

Milton Ulladulla bypass

Environmental impact statement

Chapter 5 Project description

September 2026



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5. Project description

5.1 Project overview

The project involves the construction of a new 12 kilometre (km) road (referred to as the bypass) which would bypass the Milton and Ulladulla town centres. The project would also include a connection to Bishop Drive, Ulladulla to facilitate access to the existing Princes Highway and surrounding suburbs of Mollymook and Narrawallee.

The project is expected to improve road safety, reduce congestion, enhance freight efficiency, and support the amenity and liveability of the Milton and Ulladulla town centres by removing through traffic, particularly heavy vehicles, from high pedestrian and vehicle conflict zones in the townships.

The existing Princes Highway between Little Forest and Burrill Lake via Milton and Ulladulla town centres would be converted to a local road once the project is operational.

The detailed project description in this chapter is based on the project’s concept design and has been developed with consideration of:

- findings from Aboriginal engagement activities and the Designing with Country process, detailed in Section 3.5 of Chapter 3 (Strategic context and project need) and the project’s Connecting with Country Report
- place making and urban design principles and objectives, detailed in Section 3.6 of Chapter 3 (Strategic context and project need) and Technical Report 5: Urban Design, Landscape Character and Visual Impact Assessment
- community and stakeholder feedback as detailed in Chapter 6 (Community and stakeholder engagement) and Appendix D Community and stakeholder engagement table
- avoiding and minimising environmental and social impacts through environmentally led design principles.

The concept design and construction methodology would continue to be refined during further design development and construction planning. Sufficient flexibility has been provided in the concept design to:

- allow for refinement in response to submissions received following the exhibition of this Environmental Impact Statement (EIS)
- allow for refinement during detailed design and further construction planning to consider design innovation and/or alternative construction techniques
- respond to improved technologies or materials
- improve value for money.

A summary of the key features of the project is provided in Table 5-1. More detailed design and construction methodology descriptions are provided in Sections 5.2 and 5.3 respectively. The key features are shown on Figure 5-1 to Figure 5-10.

Table 5-1: Project summary table

Project element	Summary	Reference
Operations		
Description	The project would extend about 12km from just north of Little Forest Road, Little Forest in the north, to near Canberra Crescent, Burrill Lake in the south. The project would bypass the towns of Milton and Ulladulla and include a connection to Bishop Drive, Ulladulla, to facilitate access to the existing highway and the surrounding suburbs of Mollymook and Narrawallee.	Figure 5-1 to Figure 5-10
Operational footprint	About 200 hectares (ha).	Figure 5-1 to Figure 5-10

Project element	Summary	Reference
Road alignment	The road alignment deviates from the existing Princes Highway near the intersection with Little Forest Road and passes across agricultural land to the south, crossing Croobyar Creek and down to Ringland Lane. The bypass then turns to the southeast, crossing Croobyar Road, Pettys Creek, Wilfords Lane and Slaughterhouse Road towards the central connection. From the central connection, the bypass traverses in a generally southerly direction to rejoin the Princes Highway near Canberra Crescent.	Section 5.2.2
Access connections	The project includes three connections to provide access to the townships of Milton and Ulladulla via the existing Princes Highway, including: - northern connection – a four-leg roundabout, connecting to Little Forest Road, the existing Princes Highway towards Milton, the existing Princes Highway towards Yatte Yattah and the new bypass - central connection – a grade separated interchange with entry/exit ramp functionality from both the north and south of the bypass. The interchange would also extend Pirralea Road to meet an extension of Bishop Drive, providing access to the Princes Highway via a new signalised intersection - southern connection – a three-leg roundabout, connecting the bypass with the existing Princes Highway towards Ulladulla, the existing Princes Highway towards Burrill Lake and Canberra Crescent.	Figure 5-11 to Figure 5-14 Section 5.2.3
Local road network and access	The project would require modifications to local roads and access roads including: - Little Forest Road - Ringland Lane - Croobyar Road - Wilfords Lane - Bishop Drive - Slaughterhouse Road - Pirralea Road - Tuckerman Road - Tetley Place - White Gum Road - Cashman Road - Green Street - Kings Point Drive - Canberra Crescent.	Section 5.2.7
Bridges, overpasses and underpasses	The following new bridges, overpasses and underpasses are proposed as part of the project: - bridge over Croobyar Creek - bridge over Ringland Lane - bridge over Croobyar Road - bridge over Pettys Creek - central connection bridge - bridge or culvert over Millards Creek - bridge over Pirralea Road/Green Street - bridge over Princes Highway at Kings Point Drive - two southern connection Shared User Path (SUP) underpasses.	Section 5.2.4, Figure 5-1 to Figure 5-10

Project element	Summary	Reference
Emergency vehicle access	The project proposes two sets of emergency vehicle access points. The first access point is located on the project between Ringland Lane and Croobyar Road with a restricted access road connecting to Croobyar Road opposite the Rural Fire Service Station. The second access point is located at the existing intersection of Green Street and Pirralea Road, with a restricted access road connecting either side of the project. Two U-turn bays are proposed along the length of the project to permit emergency vehicles to safely turn. These are located north of Croobyar Road and near Green Street. Emergency service access road connections and service gates would also be provided at these locations allowing Emergency Services access onto the bypass at these crossing locations.	Section 5.2.6, Figure 5-3 and Figure 5-7
Active transport	Shared User Paths are proposed at the following locations: - Bishop Drive Extension on the eastern side of the road - existing Princes Highway on the south western side of the intersection with Bishop Drive - Pirralea Road on the eastern side of the road until Tetley Place - Green Street on the eastern side of the road to tie into the approved subdivision and on the northern side of the Green Street underpass - Kings Point Drive on the section crossing over the bypass - at the southern connection, under passing the roundabout and along the existing Princes Highway towards Ulladulla on the western side of the road, tying into the existing shared user path. Footpaths are proposed at the following locations: - connection from the shared user path on Green Street to Cashman Road - along the property access road (existing Princes Highway) at the southern connection, on the eastern side of the road.	Section 5.2.8
Public transport	Commuter bus services and school bus services operate within the project boundary. The project would directly impact four bus stops, with new relocated bus stops proposed where required. Consultation would be undertaken with public transport providers and Shoalhaven City Council (Council) to maintain service and access.	Section 5.2.9
Operational ancillary infrastructure	Operational ancillary infrastructure proposed for the project street furniture such as lighting, safety signs and safety barriers. The project also proposes to provide operational ancillary infrastructure for traffic management, such as variable message signs, closed circuit television cameras, traffic sensors and power and communications cabling.	Section 5.2.12
Environmental design and controls	The main operational environmental designs and controls of the project include: - fauna connectivity structures - water quality basins and swales - noise walls.	Section 5.2.11, Figure 5-1 to Figure 5-10
Construction		
Construction footprint	About 259ha	Figure 5-20 to Figure 5-29
Timeframe	Construction of the project is expected to commence in 2028 and take about three to four years, subject to planning approval and weather.	Section 5.3.2

Project element	Summary	Reference
Workforce	The project is expected to support an indicative peak construction workforce of about 650 to 740 full time equivalent jobs (direct employment). The average size of the construction workforce on site would be about 380 people.	Section 5.3.14
Earthworks	The project earthworks are estimated to balance cut and fill volumes, and would include: earthwork (cut to fill) – 2,520,000 tonnes (t) Although cut and fill volumes are balanced, should excavated material be found to be unsuitable for reuse on site, it would be taken offsite for beneficial reuse or disposed of at an appropriately licensed facility.	Section 5.3.5 (Earthworks) Figure 5-1 to Figure 5-10 Figure 5-21 and Figure 5-22
Construction ancillary facilities	Potential sites for construction ancillary facilities required by the project are located at: - northern connection construction ancillary facility – near Little Forest Road - Croobyar Road construction ancillary facility – south of Ringland Lane and west of Croobyar Road - Woodstock Road construction ancillary facility – east of Woodstock Road and south of Warden Road - Wilfords Lane construction ancillary facility – to the west of Wilfords Lane - Windward Way construction ancillary facility – to the west of Slaughterhouse Road and south of Windward Way - central connection construction ancillary facility – to the east of Turnbull Lane - White Gum Road construction ancillary facility – to the south of White Gum Road and east of Pirralea Road - Blackburn Road construction ancillary facility – to the east of Blackburn Road and north of Kings Point Drive - southern connection construction ancillary facility – to the west of the existing Princes Highway just north of the proposed southern connection roundabout.	Section 5.3.11, Figure 5-20 to Figure 5-29, Table 5-10
Blasting	Two Milton Monzonite cuts located along the alignment south of Croobyar Creek near Corks Lane and the Milton Water Treatment Plant would require blasting.	Section 5.3.5, Figure 5-20 to Figure 5-29
Temporary work	Temporary work and facilities would likely include: - site fencing - utility connections - access track and haulage roads - sediment basins - waterway diversions - waterway crossings - drainage connections - traffic safety barriers - temporary road construction signage (project information, directional signage) - retaining walls - traffic control signals (TCS) - working platforms and support structures for bridgeworks.	Section 5.3.12, Figure 5-20 to Figure 5-29

Project element	Summary	Reference
Utilities	The project would require relocation and/or adjustment to existing utilities to support construction, including: • potable water • electricity • sewer • telecommunications.	Section 5.2.14
Water usage	Around 267,000kL of potable water and 2,670,000kL of non-potable water would be used over a four-year construction period.	Section 5.3.16
Vegetation clearing	Construction of the project would require the clearance of 103.89ha of native vegetation (see below) and 96.17ha of non-native vegetation. • PCT 3077: Illawarra Complex Dry Rainforest 2.91ha • PCT 3154: Illawarra Blackbutt Moist Forest 24.71ha • PCT 3188: South Coast Riverflat Peppermint Forest 8.05ha • PCT 3267: Shoalhaven Foothills Turpentine Forest 36.37ha • PCT 3270: Shoalhaven Lowland Wet Gully Forest 0.13ha • PCT 3588: Shoalhaven Foothills Bloodwood Heathy Forest 10.83ha • PCT 3638: South Coast Sands Bangalay Forest 1.89ha • PCT 3662: South Coast Lowland Blackbutt Forest 12.27ha • PCT 3917: Shoalhaven Lowland Heath 0.05ha • PCT 4052: South Coast Low Hills Red Gum Grassy Forest 6.56 ha • PCT 4146: Illawarra Sands Littoral Rainforest 0.12ha.	Chapter 7 (Biodiversity) and Technical Report 1: Biodiversity Development Assessment Report
Property	The project would require permanent acquisition including about 54.35 ha of private property acquisition, 0.6ha of local government property acquisition and 35ha of state government property acquisition. The project would temporarily lease 23.4ha of privately owned property.	Section 5.2.13 and Chapter 13 (Land use and property)
Project cost	About \$940,000,000	Estimated Development Cost Report provided to DPHI

5.2 The completed project

5.2.1 Operational footprint

The operational footprint is shown on Figure 5-1 to Figure 5-10 and would comprise the final road reserve, including the following permanent features:

- permanent road pavement of the bypass of Milton and Ulladulla
- interchanges, bridges, tie-ins and ramps
- culverts and drainage structures
- water quality control measures, including basins and swales
- landscaping
- noise walls
- retaining walls
- fauna crossing structures
- maintenance access
- fencing

- lighting
- signage
- traffic control systems
- safety barriers
- shared user paths.

The operational footprint would be about 200 hectares. The bypass would vary in width and be about 12 kilometres long at completion. At its narrowest, the road would be one lane in each direction with a width of around 15 metres (m). At its widest, at the central connection, the operational footprint would be about 250 metres including exit ramps and roundabouts.

