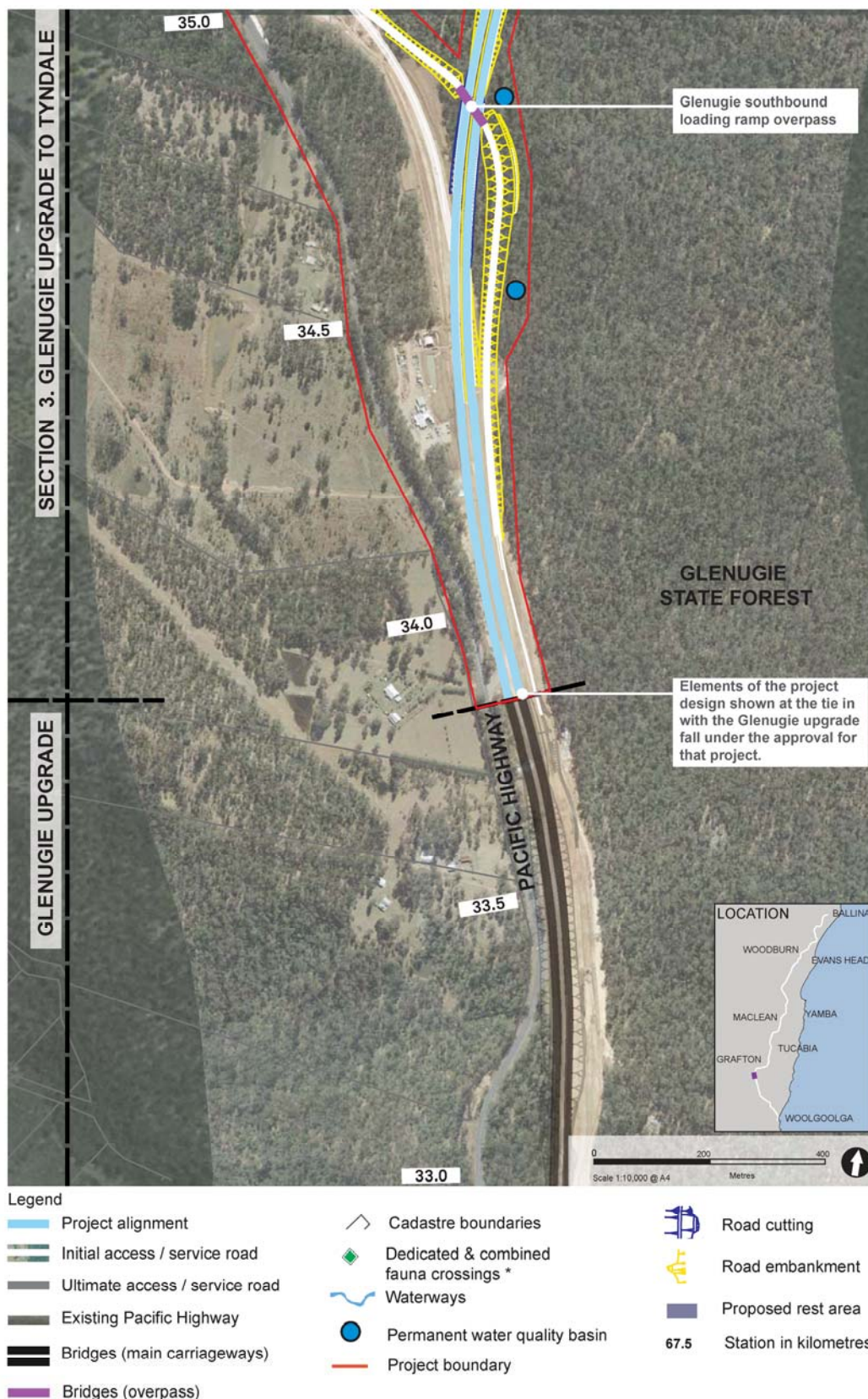
Cross section at station 67.2 showing profile of embankment at Sheehys Lane, Tyndale (indicative only)



Cross section at station 67.7 showing Road cutting at Bondi Hill to form interchange at Tyndale (Option 1) (indicative only)



Cross section at station 67.7 showing Road cutting at Bondi Hill to form interchange at Tyndale (Option 2) (indicative only)



NOTE:
Proposed fauna crossing - refer to EIS Section 5.3 for details of structure.
Design features shown are indicative and would be subject to refinement at the detailed design stage.
Project boundary shown incorporates a 'construction boundary' and is not representative of the property acquisition boundary.

Figure 5-19: The project - Section 3 (Station 33.7 to 35.0)

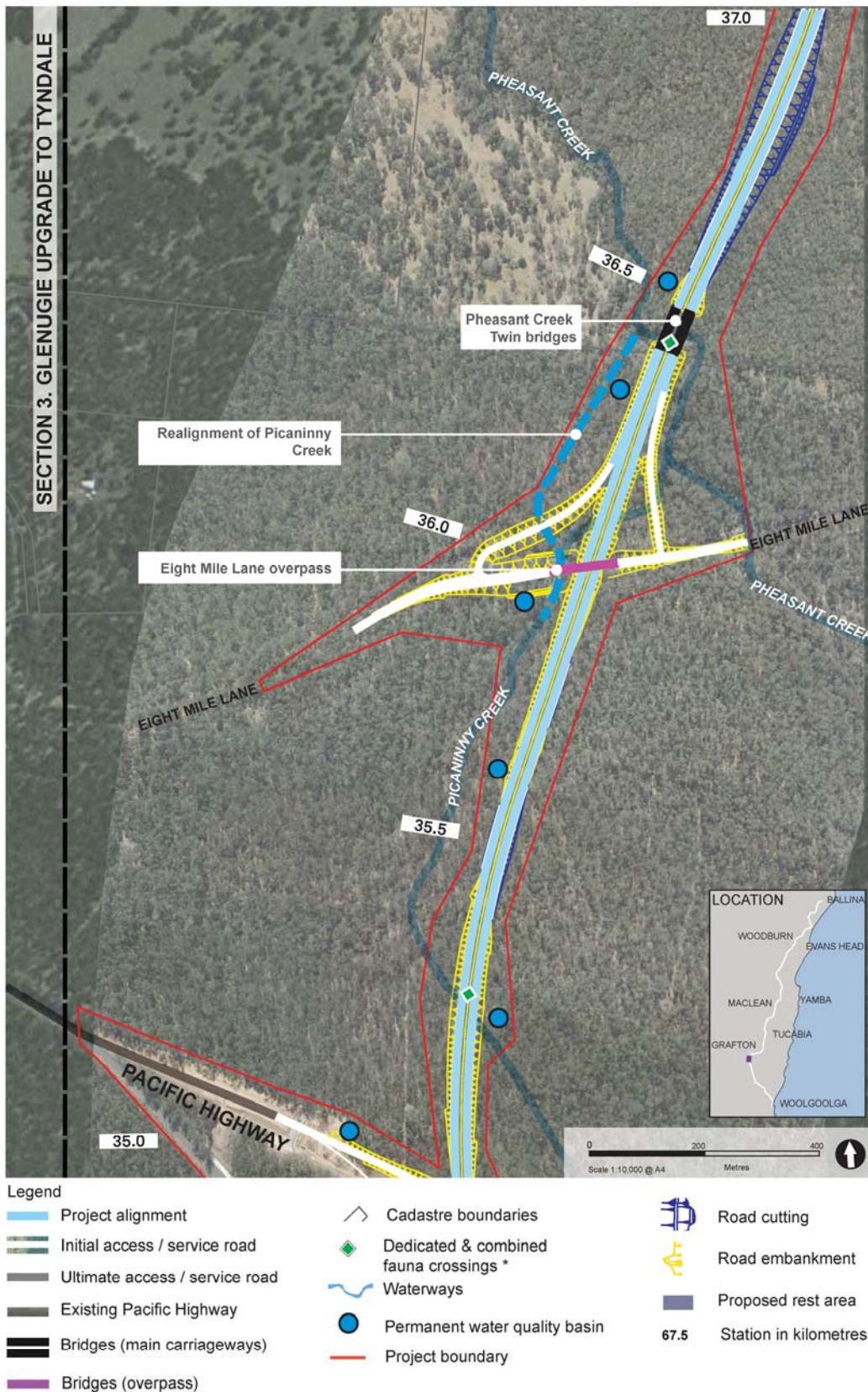


Figure 5-20: The project - Section 3 (Station 35.0 to 37.0)