5.2.2 Road alignment and cross section

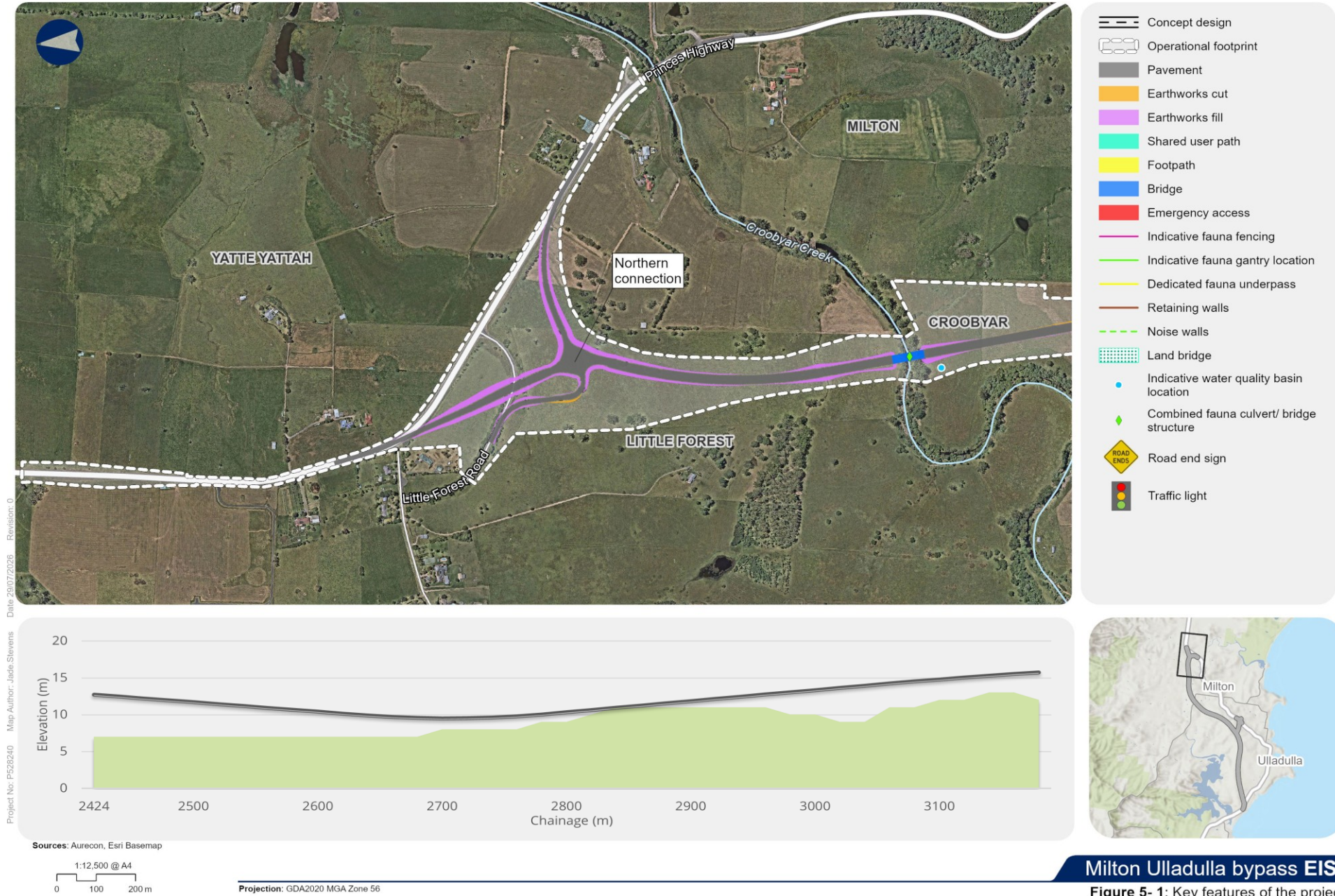
The bypass alignment deviates from the existing Princes Highway near the intersection with Little Forest Road and passes across agricultural land to the south, crossing Croobyar Creek and south towards Ringland Lane. The bypass then turns to the southeast, crossing Croobyar Road, Pettys Creek, Wilfords Lane and Slaughterhouse Road. It traverses another 800 metres to the south east before coming to the central connection (refer to Figure 5-12), which provides on and off ramps onto the local road network and Bishop Drive Extension to access the existing Princes Highway. Bishop Drive Extension would connect with the existing Princes Highway via an upgraded signalised intersection. This section would be about 8.6 kilometres of highway.

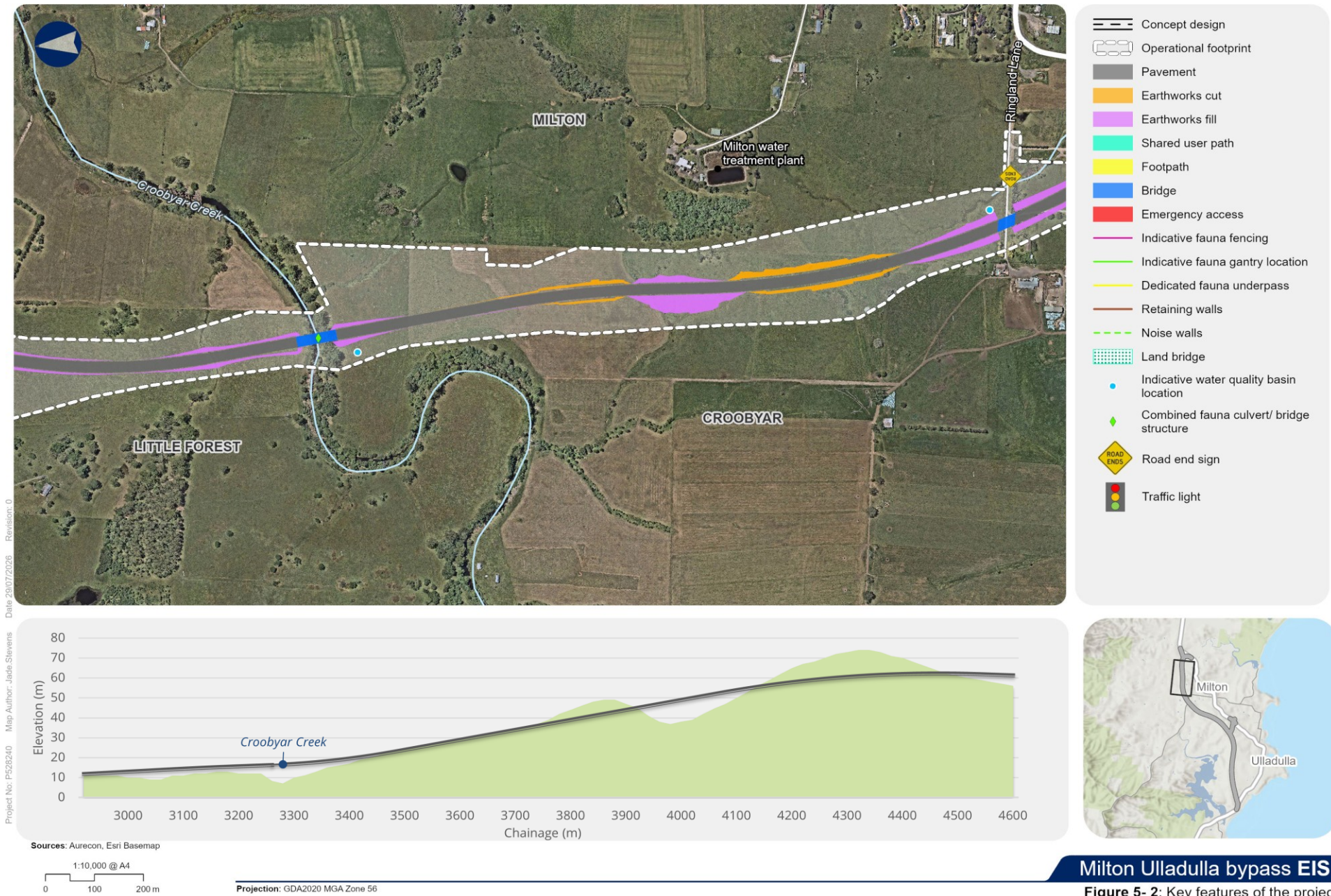
From the northern connection, the road alignment would be two lanes in each direction until around 600 metres north of the central connection, where the lane configuration would be one northbound lane and two southbound lanes (refer to Figure 5-1 to Figure 5-6).

From the central connection, the bypass traverses in a generally southerly direction to rejoin the Princes Highway near Canberra Crescent. The alignment would cross Green Street and pass under Kings Point Drive. From the central connection, the southbound carriageway would be two lanes for around 1.7 kilometres (to just south of Green Street). Beyond this point, the bypass would have one lane in each direction until about 300 metres north of the southern connection.

From the southern connection, the northbound carriageway would have two lanes for about 1.5 kilometres. Beyond this point, it would have a single lane to the central connection (refer to Figure 5-9).

At the southern connection (refer to Figure 5-14), a roundabout would be constructed to provide access between the bypass, Ulladulla and Burrill Lake via the existing Princes Highway.





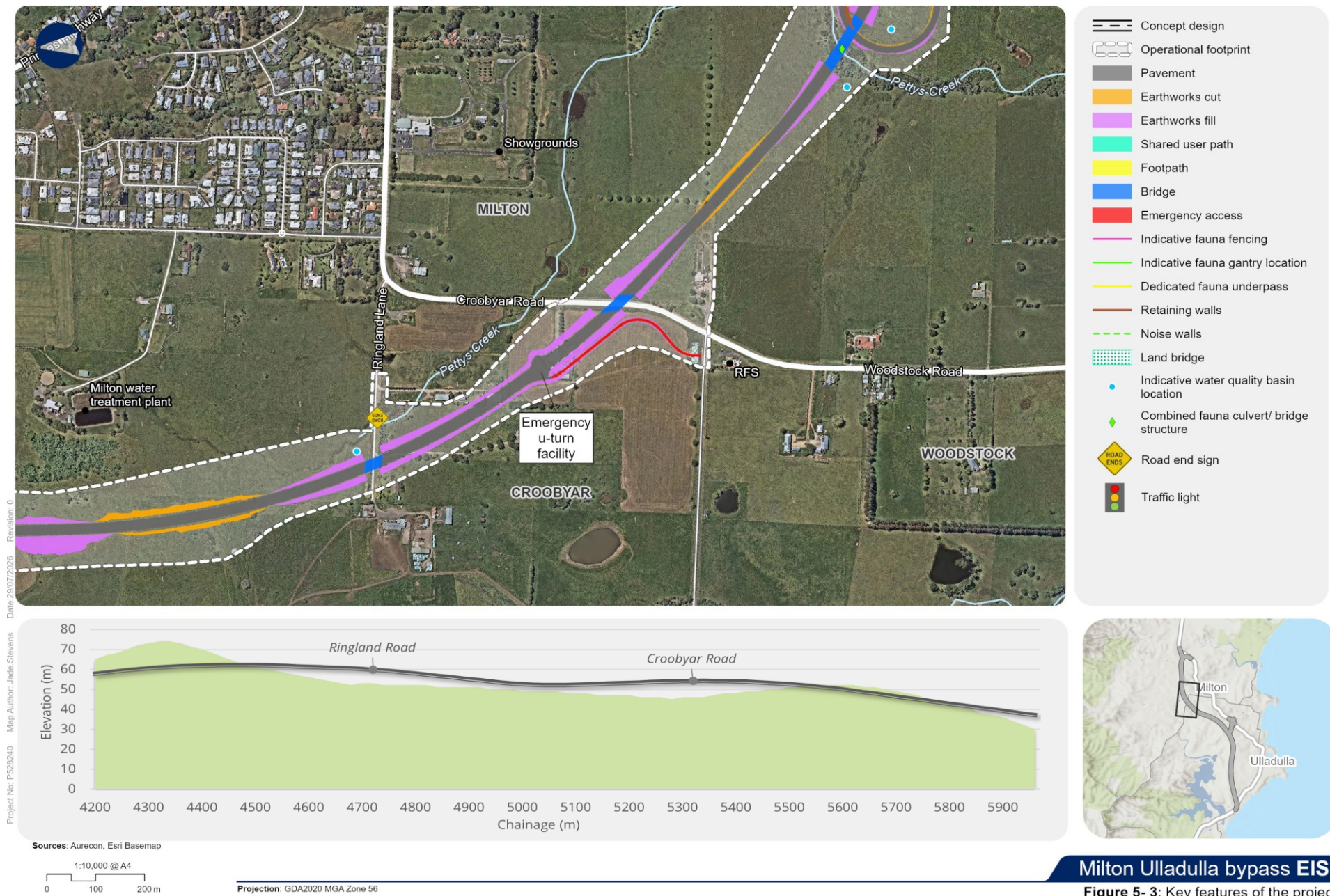


Figure 5- 3: Key features of the project

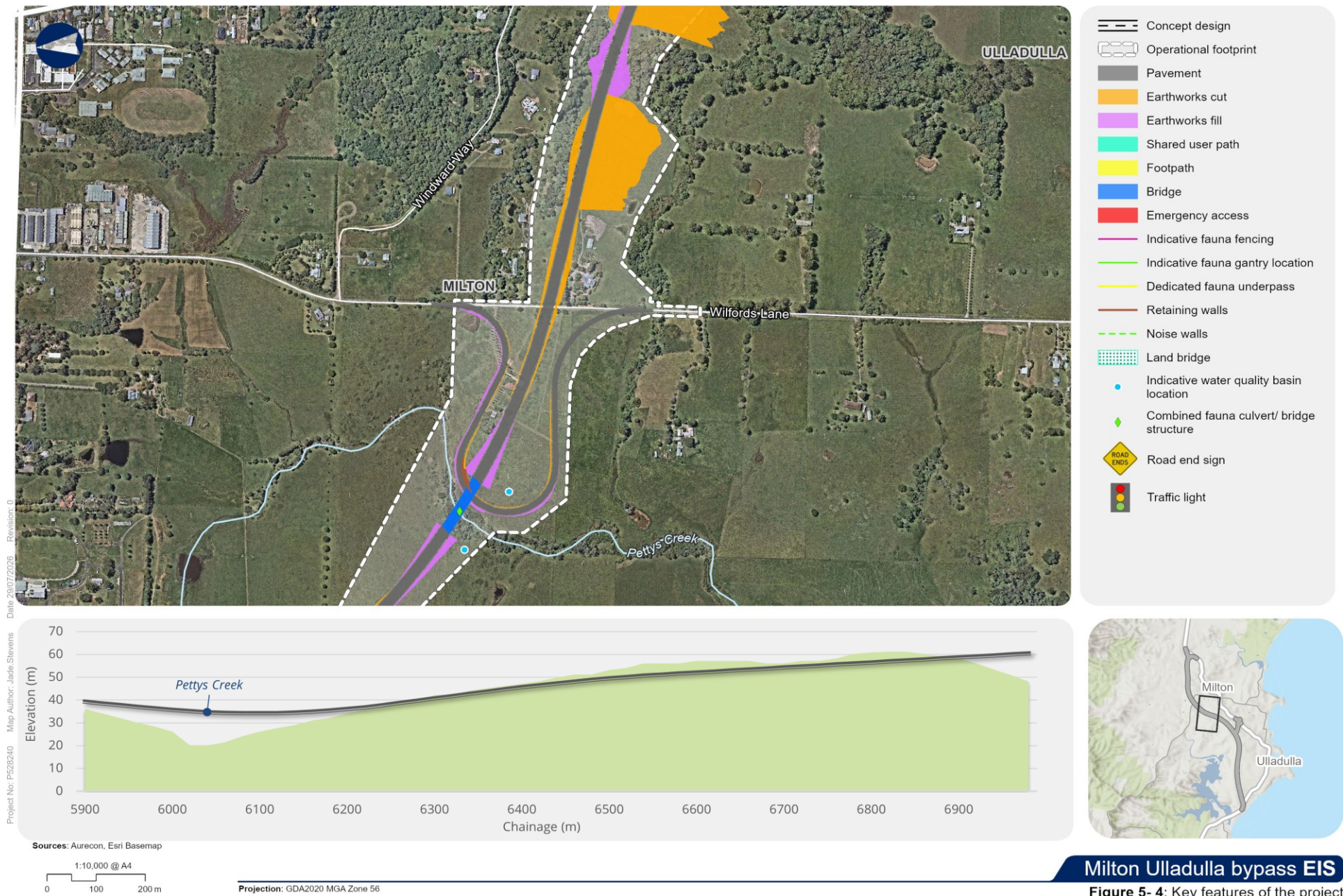
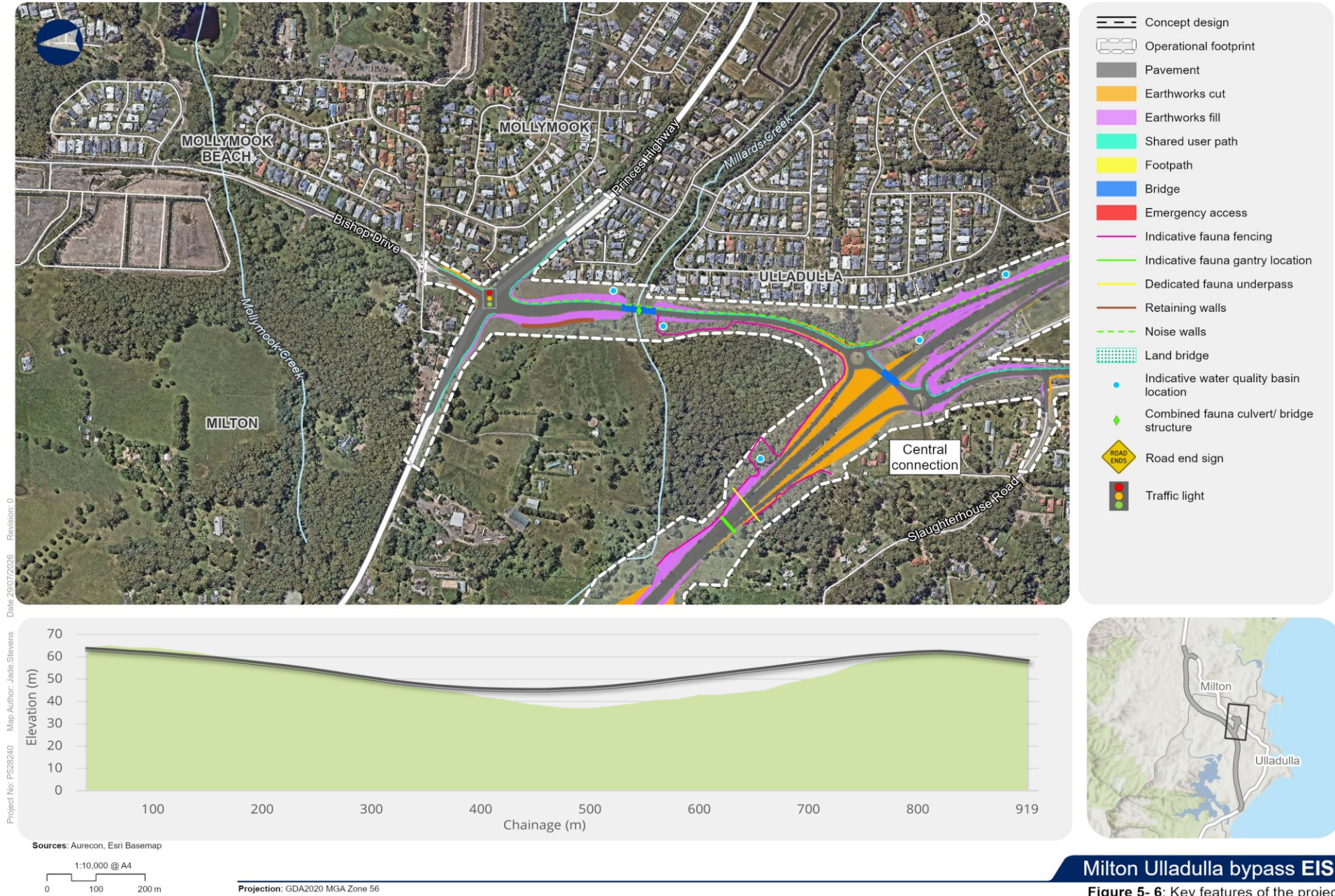