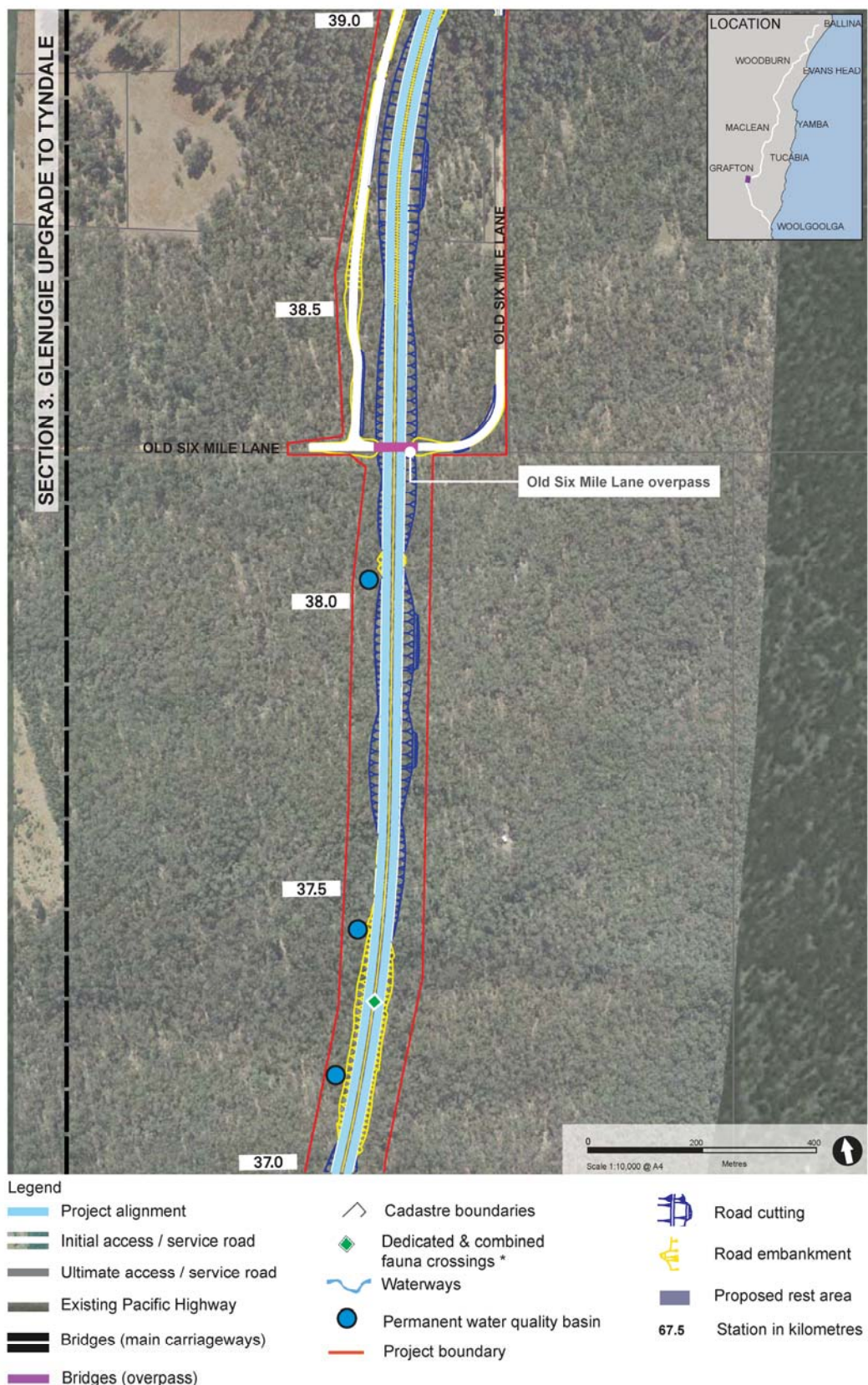


Figure 5-21: The project - Section 3 (Station 37.0 to 39.0)

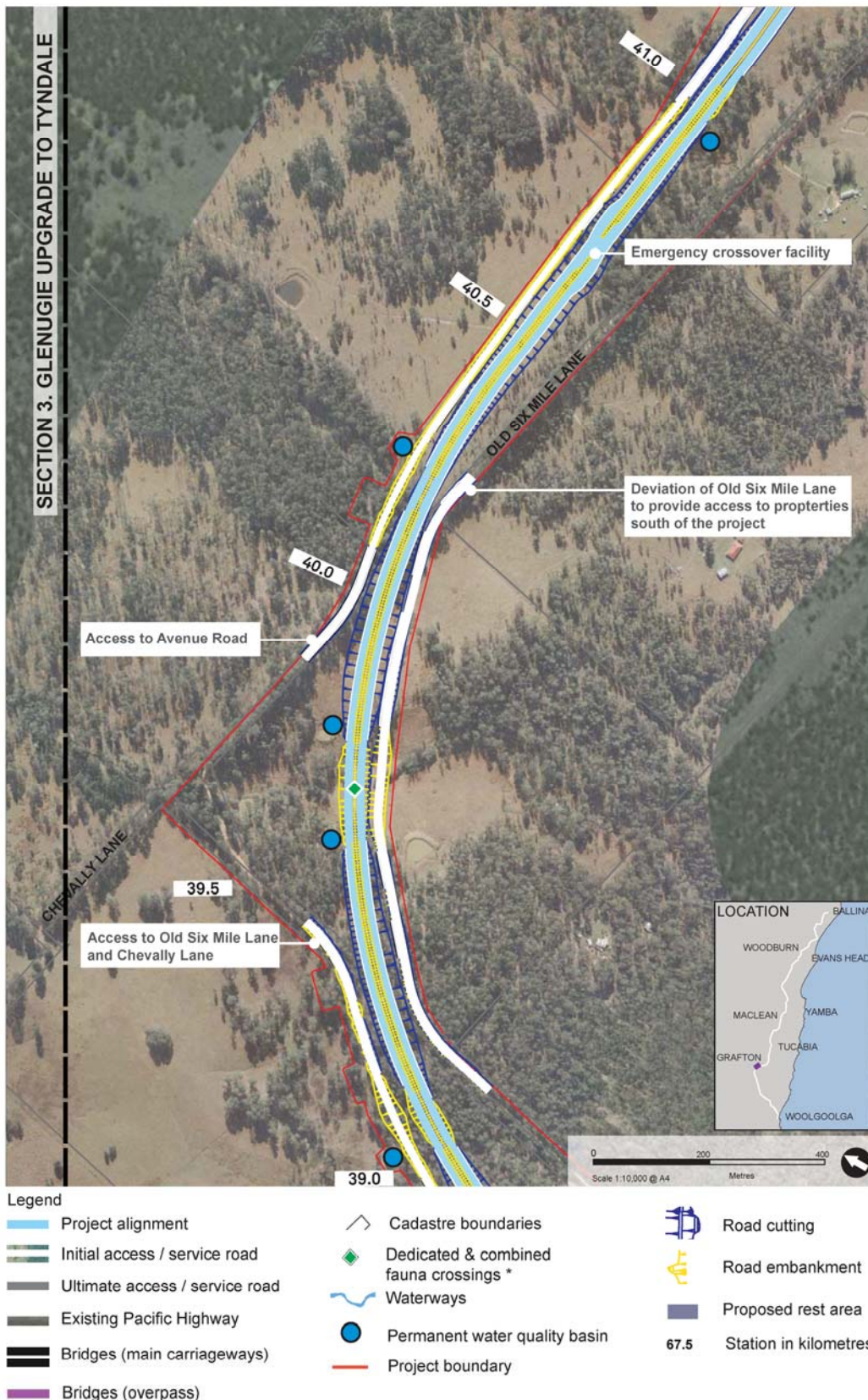


Figure 5-22: The project - Section 3 (Station 39.0 to 41.0)