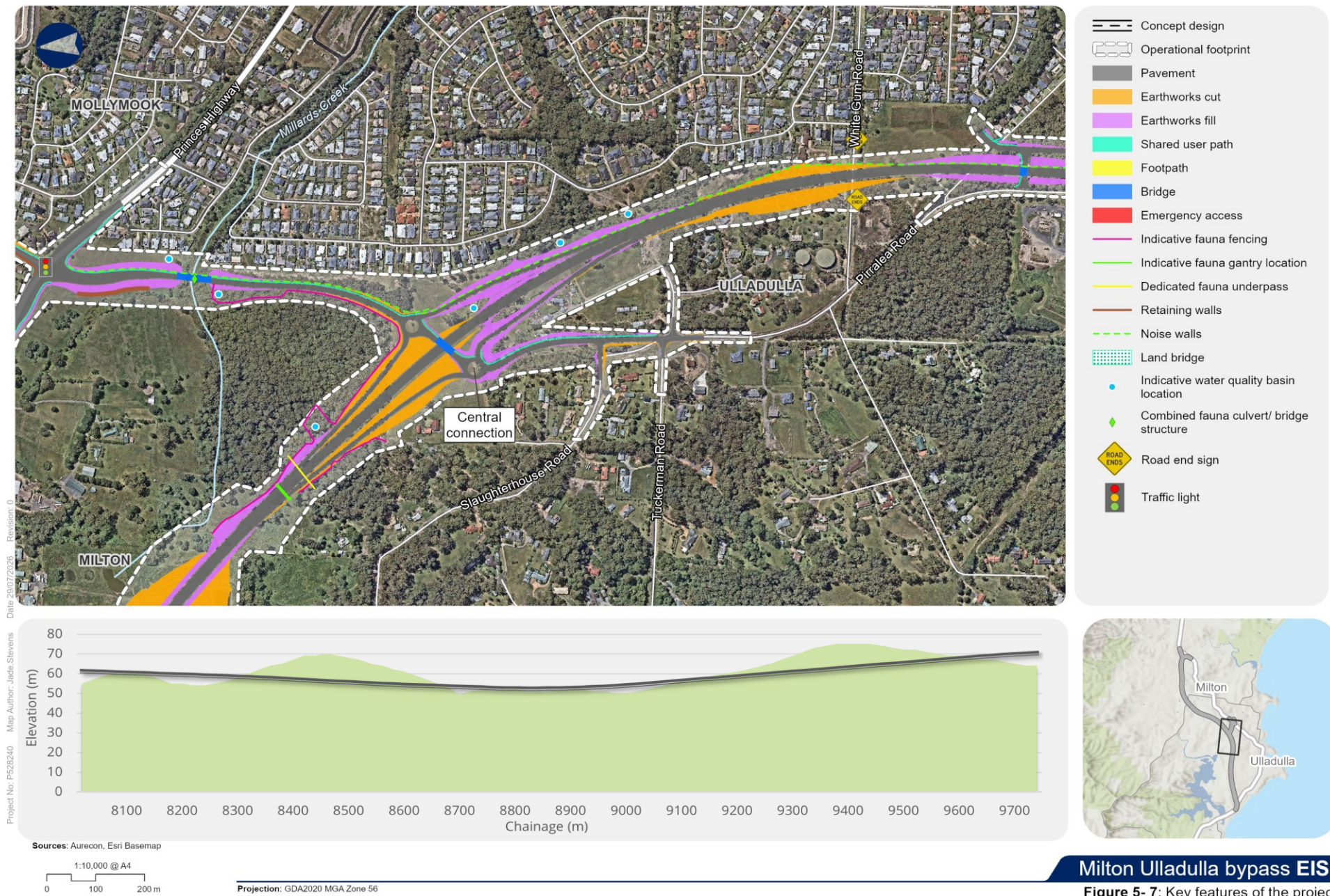


Figure 5- 5: Key features of the project



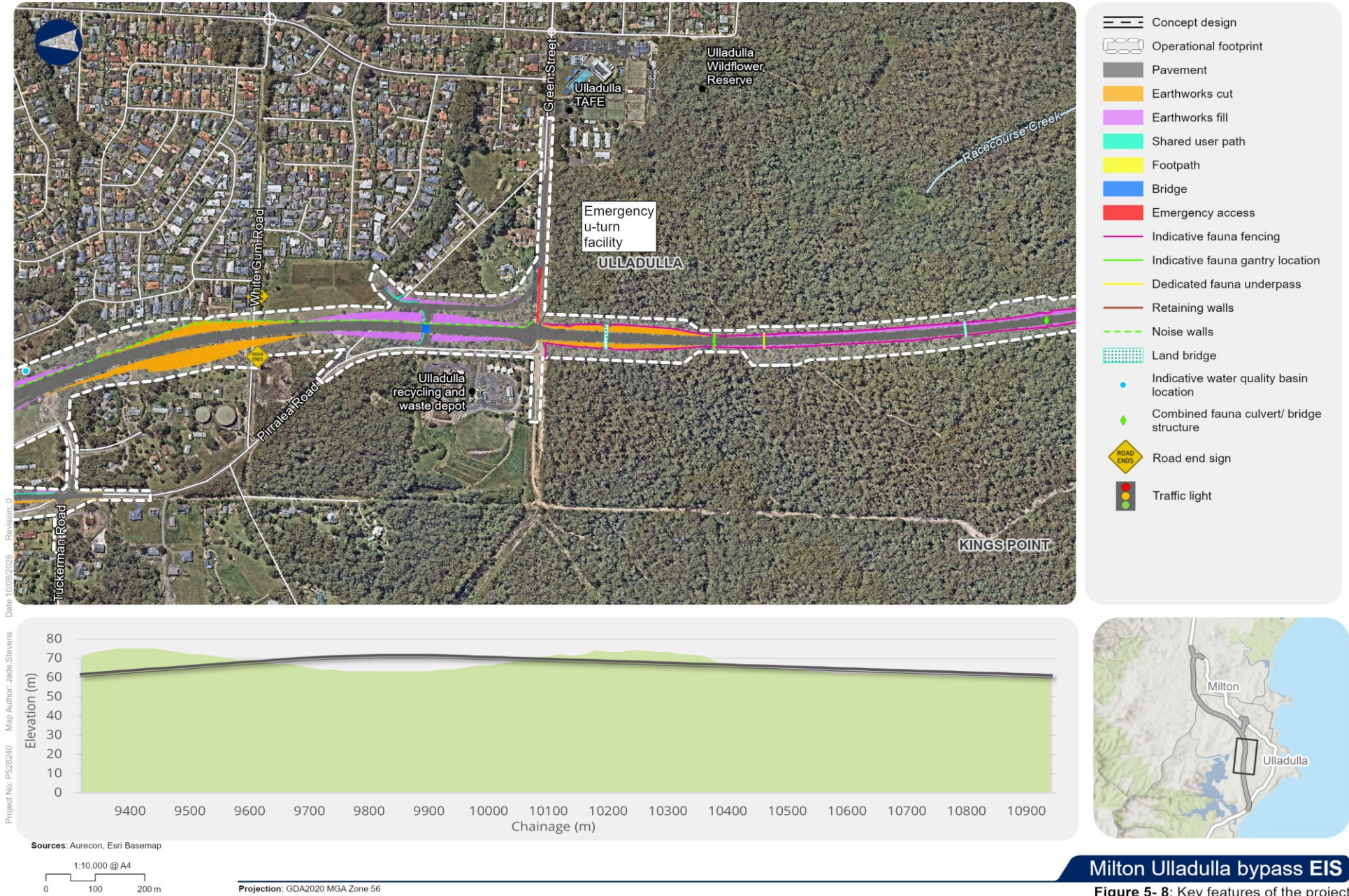
Milton Ulladulla bypass EIS

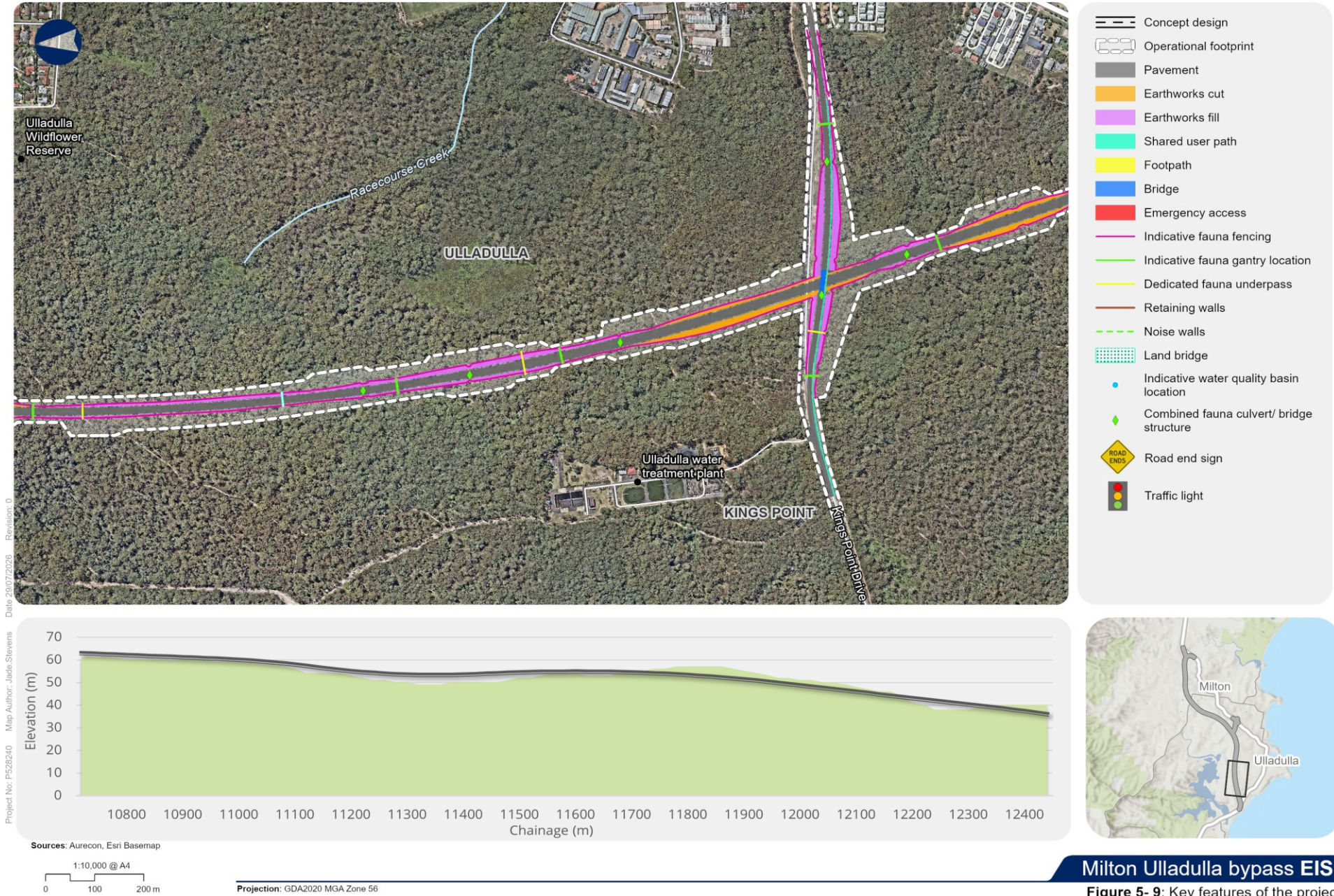
Figure 5- 6: Key features of the project

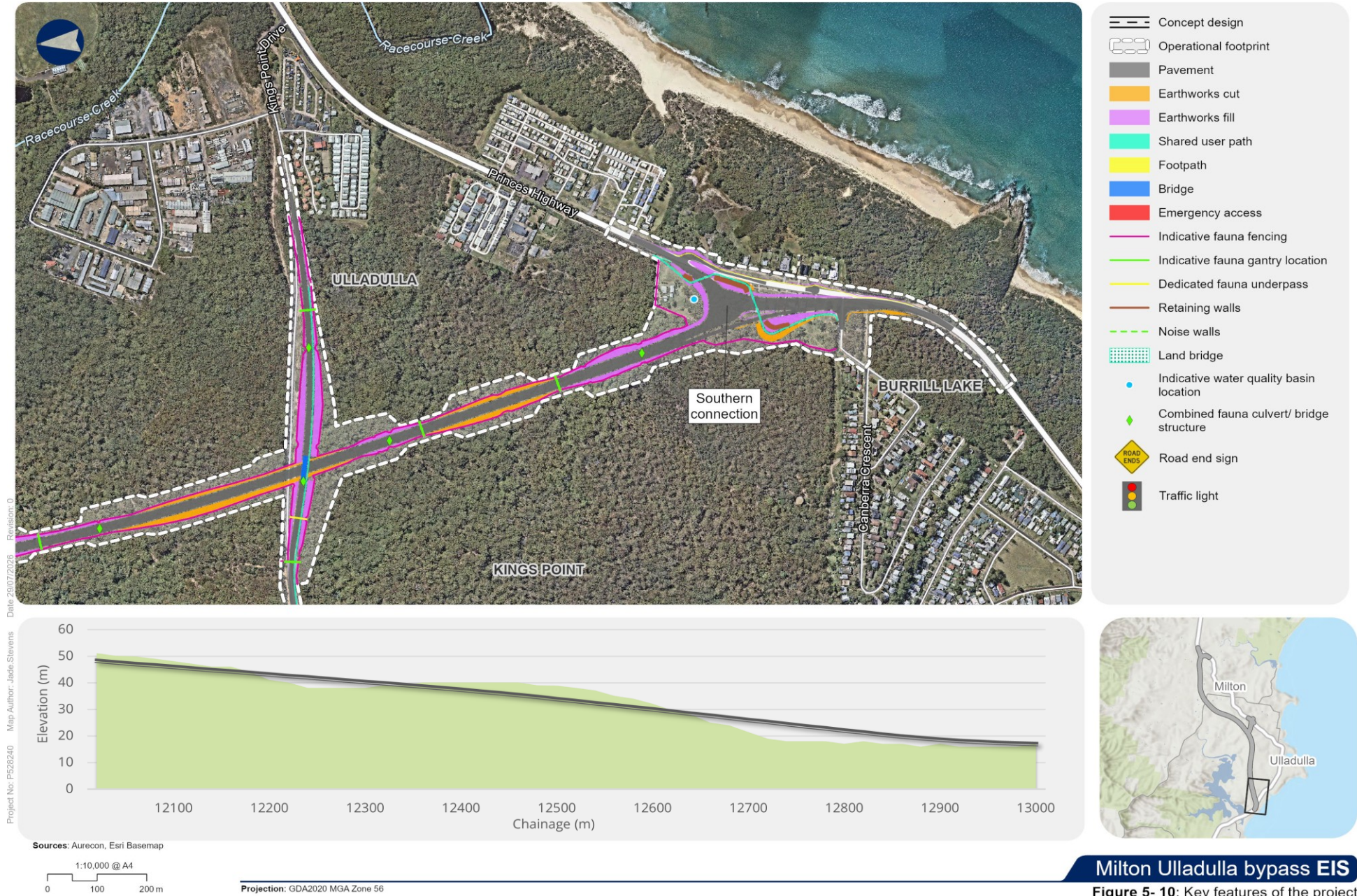


Milton Ulladulla bypass EIS

Figure 5- 7: Key features of the project







Design criteria

The project has been designed in general accordance with Transport Professional Services Requirements, Austroads guidelines, Australian Standards, and Transport supplementary documents. The key design criteria that are typical for the project are outlined in Table 5-2.

Table 5-2: Key design criteria for the bypass

Design element	Typical design criteria
Posted speed limit	100km/h
Traffic lane width	3.5m with widening in accordance with Transport design standards
Nearside shoulder widths	2.5m (3.0m clear between edge line and nearside barrier) with widening in accordance with Transport design standards
Offside shoulder widths	Nil adjacent to median. 1.0m where carriageway is separated, with widening in accordance with Transport design standards
Median width	3.0m with widening in accordance with Transport design standards
Minimal horizontal radius	600m (desirable minimum) for superelevated curves
Maximum vertical grade	6% absolute maximum
Vertical clearance of bridges from highway surface	5.4m
Design vehicle	PBS 2B (30m)
Stopping sight distance on main carriageway	209m
Flood protection	1% annual exceedance probability

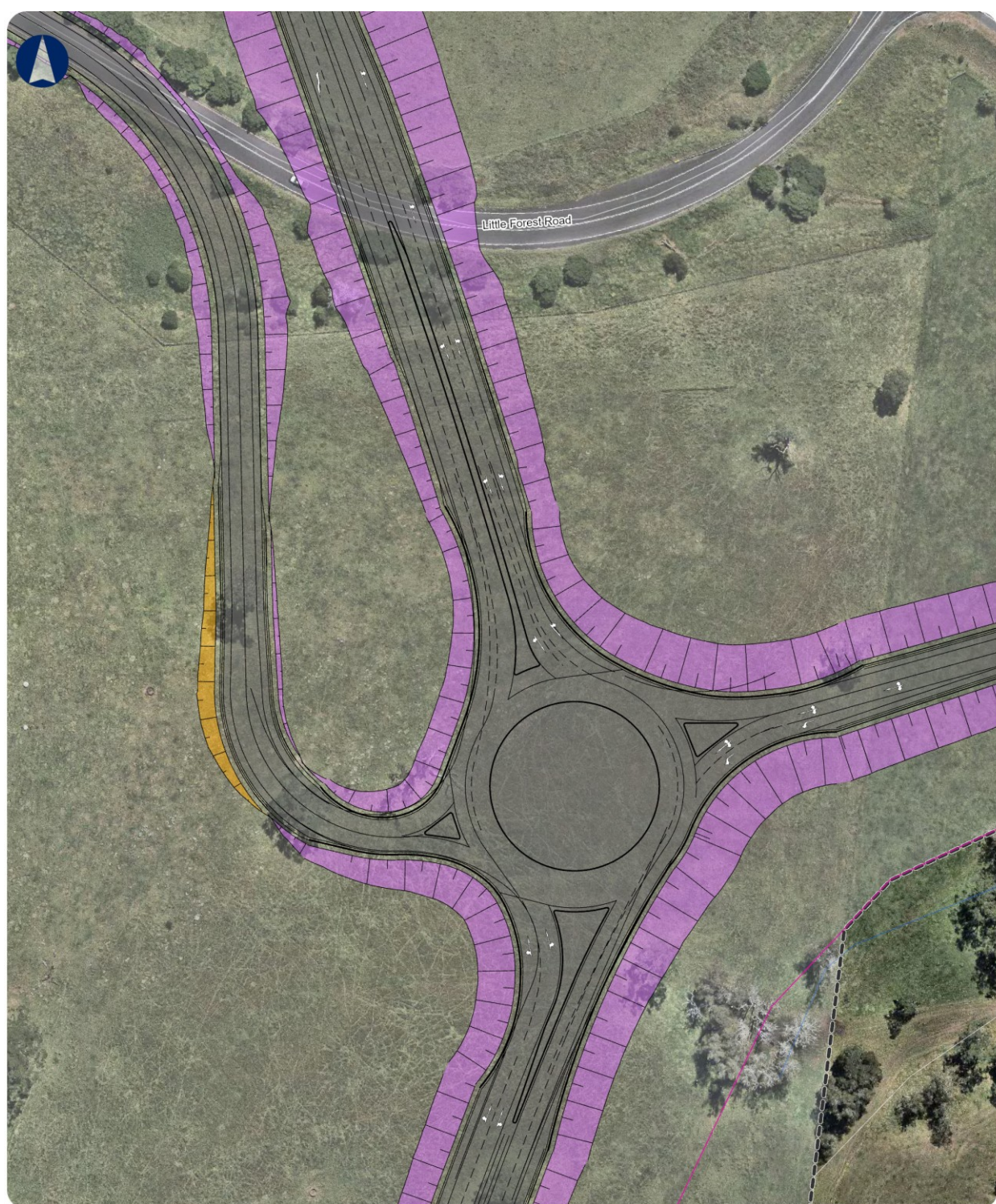
5.2.3 Key connection and intersection points

Three connection points would be provided on the bypass to connect to the existing Princes Highway or facilitate access to Milton and Ulladulla townships. In addition, one of the connection points would alter an existing intersection on the Princes Highway. These are detailed in Table 5-3. Key changes to local roads near the connection points described below are shown in Figure 5-1 to Figure 5-10.

Table 5-3: Connection and intersection points

Connection point	Description of the connection point
Northern connection	A new northern connection would involve an at-grade four-leg roundabout, connecting the bypass with Little Forest Road and the existing Princes Highway into Milton. The existing Little Forest Road and Princes Highway intersection and the section of the Princes Highway between the northern leg and the eastern leg of the roundabout would be decommissioned and no longer be publicly accessible. The northern connection is shown in Figure 5-11.
Central connection	The central connection would provide access to the bypass, the existing Princes Highway and surrounding local roads through a grade separated dual roundabout interchange. The interchange is comprised of entry and exit ramps from both the southbound and northbound carriageways, feeding into two roundabouts either side of the main alignment that are connected by a bridge over the bypass. The central connection links the Bishop Drive Extension (and existing Princes Highway) (refer below) to the east and Pirralea Road to the west. Pirralea Road would be realigned and connect at T-intersections to Slaughterhouse Road, Tuckerman Road and Tetley Place. The central connection is shown in Figure 5-12.

Connection point	Description of the connection point
Bishop Drive Extension/ existing Princes Highway intersection	Bishop Drive Extension/existing Princes Highway intersection would be upgraded to a four-leg signalised intersection at Bishop Drive and the existing Princes Highway. The Bishop Drive Extension/existing Princes Highway intersection is shown on Figure 5-13.
Southern connection	The southern connection would provide a connection between the bypass and the existing Princes Highway towards Ulladulla and Burrill Lake with an at-grade three-leg roundabout. The southern leg is the existing Princes Highway from Burrill Lake with a single lane in each direction. For travellers wanting to get onto the bypass, an additional northbound direct lane to the bypass without needing to access the roundabout is provided, but access into Ulladulla would be via the roundabout. The eastern leg is the existing Princes Highway to Ulladulla with a single lane into Ulladulla, but two lanes southbound (into the roundabout). The western leg is the bypass, with two lanes in either direction before merging into one lane in either direction. The shared user path passes underneath this connection to maintain the existing shared path movement to the west of the existing Princes Highway (refer to Section 5.2.8). The southern connection is shown in Figure 5-14.

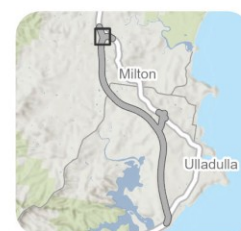


-  Concept design
-  Project boundary
-  Pavement
-  Earthworks cut
-  Earthworks fill
-  Indicative fauna fencing

Source: Aurecon, TfNSW, NSW Spatial Services, ESRI

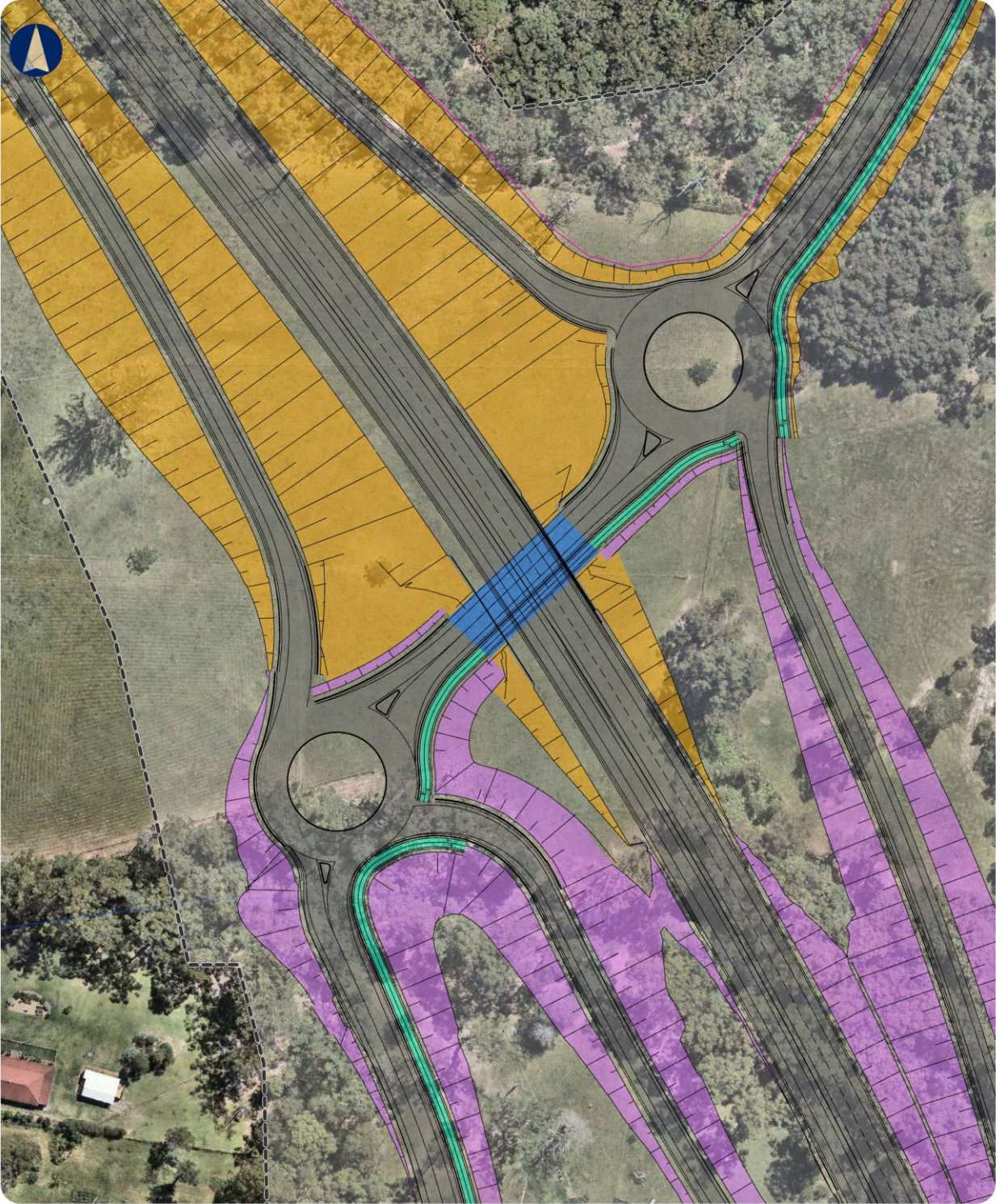
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0 25 50 m

Projection: GDA2020 MGA Zone 56

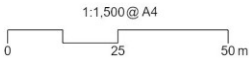


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Figure 5-11: Indicative Northern Connection



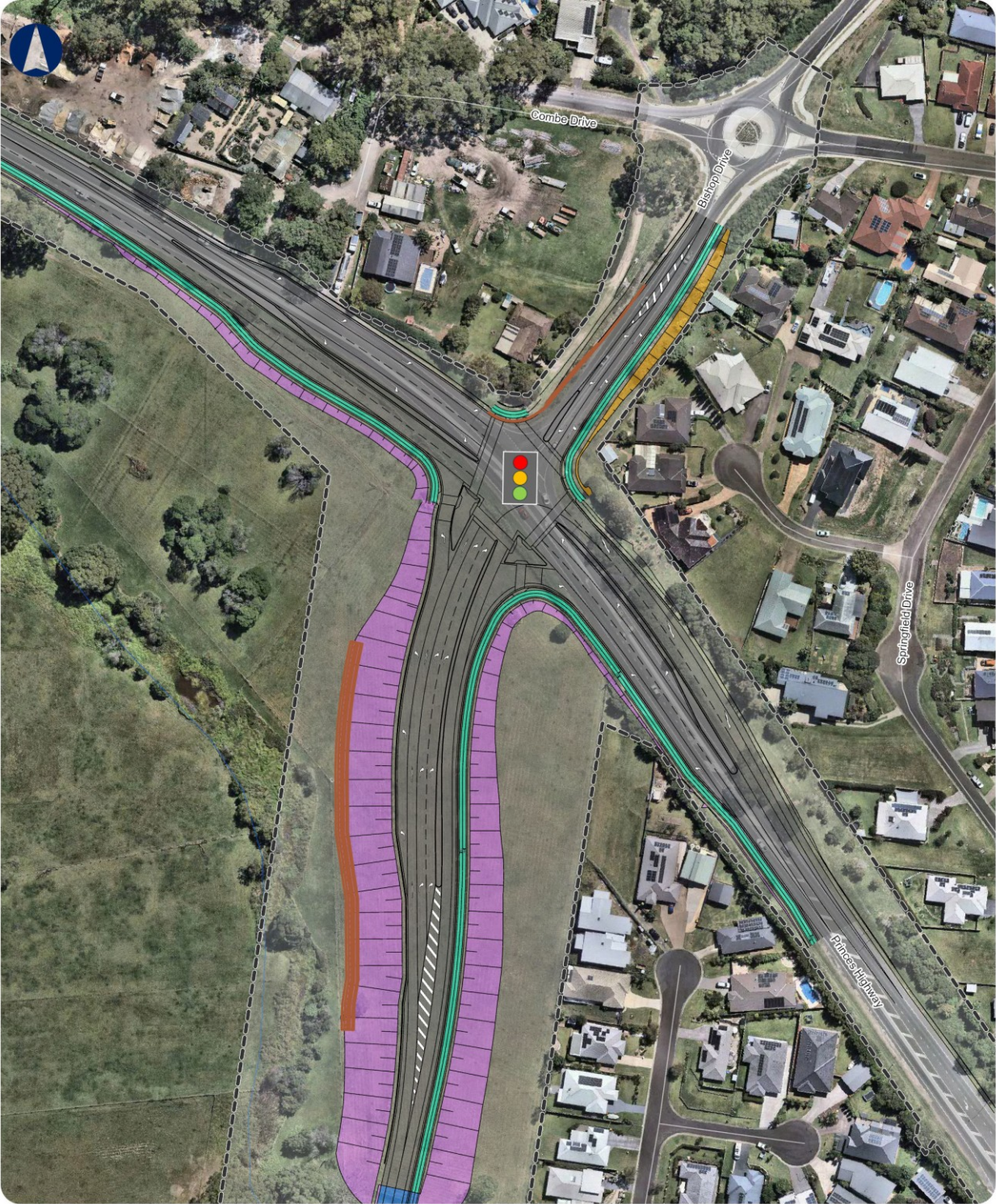
Source: Aurecon, TfNSW, NSW Spatial Services, ESRI



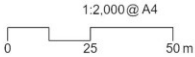
Projection: GDA2020 MGA Zone 56

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Figure 5-12: Indicative Central Connection