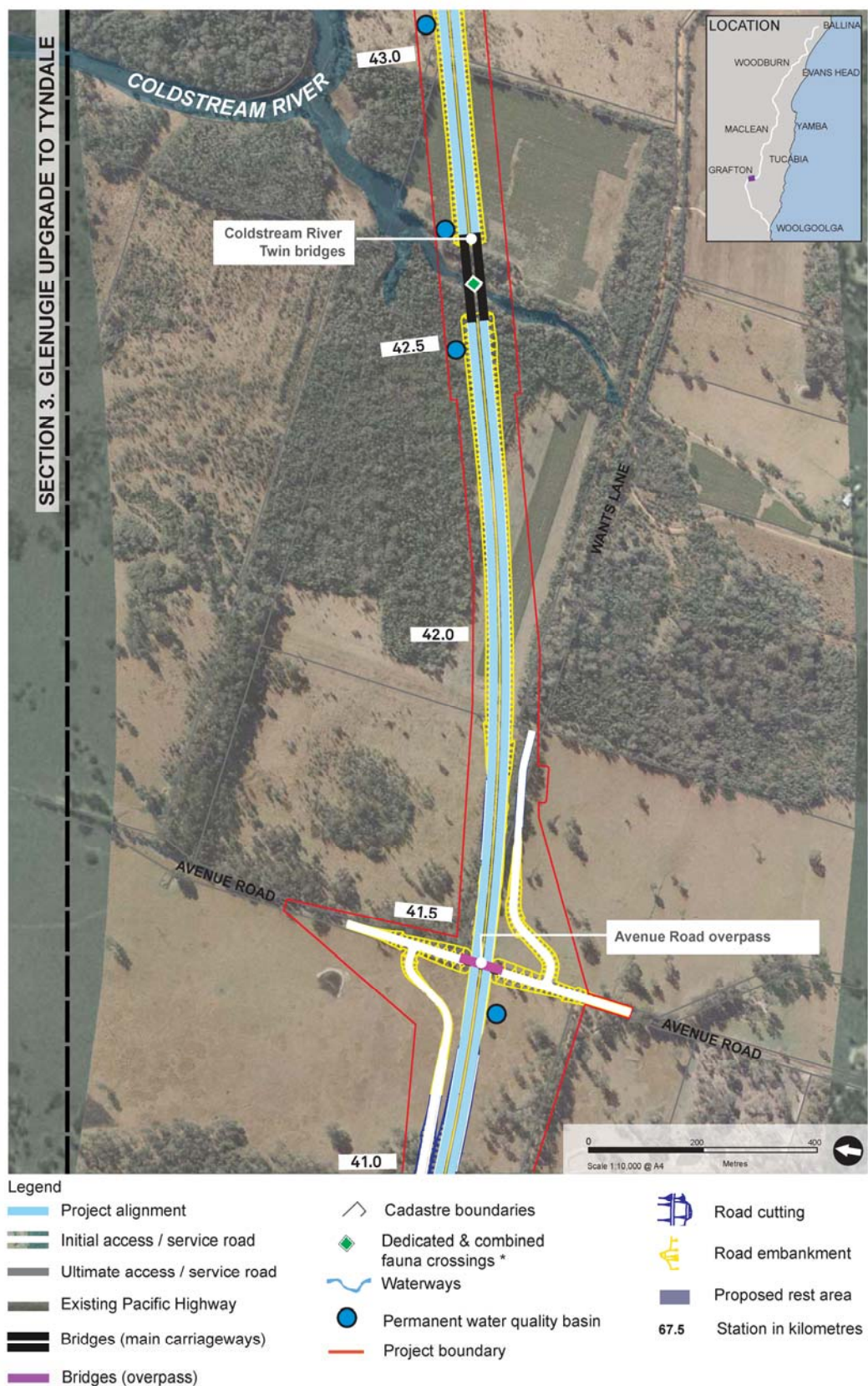


Figure 5-23: The project - Section 3 (Station 41.0 to 43.0)

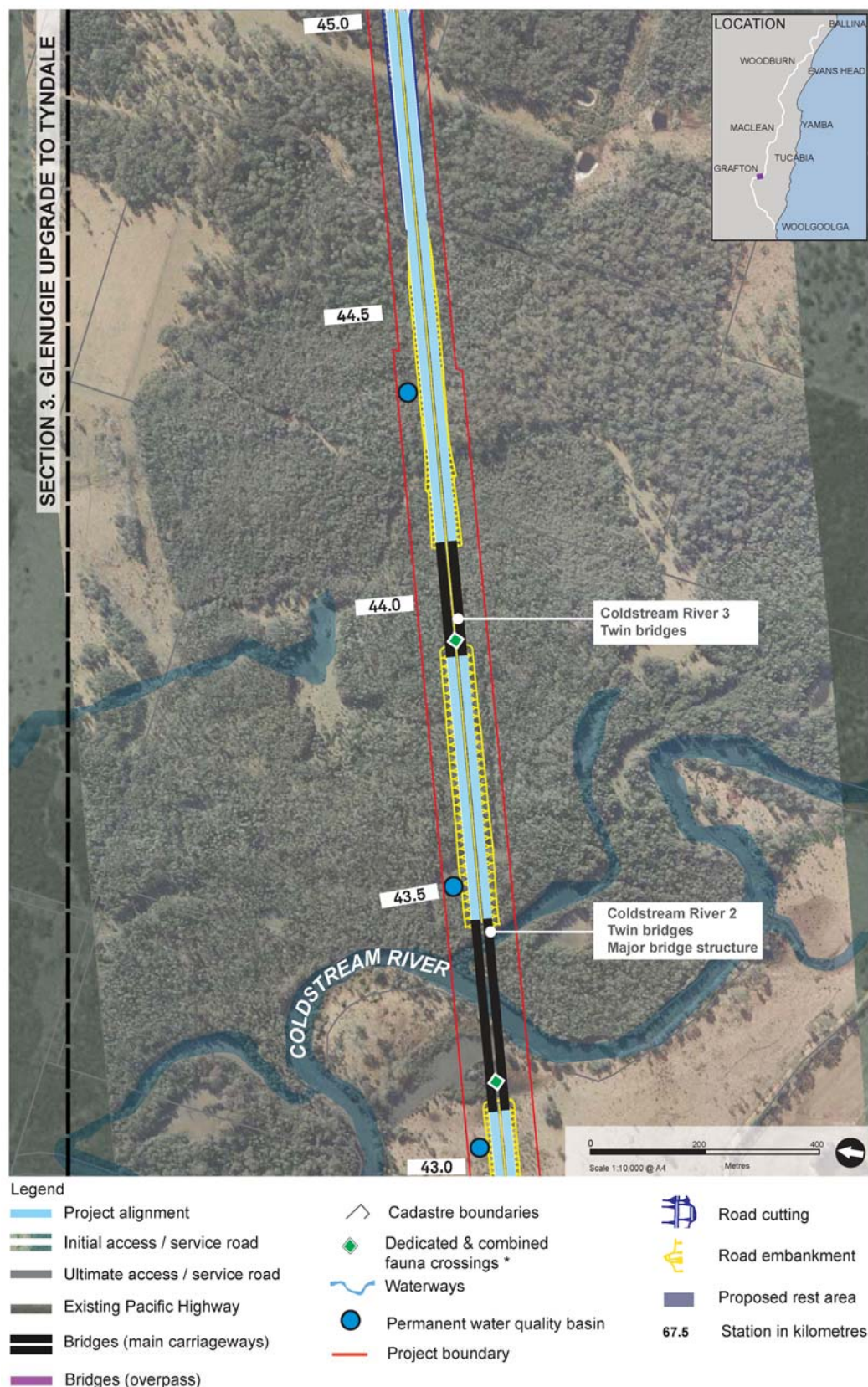


Figure 5-24: The project - Section 3 (Station 43.0 to 45.0)