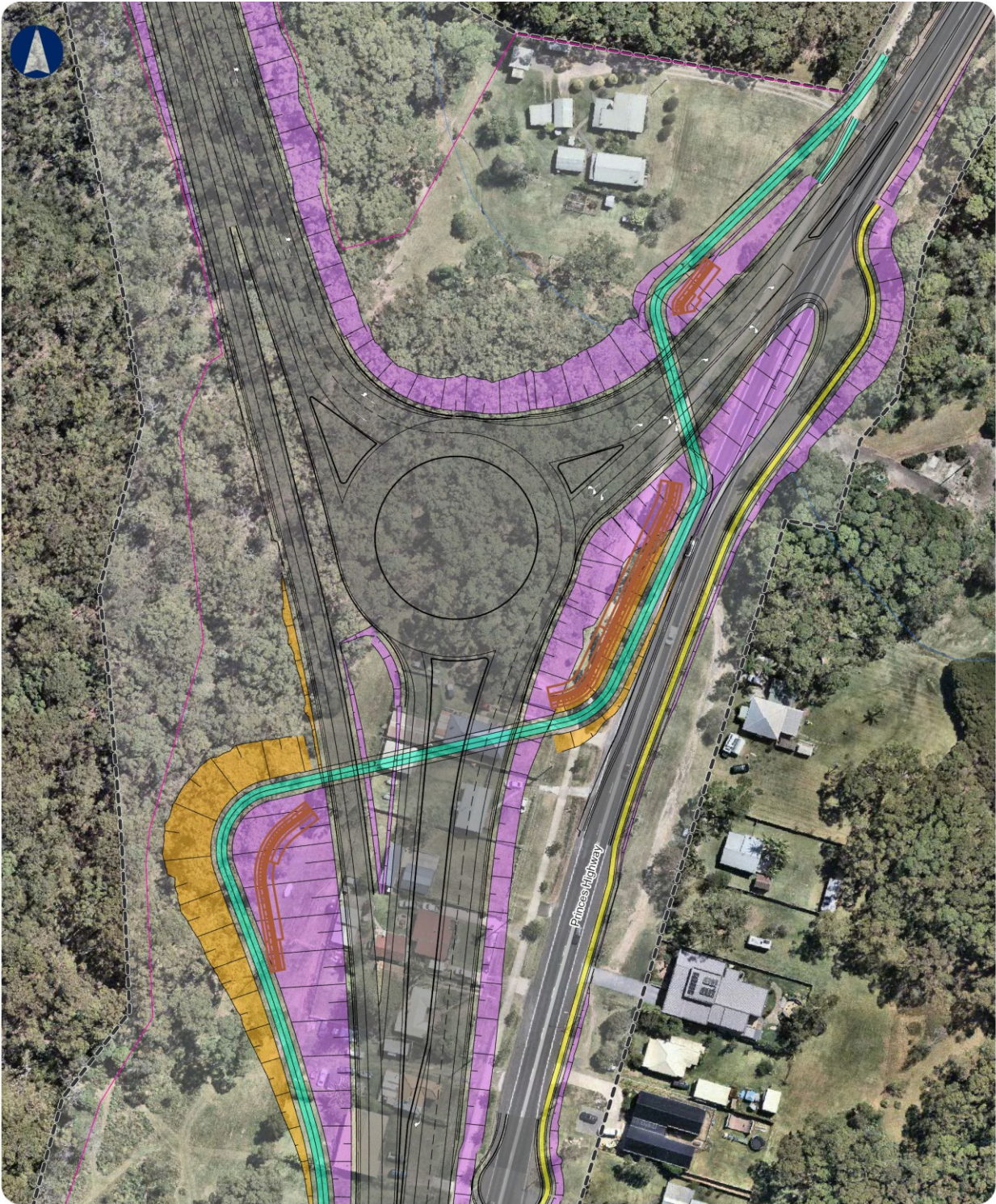
Source: Aurecon, TfNSW, NSW Spatial Services, ESRI



Projection: GDA2020 MGA Zone 56

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Figure 5-13: Indicative Bishop Drive Extension/existing Princes Highway intersection



- | | |
|------------------|--------------------------|
| Concept design | Shared user path |
| Project boundary | Footpath |
| Pavement | Retaining walls |
| Earthworks cut | Indicative fauna fencing |
| Earthworks fill | |

Source: Aurecon, TNSW, NSW Spatial Services, ESRI

1:1,500@ A4
0 25 50 m

Projection: GDA2020 MGA Zone 56



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Figure 5-14: Indicative Southern Connection

5.2.4 Bridges

Ten bridge structures would be required for the project that either comprise an overpass or an underpass of the bypass. This would include:

- three creek bridges
- two bridges over the bypass
- three bridges over local roads
- two pedestrian underpasses.

The concept design for structures has considered:

- relevant design standards in terms of sight lines, structural performance and maintenance requirements
- avoiding and minimising environmental and social impacts
- geotechnical constraints
- constructability
- the urban design principles and visual impact on the surrounding area (refer to Chapter 11 (Urban design, landscape character and visual amenity))
- avoidance of piers in watercourses where possible
- provision of adequate waterway capacity, with minimal increase to water levels upstream of the structure
- scour protection to avoid erosion around piers and creek banks
- the need to incorporate safety screens, hand rails and noise walls, where required, as integral parts of the bridge balustrade
- provision of appropriate horizontal and vertical clearances to local roads or other access
- consideration of crime prevention through environmental design issues (for underpasses).

The indicative design of the bridges are summarised in Table 5-4 and with indicative renders shown in Figure 5-15 and Figure 5-16. Bridge designs and structure types would be further refined during detailed design.

Table 5-4: Indicative bridge design

Bridge location	Description	Indicative structure type	Indicative length (m)	Indicative width (m)	Indicative number of spans
Bridge over Croobyar Creek	A bridge over Croobyar Creek.	Simply supported Super-T girder	73.1	22.2	3
Bridge over Ringland Lane	The bypass would bridge over the existing Ringland Lane to allow continued property access. The overpass would be designed to permit vehicular traffic and movement of cattle for the purpose of the dairy farm.	Simply supported Super-T girder	29.19	22.7	1
Bridge over Croobyar Road	The bypass would bridge over the existing Croobyar Road to allow continued local traffic. The design would allow space for future construction of active transport infrastructure.	Pergola Bridge	27.7	22.7	1
Bridge over Pettys Creek	A bridge over Pettys Creek and the realigned Wilfords Lane.	Simply supported Super-T girder	113.0	23.0	3
Central connection bridge	A bridge between the two roundabouts that form the dumbbell interchange at the central connection.	Simply supported Super-T girder	30.8	15.18	1

Bridge location	Description	Indicative structure type	Indicative length (m)	Indicative width (m)	Indicative number of spans
Bridge over Millards Creek	A bridge or culvert over Millards Creek, with one lane northbound and southbound.	Simply supported Super-T girder ¹	75.2	15.18	2
Bridge over Green Street	The bypass would bridge over Green Street with a small underpass constructed to go underneath the bypass, connecting Pirralea Road to Cashman Road and Green Street.	Simply supported Super-T girder	21.63	19.5	1
Kings Point Drive bridge over bypass	Kings Point Drive would be realigned to bridge over the bypass. The bridge would be one lane both eastbound and westbound.	Simply supported Super-T girder	33.52	14.68	1
Southern connection shared user path underpass	Two connected underpasses would go under the southern connection roundabout, connecting Burrill Lake to Ulladulla.	Simply supported Super-T girder or plank girder	75.25 and 35	5.5	1

¹: An alternative design option is being investigated which would replace these bridge structures with a culvert consisting of a reinforced concrete box. The structure type would be confirmed during detailed design.

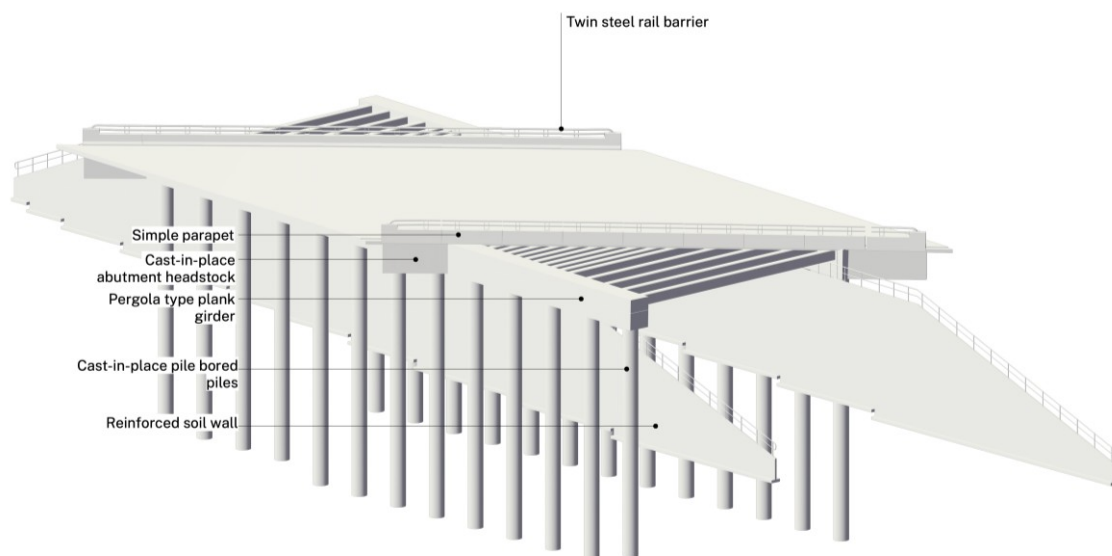


Figure 5-15: Indicative pergola bridge

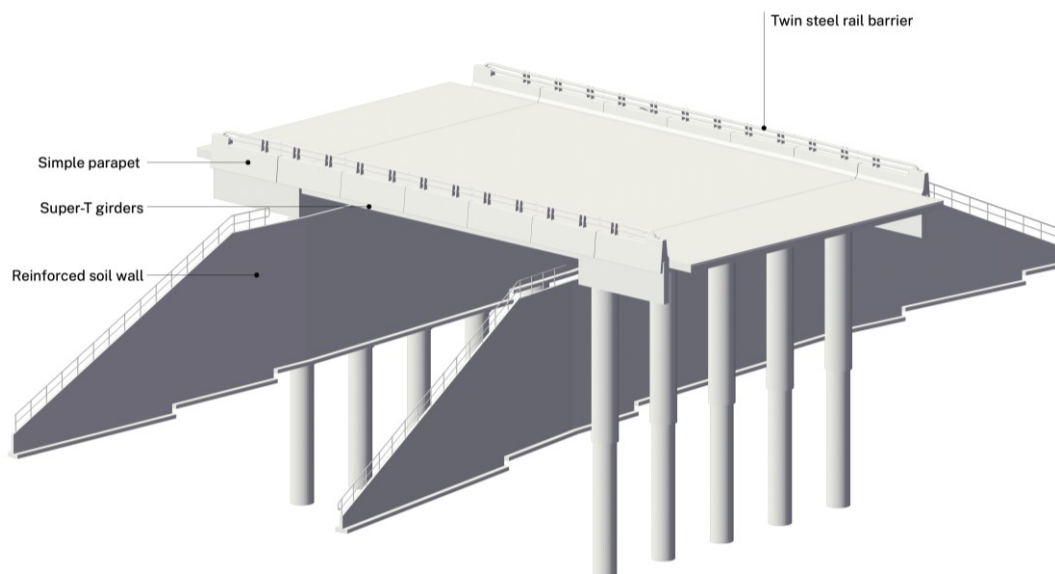


Figure 5-16: Indicative super T girder bridge

5.2.5 Road cuttings, fill embankments and retaining walls

Numerous cuttings are proposed across the alignment with a maximum height of 13 metres. Cut benches (flat steps in the slope) would be provided at regular intervals (generally every 10 metres) to improve the stability of deep cuttings. Cuttings would generally have a slope of 2H:1V.

There are two monzonite cuttings proposed along the alignment. In these monzonite cuttings, 0.25H:1V cut slope profiles are proposed due to the nature of the material. Figure 5-18 shows an indicative cross section of a monzonite cutting. Blasting would be required to cut through the monzonite in these locations, both of which are situated between Croobyar Creek and Ringland Lane. Further detail on blasting can be found in Section 5.3.5.

Three locations along the project have been nominated as areas for wider cuts where additional non – monzonite material can be excavated to be used in fill embankments for the project. These areas were chosen due to the minimal vegetation and are outside areas of very high strength Milton Monzonite within the project boundary. The identified areas for wider cuts are shown in Figure 5-20 to Figure 5-29. These figures show the potential maximum extents for these areas, however, during construction, the contractor would only excavate what is required and so the final excavated area may be smaller than shown. Efforts would be made to shape these cuts to blend in with the existing environment, to match the existing profile. Figure 5-19 shows an indicative cross section of the final land form of a widened cut area.

Fill embankments would typically have a slope of 2H:1V to reduce the overall footprint with a maximum height of 12 metres. Benches would be provided at regular intervals (generally every 10 metres) to improve the stability of high embankments. Figure 5-17 shows an indicative cross section through a fill embankment.

Six locations along the project have retaining walls where cuttings or embankments would impact the surrounding infrastructure or environment:

- RS01 – along realigned Wilfords Lane to retain the bypass embankment away from the road
- RS02 – on the western side of Bishop Drive to retain an existing property driveway
- RS03 – to retain the fill embankment of the Bishop Drive Extension away from a tributary to Millards Creek
- RS04, RS05 and RS06 – these three retaining walls are at the southern connection shared user path underpass, where retaining walls would improve user experience and crime prevention through environmental design considerations.

Cuttings, embankments, and retaining walls across the project are shown in Figure 5-1 to Figure 5-10 and Figure 5-20 to Figure 5-29. The cuttings are subject to change following geotechnical analysis and design development. The location and dimension of cuttings and embankments would be confirmed during detailed design. All slopes would be revegetated to the edge of the indicative road corridor or existing landforms, where reasonable and feasible, to integrate the project with the surrounding landscape.

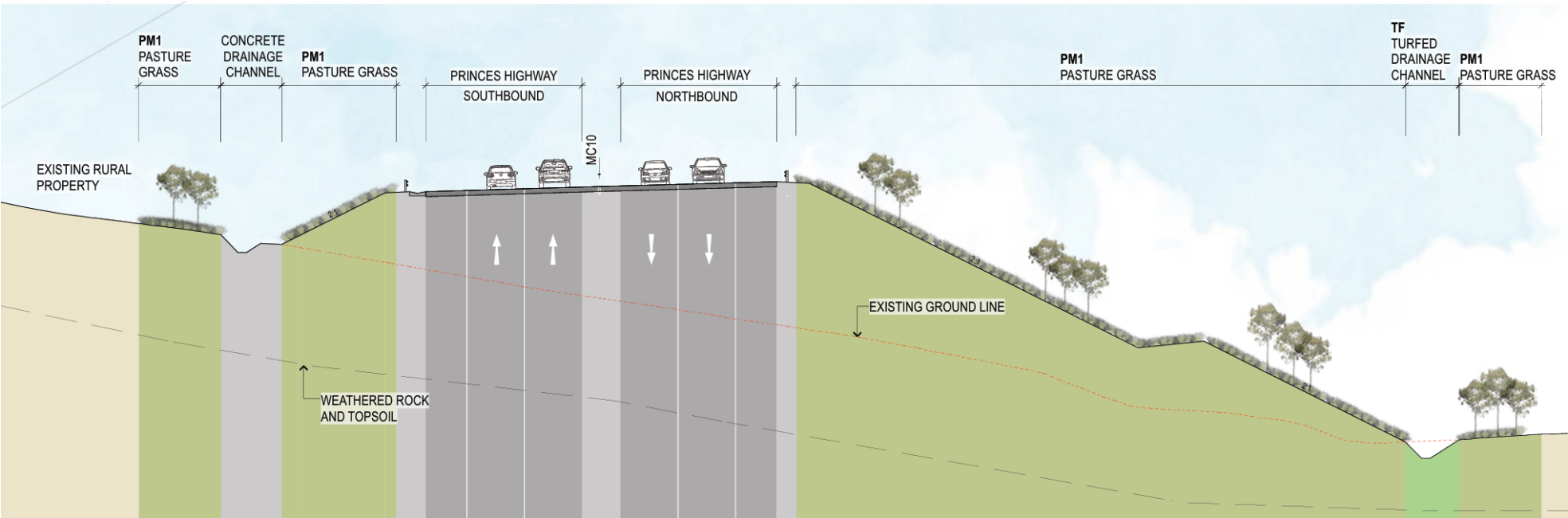


Figure 5-17: Indicative cross section through fill embankments

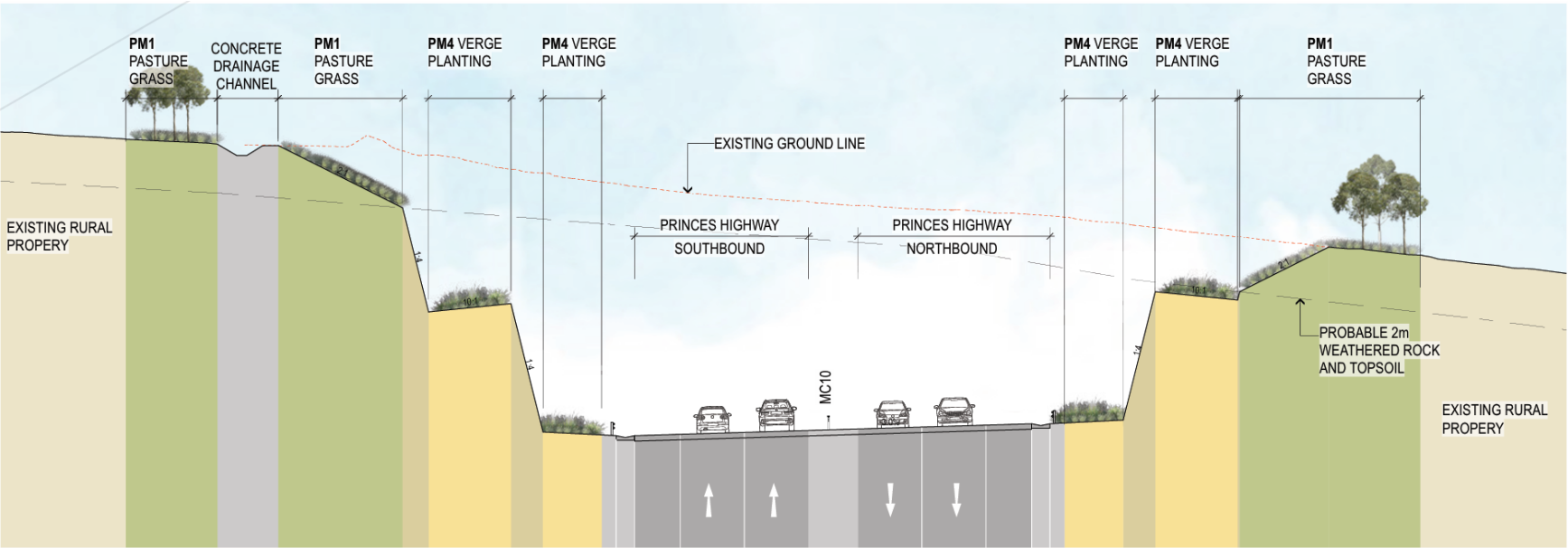


Figure 5-18: Indicative cross section through monzonite cutting

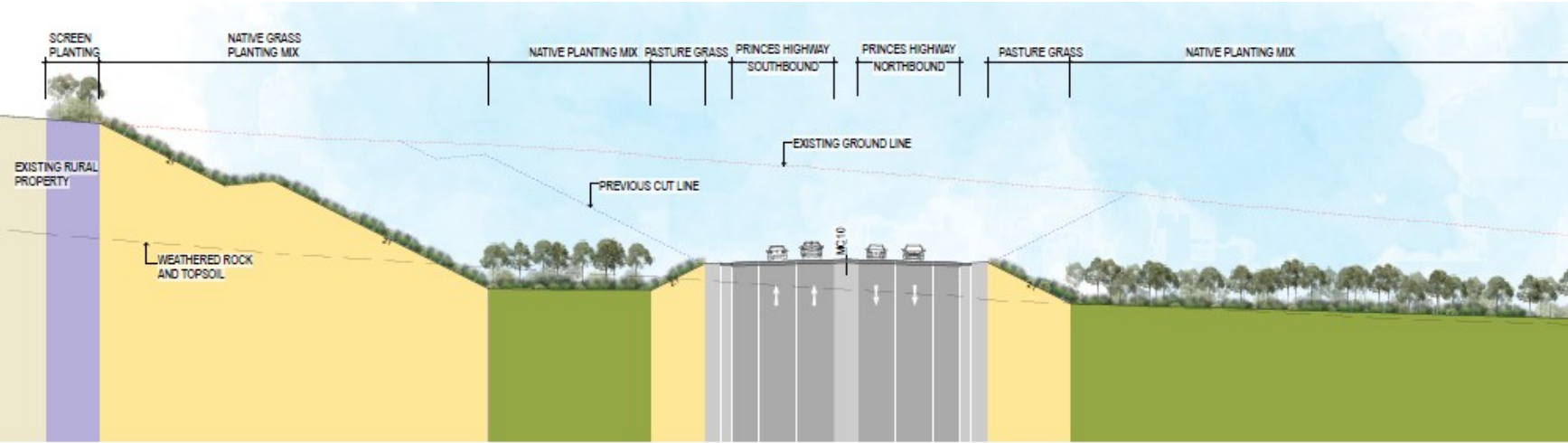


Figure 5-19: Indicative cross section through the widened cut area

5.2.6 Emergency and restricted vehicle access

The project would provide two sets of emergency and restricted vehicle access points to permit safe and fast emergency vehicle access to the bypass. The facilities would include a median crossover, stopping bays, median emergency vehicle U-turn facilities and restricted access to the local road network for emergency vehicles.

The first access point is located on the bypass between Ringland Lane and Croobyar Road with a restricted access road connecting to Croobyar Road opposite the RFS Station. The second access point is located at the existing intersection of Green Street and Pirrarea Road, with restricted access roads connecting either side of the bypass. These facilities are shown in Figure 5-1 to Figure 5-10.

5.2.7 Local road network

Changes to the local road network and proposed access road upgrades for the project are listed below. These modifications are needed to maintain connections on the existing road network that would be directly affected by the project. Changes to the local road network would be subject to further refinement during detailed design. Subject to that further refinement, changes to the local road network and proposed access road upgrades would include:

- Little Forest Road would be realigned and would function as the western leg of the northern connection roundabout (refer to Figure 5-1)
- The bypass would bridge over Ringland Lane, maintaining connectivity to Croobyar Farm via an underpass accommodating both vehicle and cattle movements. A cul-de-sac on Ringland Lane would be provided east of the bypass for local traffic, with driveway access retained for private property access to the west of the bypass (refer to Figure 5-3)
- The existing arrangement of Croobyar Road and Woodstock Road would remain unchanged, as the bypass bridge over Croobyar Road would maintain existing access. A dedicated private access road from Croobyar Road to the bypass U-turn bays would be provided for Milton Rural Fire Service Brigade (located on Croobyar Road) (refer to Figure 5-3)
- Wilfords Lane is a two-way local road providing access to about 15 properties. To maintain access for properties on Wilfords Lane west of the project, Wilfords Lane would be realigned to loop under the bypass bridge over Pettys Creek. This would result in an increase of about 800 metres in travel length for local users (refer to Figure 5-4)
- Slaughterhouse Road would be divided about 200 metres south of Windward Way on both sides of the bypass:
 - on the western side of the project, a formal turning head on Slaughterhouse Road would be provided near the bypass. The properties would have direct access to the bypass through entry and exit ramps at the central connection and to the existing Princes Highway via the Bishop Drive Extension from the central connection (refer to Figure 5-6)
 - on the eastern side, the road would terminate at Windward Way, with signage indicating the end of the road and driveway access retained for existing properties. To access the western side of the project, motorists in this area would have to travel via the existing Princes Highway through the Bishop Drive Extension and central connection to Pirrarea Road (refer to Figure 5-5).
- Tuckerman Road and Tetley Place would connect to Pirrarea Road at a T-junction intersection and would access the bypass and the existing Princes Highway via the central connection and Bishop Drive Extension (refer to Figure 5-6)
- Bishop Drive Extension would connect to the central connection roundabouts with a signalised intersection upgrade at the existing T-Junction intersection of Bishop Drive and the Princes Highway (refer to Figure 5-6)
- White Gum Road would terminate about 200 metres east of Pirrarea Road either side of the bypass with no formal turning facilities on either side of the project, end points would be clearly signposted:
 - access to properties east of the project would be maintained via the existing local road network and a future link road between White Gum Road and Green Street (refer to Figure 5-7)
 - access to properties west of the project would be provided via Pirrarea Road and the central connection (refer to Figure 5-6 and Figure 5-7).
- Green Street would be realigned parallel to the bypass on the eastern side and would continue to operate as a local access road. The bypass would bridge over the realigned Green Street and maintain access from Green Street (east of the project) to Pirrarea Road (west of the project) via an underpass and would also provide Green Street traffic access to the project via the central connection. Existing access to the waste depot via Pirrarea Road would be maintained (refer to Figure 5-7)

- Kings Point Drive would be realigned slightly to the south of the existing alignment, and would bridge over the bypass (refer to Figure 5-8)
- Access to Canberra Crescent would be provided via a T-junction intersection with the realigned existing Princes Highway, where left-in, left-out and right-in movements would be unrestricted. However, unlike the existing conditions, direct right-turn movements out of Canberra Crescent would be restricted, meaning vehicles would have to travel north to use the southern connection roundabout to access the Princes Highway southbound. This arrangement would improve safety by reducing turning conflicts on the existing Princes Highway while maintaining access, however, it would result in a slight increase in travel times (refer to Figure 5-9)
- A section of existing Princes Highway (north of Canberra Crescent) would be repurposed into a local property access road for properties to the east of the highway. Using this access road, residents would be able to access their properties from the existing Princes Highway. The proposed local access road would deviate from the Princes Highway at Ulladulla and travel south to capture all property driveways before ending (refer to Figure 5-9)
- the existing Princes Highway between Little Forest and Burrill Lake via Milton and Ulladulla town centres would be converted to a local road once the project is operational.

Key design criteria for local roads and access roads are provided in Table 5-5.