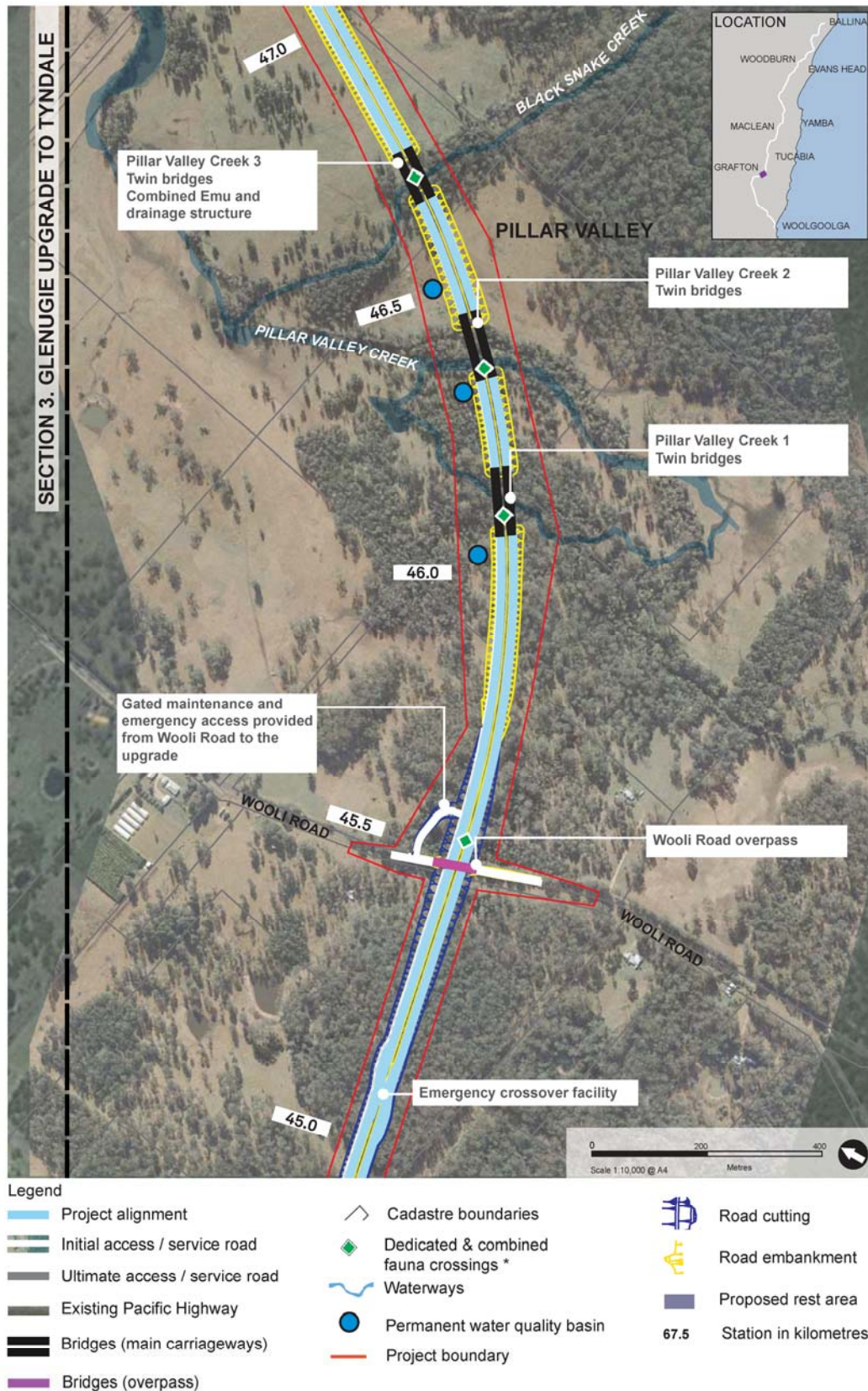


Figure 5-25: The project - Section 3 (Station 45.0 to 47.0)

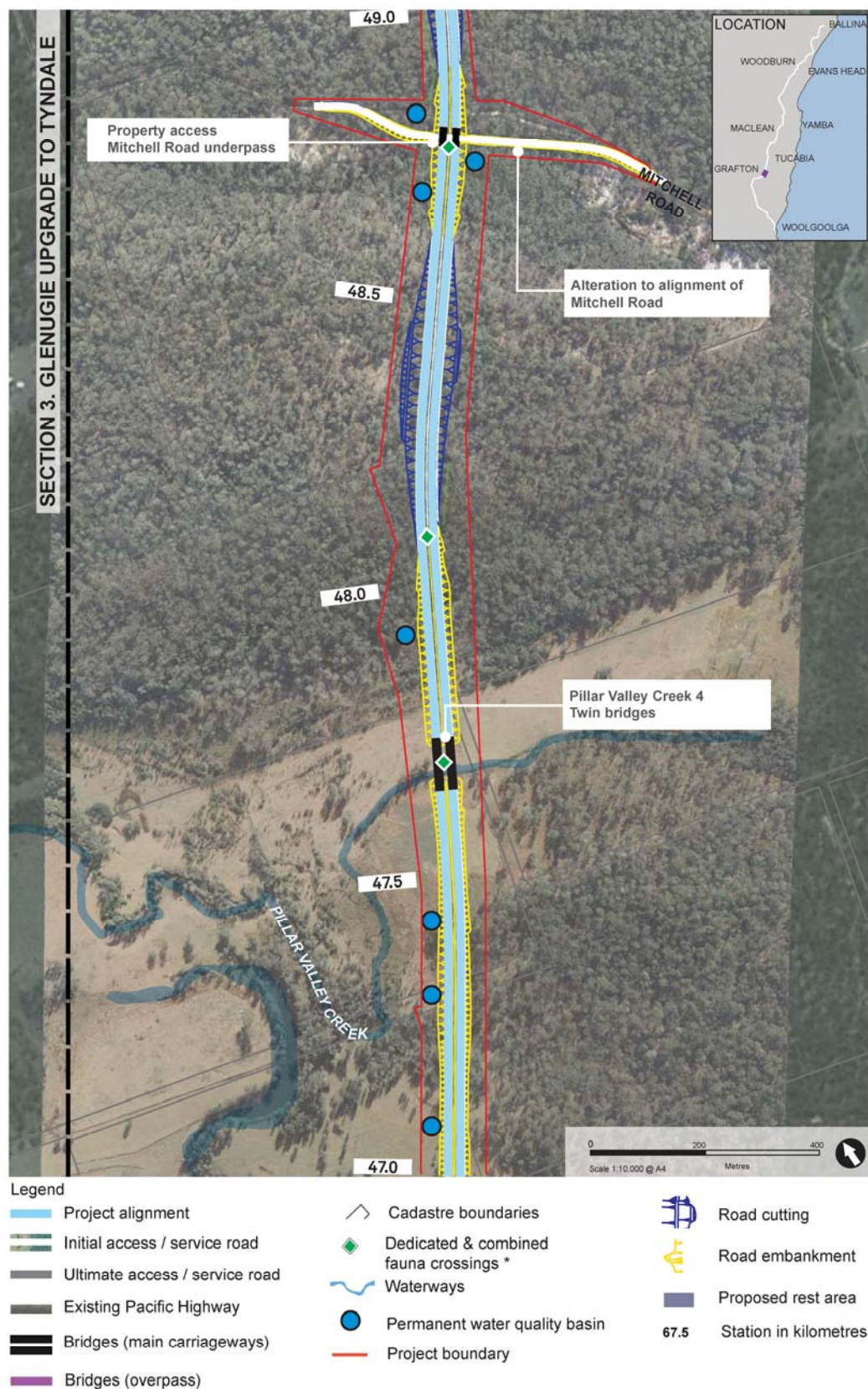


Figure 5-26: The project - Section 3 (Station 47.0 to 49.0)

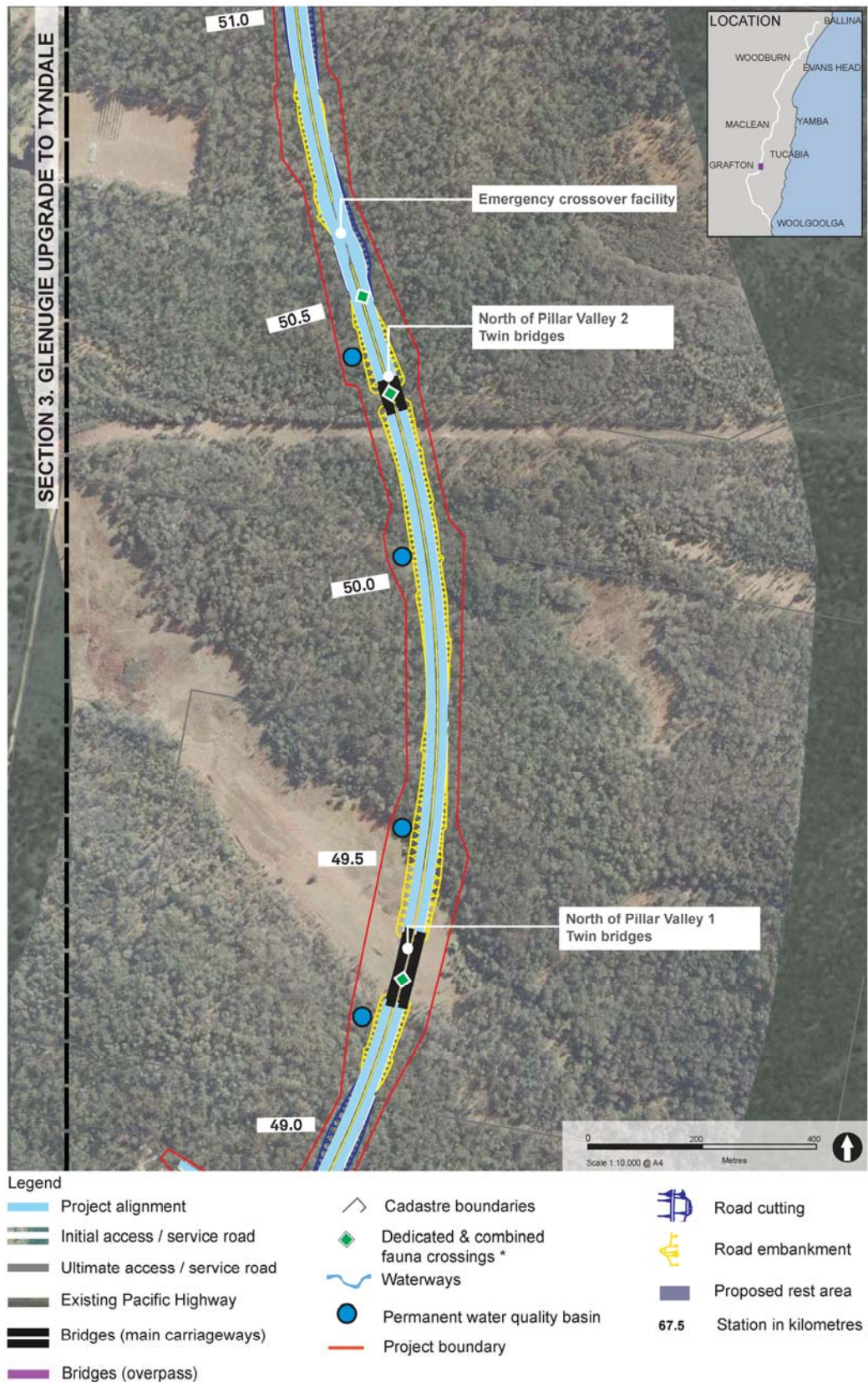


Figure 5-27: The project - Section 3 (Station 49.0 to 51.0)

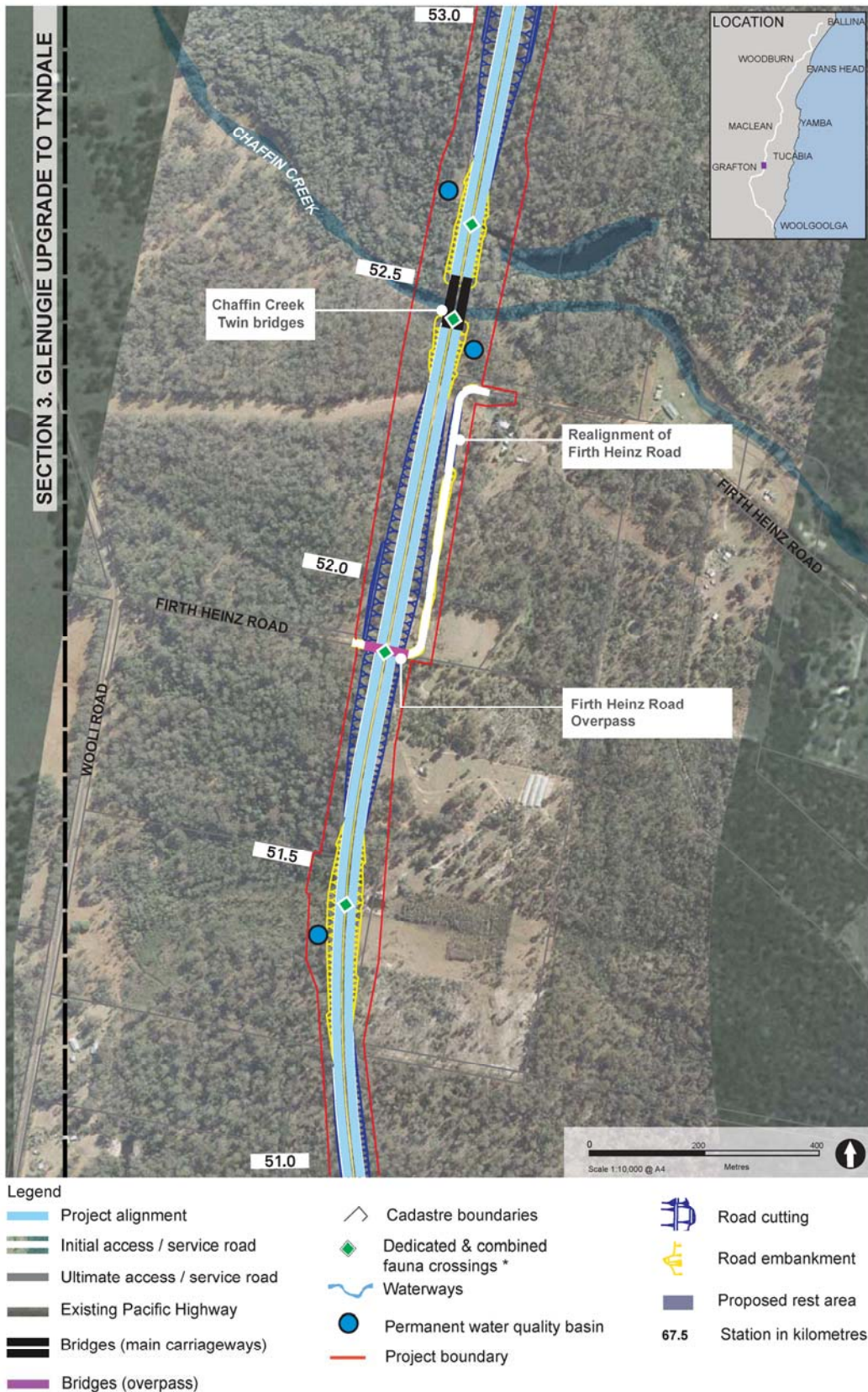


Figure 5-28: The project - Section 3 (Station 51.0 to 53.0)

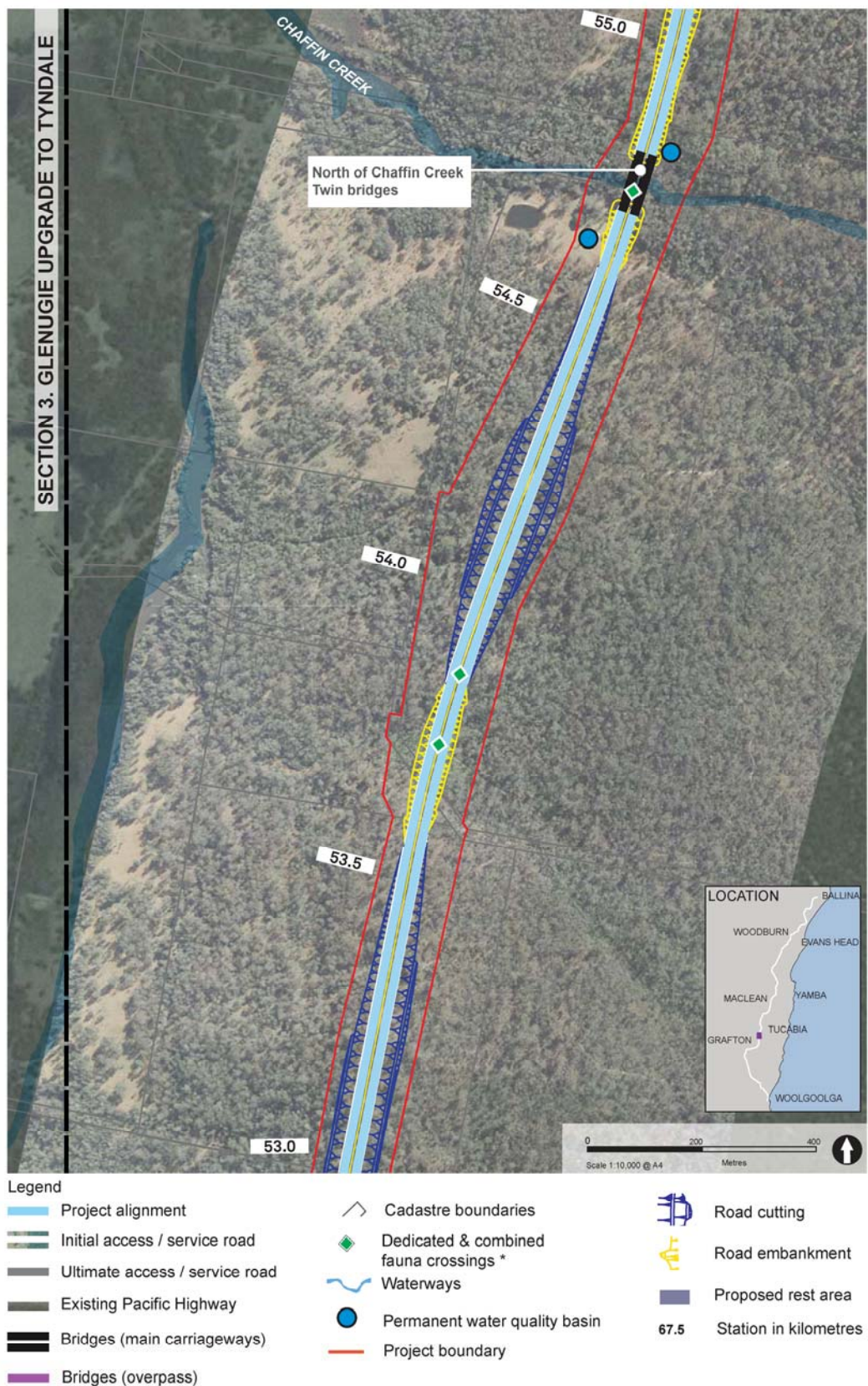


Figure 5-29: The project - Section 3 (Station 53.0 to 55.0)



Figure 5-30: The project - Section 3 (Station 55.0 to 57.0)

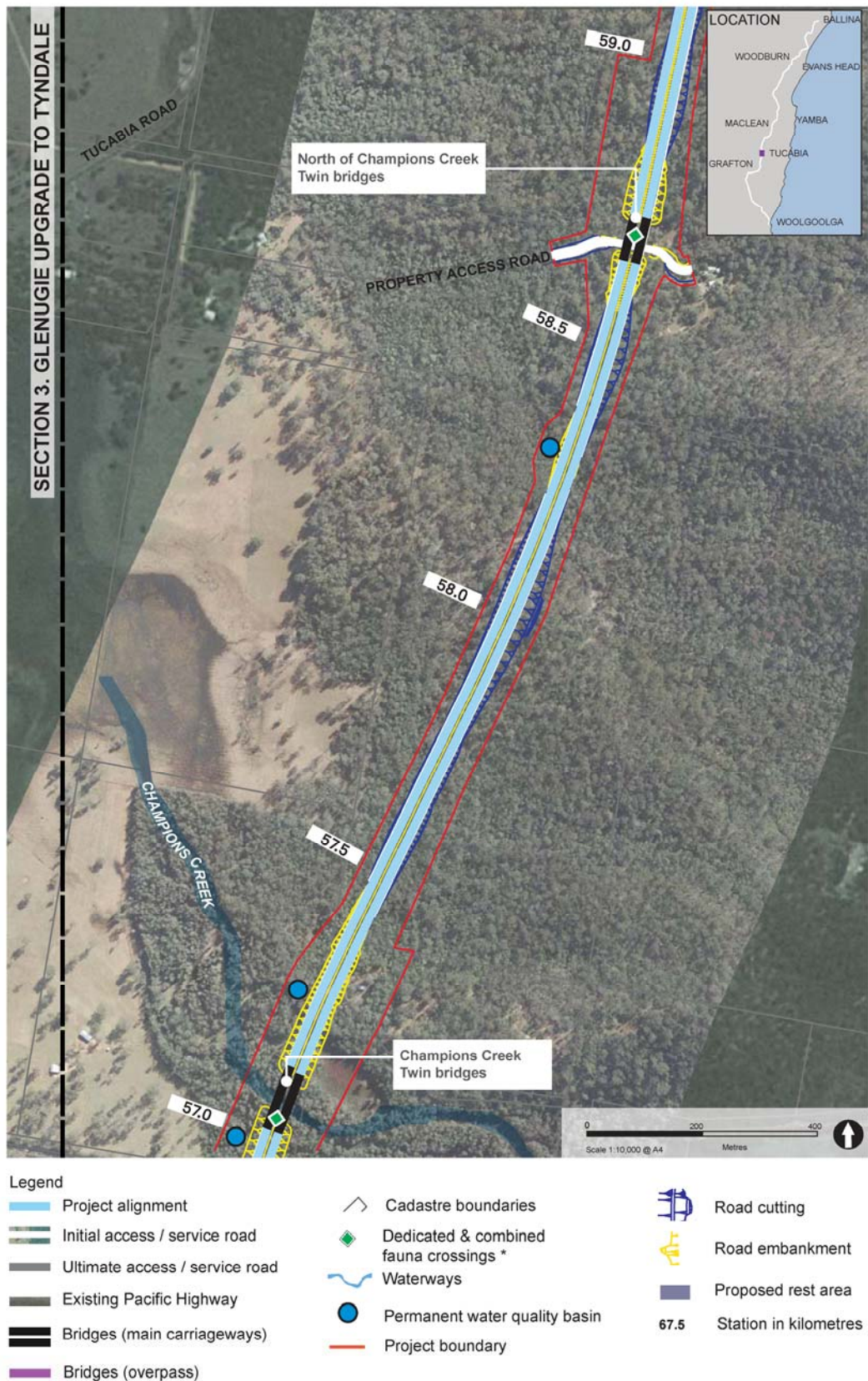


Figure 5-31: The project - Section 3 (Station 57.0 to 59.0)

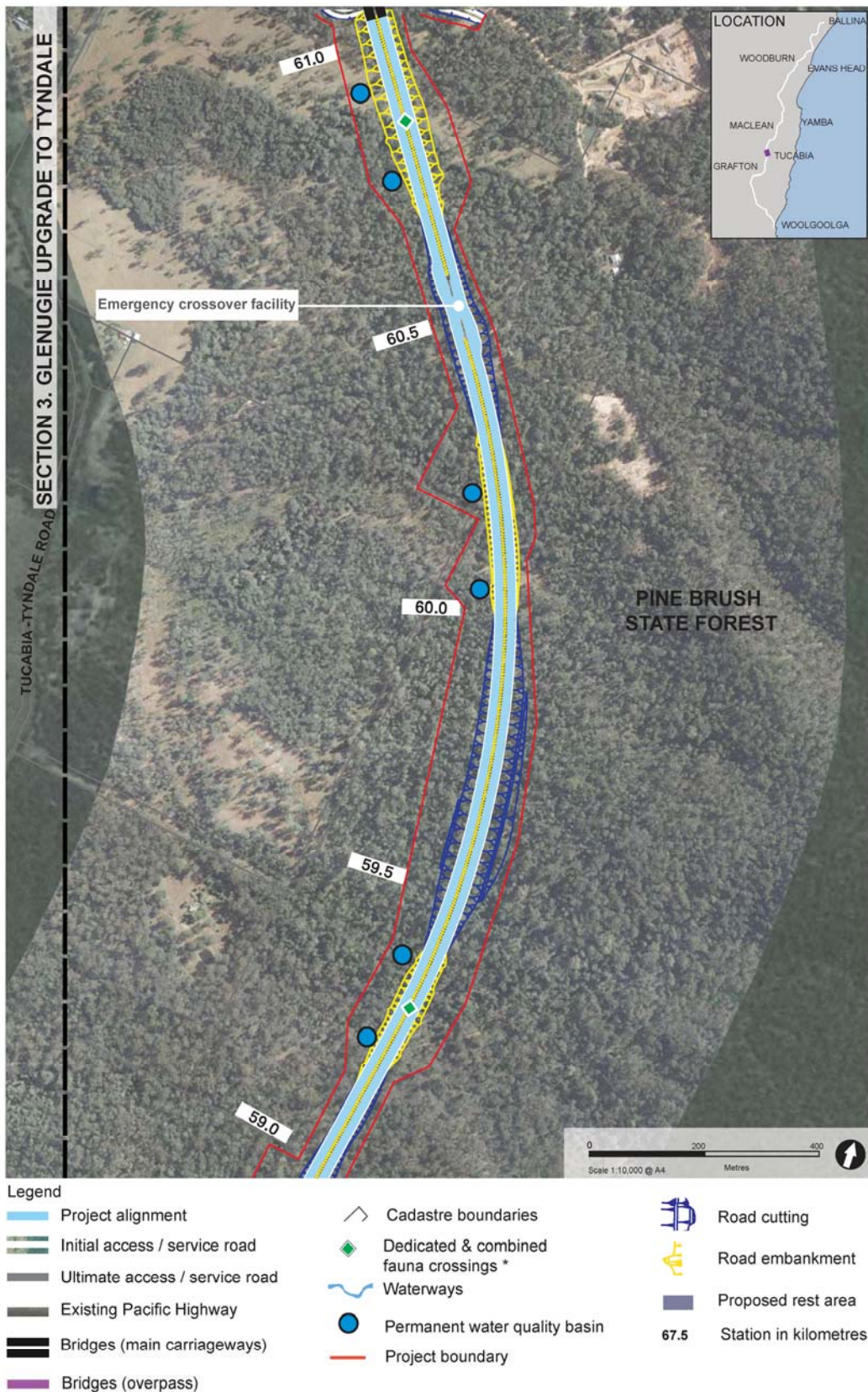


Figure 5-32: The project - Section 3 (Station 59.0 to 61.0)

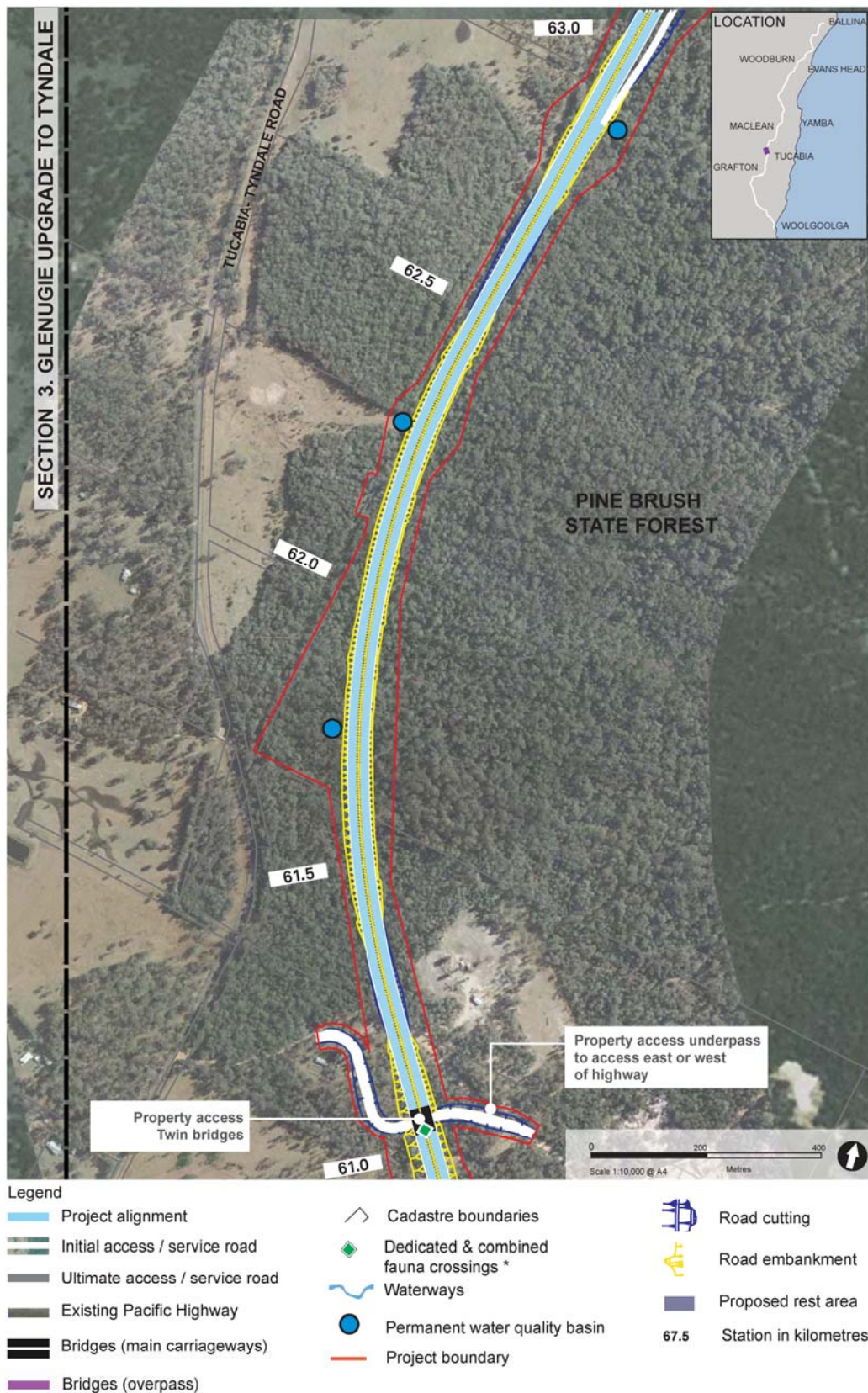


Figure 5-33: The project - Section 3 (Station 61.0 to 63.0)

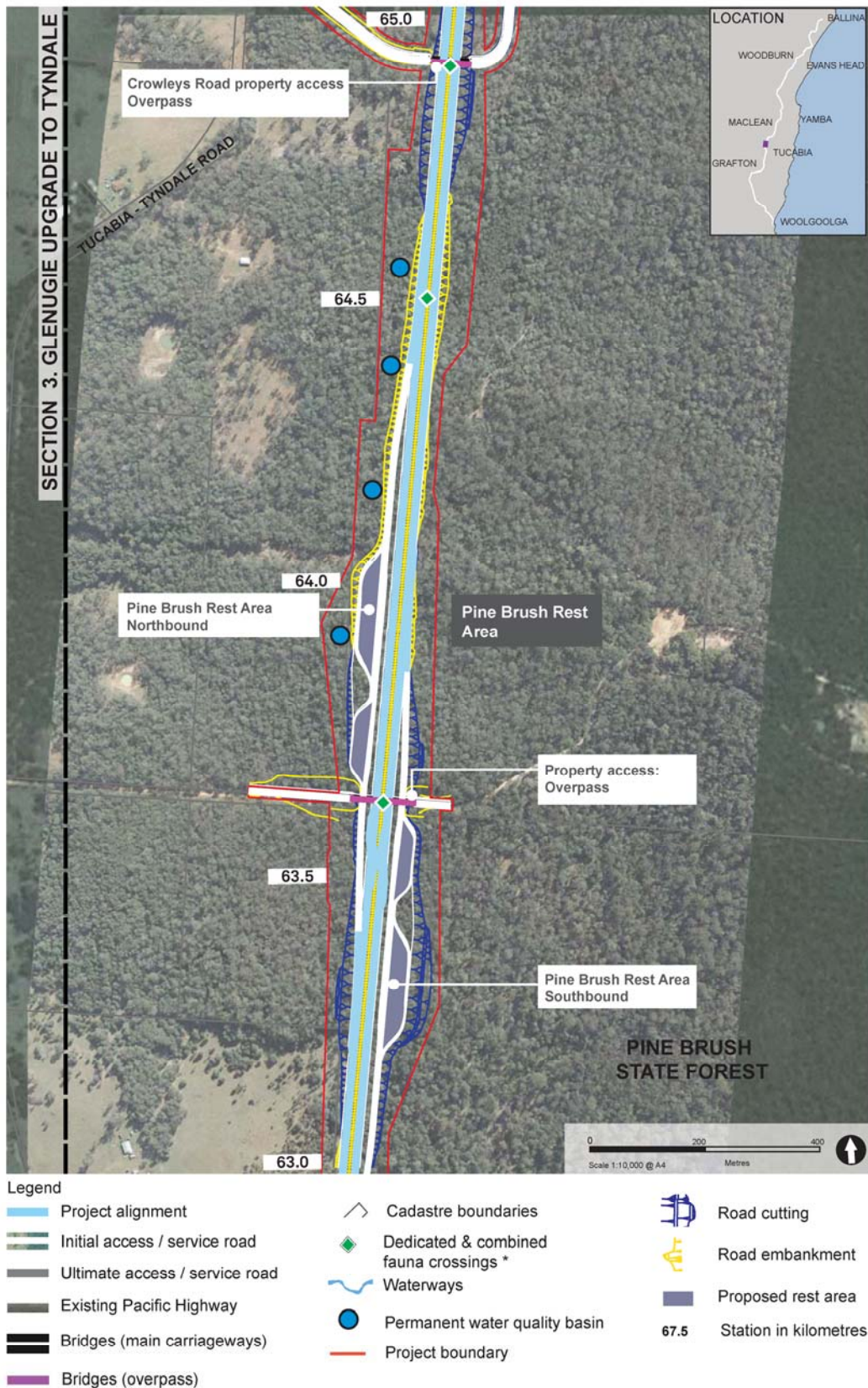


Figure 5-34: The project - Section 3 (Station 63.0 to 65.0)

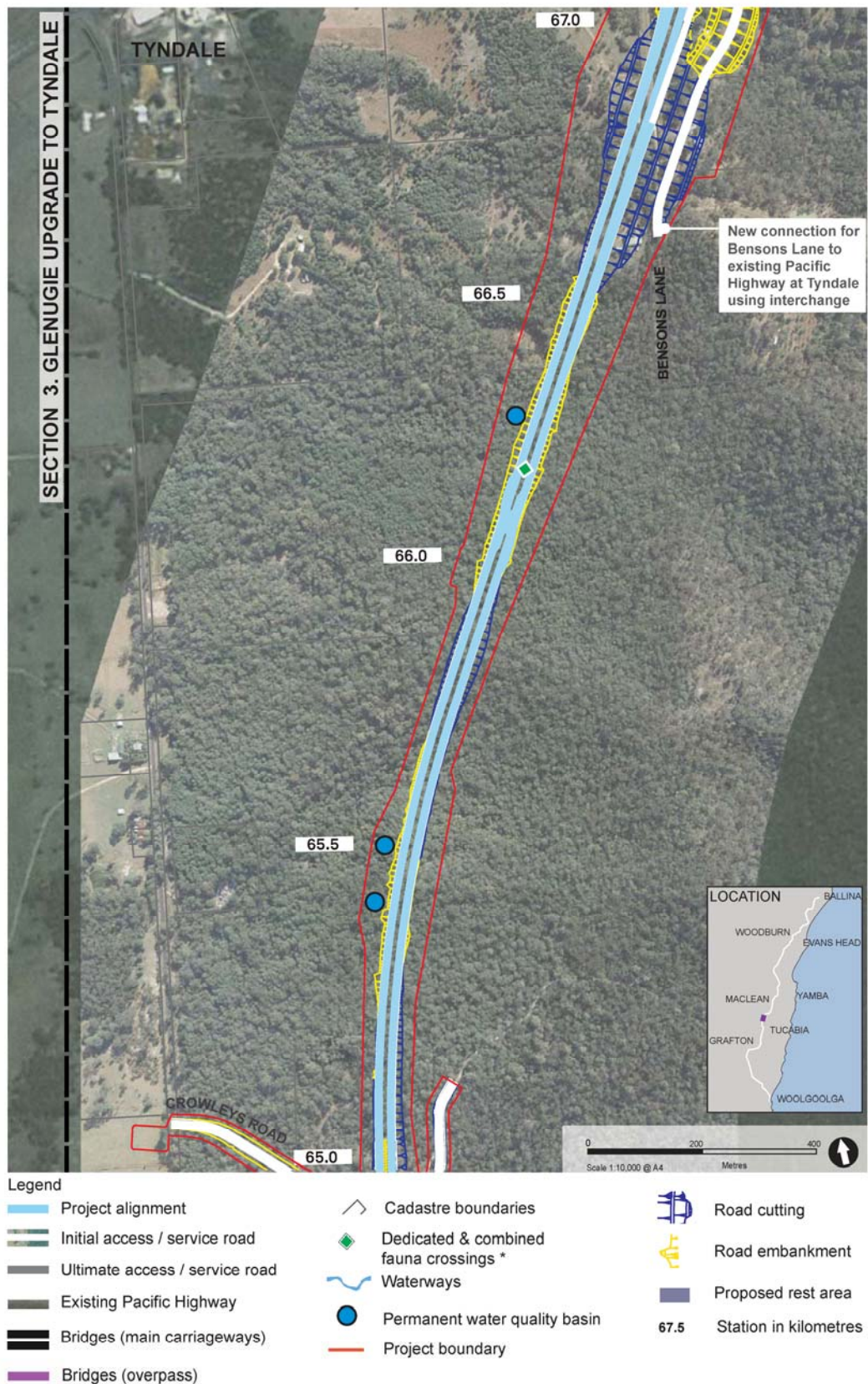


Figure 5-35: The project - Section 3 (Station 65.0 to 67.0)

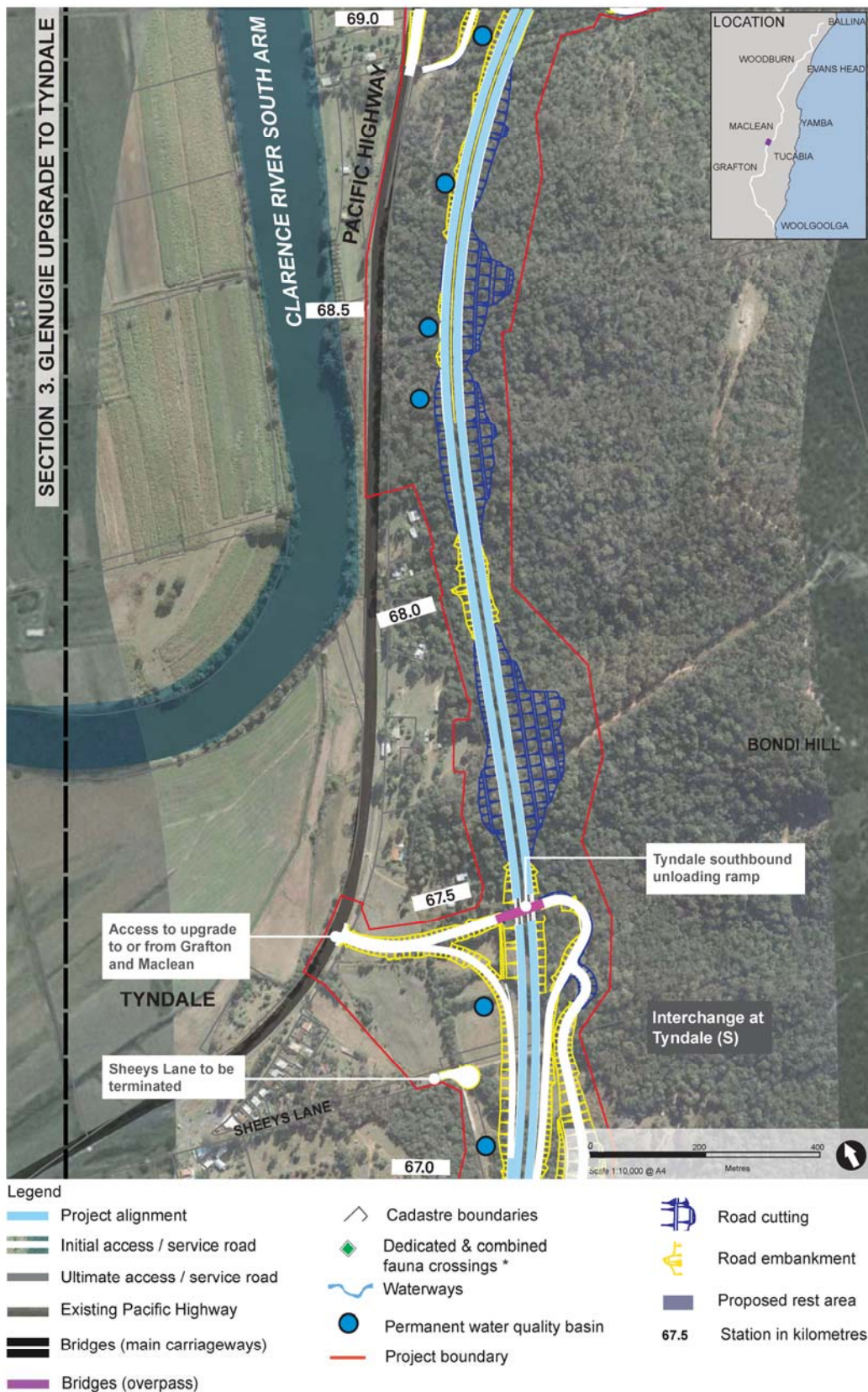


Figure 5-36: The project - Section 3 (Station 67.0 to 69.0)