Table 5-5 Key design criteria for local roads and access roads

Local roads and access roads	Design speed (km/h)	Posted speed (km/h)	Typical traffic lane width (m)	Typical shoulder widths (m)	Pavement
Little Forest Road	70	60	3.5	2.0	Asphalt over granular base
Existing Princes Highway at northern connection	90	80	3.5	Existing or 2.0 whichever is greater	Full depth asphalt
Ringland Lane	50	50	Existing	Existing	Asphalt over granular base
Croobyar Road	70	60	3.5	2.0	N/A
Woodstock Road	70	60	3.5	2.0	N/A
Wilfords Lane	70	60	3.5	2.0	Asphalt over granular base
Slaughterhouse Road	60	60	Existing	Existing	Asphalt over granular base
Pirralea Road	70	60	3.5	2.0	Full depth asphalt
White Gum Road	50	50	Existing	Existing	N/A
Bishop Drive Extension	70	60	3.5	2.0	Full depth asphalt
Existing Bishop Drive	60	60	Existing	Existing	Full depth asphalt
Existing Princes Highway at central connection	70	60	3.5	Existing	Full depth asphalt
Cashman Road	50	50	3.5	2.0	N/A
Green Street	60	50	3.5	2.0	Asphalt over granular base
Kings Point Drive	90	80	3.5	2.0	Asphalt over granular base
Existing Princes Highway at southern connection	70	60	3.5	2.0	Full depth asphalt
Canberra Crescent	50	50	3.5	Existing	Asphalt over granular base

Local roads and access roads	Design speed (km/h)	Posted speed (km/h)	Typical traffic lane width (m)	Typical shoulder widths (m)	Pavement
Local property access road east of southern connection	30	30	3.5	To suit swept paths and allow 2.0 for parking, if possible, on existing pavement	Asphalt over granular base
Tuckerman Road	50	50	Existing	Existing	Full depth asphalt
Tetley Place	50	50	Existing	Existing	Full depth asphalt

5.2.8 Active transport

The central connection features a new shared user path that connects the existing Princes Highway/Bishop Drive intersection along the southern side of Bishop Drive Extension, across the interchange bridge, to local roads west of the bypass. The extension of Pirralea Road would provide access to Slaughterhouse Road, Pirralea Road, Tuckerman Road and Tetley Place and includes a shared user path on the eastern side of the road. The existing Princes Highway/Bishop Drive intersection would be signalised with pedestrian/cycling crossing points to allow access to Bishop Drive to the north of the existing Princes Highway. Kerb ramps would be provided at all road crossing points of the signalised intersection.

Small sections of shared user paths would also be provided to the realigned Green Street to connect into existing and proposed (by others) shared user paths. The realigned section of Kings Point Drive across the bypass would also include a shared user path on the southern side.

The southern connection includes a shared user underpass of the project to reinstate the existing shared user path that is along the western side of the existing Princes Highway. This would provide a path with an overall underpass width of 5.5 metres to maintain connectivity between Ulladulla and Burrill Lake. The underpass crosses the new three-leg roundabout on the southern leg and eastern leg of the roundabout before it ties into the existing at-grade shared user paths on the Princes Highway.

Adjacent to the southern connection, a footpath would be provided along the stretch of existing Princes Highway which would be converted to a property access road, providing an at-grade connectivity option and maintaining pedestrian access to properties and access to beach trails to the south.

Shared user paths along the project are shown in Figure 5-1 to Figure 5-10.

Along the main alignment of the bypass where no shared user path has been provided, cyclists can use the shoulder, which would be line marked at ramps for crossing locations.

Additionally, to support Council's plans for potential future shared user paths along Croobyar Road, the Croobyar Road bridge has been designed to provide sufficient space underneath for shared user paths.

5.2.9 Public transport

The project would alter the locations of four existing bus stops:

- Princes Highway opposite Bishop Drive, Ulladulla (Stop ID 2539113, route 740) travelling southbound
- Princes Highway before Bishop Drive (Stop ID 2539114, route 740) travelling northbound
- Princes Highway at Princess Avenue, Burrill Lake (Stop ID 2539149, route 740) travelling northbound
- Princes Highway opposite Canberra Crescent, Burrill Lake (Stop ID 2539144, route 740) travelling southbound.

The project would provide new bus bays indented from the road alignment at Bishop Drive along the Princes Highway travelling northbound on the departure side of the intersection. The new bus stop would be directly serviced by the signalised pedestrian crossing. Further discussions with Council and bus companies would be undertaken to confirm if a similar approach would be suitable for the southbound departure side. In addition, the two bus stops at Burrill Lake would also be reinstated, however, further consultation is required with bus companies to determine the optimal location for those bus stops.

There are two school bus routes that use Slaughterhouse Road – the Frog bus and the Horse bus. Due to the closure of Slaughterhouse Road on either side of the bypass, these bus routes would need to be altered. Rather than using Slaughterhouse Road, the bus routes could use the Bishop Drive Extension to pass over the bypass and then connect to Pirralea Road and Green Street (as per the current bus route). Transport has consulted with bus operators including Nowra Coaches (Premier) and Ulladulla Buslines. Further information on consultation can be found in Chapter 6 (Community and stakeholder engagement).

5.2.10 Open space and green infrastructure

Green infrastructure refers to 'green' landscaped or open spaces. The project and surrounding land uses to the project do not create an opportunity for the establishment of any formal new open space areas. However, the project would consider both blue and green infrastructure opportunities through landscaping and naturalised drainage swales and the inclusion of active transport (refer to Section 5.2.8).

Landscaping of the project would be undertaken in accordance with the landscape and urban design principles as detailed in Section 3.6.2 of Chapter 3 (Strategic context and project need). Landscaping would be sensitive to the existing surrounding environment, with the project passing through open agricultural and rural environments in the north, before passing through areas of intact mature vegetation to the south. This includes consideration of reinforcement of endemic species planting within the project boundary. Concept landscaping plans for the project are shown in Technical Report 5: Urban Design, Landscape Character and Visual Impact Assessment. These plans would be further developed as part of the landscaping management plan for the project.

Refer to Section 11.2 of Chapter 11 (Urban design, landscape character and visual amenity) for further information on landscaping.

Drainage infrastructure

Blue infrastructure refers to waterways and water systems. The project would cross Croobyar Creek, Pettys Creek and Millards Creek, as well as some tributaries to these creeks. Bridge and/or culvert structures would be installed across these creeks to maintain water flows and minimise impacts to water quality. Indicative locations of bridge structures are shown in Figure 5-1 to Figure 5-10 and proposed bridge structures are described in Section 5.2.4.

Most bridges would require drainage systems to be developed to discharge to the road surface drainage system and avoid direct discharge. More detailed bridge deck drainage systems would be developed during detailed design. The project would involve a range of other drainage infrastructure including:

- cross drainage – would convey surface water under the project
- road surface drains – consisting of stormwater inlets and pits that connect to reinforced concrete pipes; roadside vegetated swales which would cater for run-off from the road surface, cut batters and the median; or culverts that provide cross-drainage under the road to discharge road runoff to the lower side of the road
- longitudinal catch drains – would be located at the top of cuttings or at the bottom of the batter to catch runoff from the project and prevent water from flowing into nearby areas.

Cross-drainage has been designed to enable water to flow under the road alignment, providing flood protection for a one percent Annual Exceedance Probability (AEP) event for the bypass and maintain the existing flow paths without undesirable impacts on adjacent land. The drainage design includes different culvert structures with reinforced concrete pipes varying from 600-millimetre diameter to 1800-millimetre diameter; and reinforced concrete box culverts between 600 x 600 millimetres and 3000 x 2700 millimetres. Key drainage design criteria include a 20 per cent AEP for channels and open drains, 10 per cent for piped systems and two per cent for culverts where surcharge is allowable. The general flood protection is designed for one per cent AEP.

Scour protection work, such as riprap, rock blankets, or engineered linings, would be installed upstream and downstream of culverts and along disturbed banks to prevent erosion and stabilise stream channels, for long-term durability and environmental compliance.

Surface drainage features including catch drains and table drains would be lined with erosion-resistant fibrous materials (e.g. jute matting) or seeded to encourage rapid vegetation establishment. In steeper terrain sections, concrete or rock lining is commonly required to enhance stability and reduce erosion risk. Furthermore, kerb and gutter systems may be introduced at key locations like deep road cuts, interchange roundabouts, and service or access roads to provide efficient runoff management.

Subsurface drainage systems would be installed to capture groundwater seepage beneath the road formation, preventing saturation-related pavement damage and embankment instability. These systems are designed based on local soil and hydrogeological conditions and integrated with surface drainage to maintain overall road longevity and function.

5.2.11 Environmental design and controls

There are a number of design-based mitigation measures and controls that would be constructed, implemented and/or maintained during operation of the project including water quality management, fauna connectivity measures and noise mitigation.

Water quality management

A range of water quality features are proposed as part of the project to minimise impacts to water quality in receiving environments in accordance with the water quality objectives. While the preferred treatment solution for this project would be to allow (or return) road stormwater runoff to sheet flow across adjacent grassed/vegetated surface within the project boundary, this is not always suitable or feasible. Where this approach is not suited, features that would form part of the project include:

- bioretention swales (bioswales): bioswales provide both stormwater treatment and conveyance functions by incorporating bioretention media within the base of a swale designed to operate as part of the drainage network. The swale component provides pre-treatment by removing coarse to medium sediments, while the bioretention system removes finer particulates and dissolved nutrients
- vegetated swales: vegetated swales convey stormwater using shallow overland flow and mild longitudinal grades, providing coarse to medium sediment removal. Pollutant removal would be achieved through the interaction of flow and vegetation, which promotes deposition and retention when velocities are kept low and flow would be evenly distributed
- bioretention basins: where site conditions prohibit the use of bioswales, end of pipe treatment in the form of bioretention basins are required to provide stormwater runoff treatment.

Transport has and would continue to consult with relevant agencies on water quality treatment and design as they are further refined through the detailed design phase of the project. Further detail of water quality management measures is provided in Chapter 18 (Hydrology, surface water and groundwater).

Fauna connectivity measures

A fauna connectivity strategy has been developed to reduce impacts on fauna associated with habitat fragmentation particularly to the south of Green Street. A range of fauna passage and connectivity structures have been proposed based on the requirements of the target species (shown on Figure 5-1 to Figure 5-10). These include dedicated structures solely for fauna connectivity purposes, including:

- two land bridges
- eight fauna gantries
- four dedicated fauna underpasses.

In addition, existing structures within the project design are expected to provide fauna connectivity. These combined purpose or 'combined' structures include:

- three bridge/culvert structures, over Croobyar Creek, Pettys Creek and Millards Creek which would provide connectivity
- seven dedicated (fauna only) or combined (fauna and drainage) culverts.

Fauna exclusion fencing would be installed to guide fauna to utilise culvert structures, these structures are further detailed in the Connectivity Strategy (Appendix M, Technical Report 1: Biodiversity Development Assessment). Fauna culvert design would be confirmed during detailed design and would include measures to make these structures appealing to fauna such as internal dry ledges, a natural substrate, fauna furniture, revegetation at entrances and external refuge poles.

Fauna gantry overhead structures would be installed across the bypass and are being investigated for Kings Point Drive. Gantries would likely consist of a steel cradle that extends between forest edges, with each end situated within the forest canopy. Hardwood logs would be positioned across this cradle to mimic a canopy.

A land bridge would likely consist of a concrete arch structure over the bypass carriageway. Land bridge design would be confirmed during detailed design but would likely include natural substrate covering the bridge, vegetation and artificial structures that mimic vegetation.

Land bridges would be combined with fauna exclusion fencing to guide fauna to use structures.

Fauna connectivity structures would be designed and installed with allowance for maintenance access. A detailed summary of fauna connectivity structures is provided in Section 7.5.1 of Chapter 7 (Biodiversity).

Noise mitigation

Potential operational traffic noise impacts and suitable noise mitigation measures considered feasible are detailed in Section 12.5 of Chapter 12 (Noise and vibration). Noise mitigation measures have been developed based on the concept design and a preliminary feasible and reasonable assessment. These include potential treatment for operational traffic noise such as:

- noise walls along a 2.2 kilometre length from the existing Princes Highway/Bishop Drive intersection through the central connection to Green Street (refer to Figure 5-6)
- at-property treatments for sensitive receivers (residential and non-residential) where other noise mitigations are not feasible or reasonable.

Noise walls would be designed and installed with allowance for maintenance access. The noise mitigation measures (including barrier heights and locations) would be reviewed at the detailed design stage. This assessment may result in more or less receivers qualifying for consideration of noise mitigation and would consider any changes to the design and, where required, feedback from consultation with affected residents.

In April 2026, Transport issued a community update that identified that studies were being undertaken to identify potential operational noise impacts and suggested feasible noise mitigation options. Further consultation would continue with the community during the public display of this EIS and during later stages of the project.

5.2.12 Operational ancillary infrastructure

The project would be supported by operational ancillary infrastructure such as wayfinding and signage, CCTV, streetlighting at intersections and street furniture. Operational ancillary infrastructure would be confirmed during detailed design. This would likely include provision of the items listed in Table 5-6.

Table 5-6: Operational ancillary infrastructure

Ancillary infrastructure	Description
Safety barriers	Safety barriers would be provided on bridges and on medians to separate the opposing carriageways and alongside the bypass mainline and on and off ramps.
Traffic control systems	Traffic control systems would include CCTV systems, Variable Message Signs (VMS) and Vehicle Detection Site (VDS). CCTV cameras would monitor all intersection approaches at three key connection points. VMS would be positioned facing northbound and southbound respectively. Each unit would be located beyond the project extents, at least 200m in advance of key decision points. VDS would be positioned on the bypass mainline to monitor northbound and southbound traffic. It would be located in the segment of the bypass that has the highest expected traffic volume.
Signage	Guide, regulatory, tourism and warning signs for road users would be installed.
Road markings	Line markings would be installed along the road corridors. Retroreflective raised pavement markers would be installed on all lanes, edges and barrier lines.
Lighting	Streetlighting would be provided along the bypass only at the northern, central and southern connections, and on local roads where there has been a change to facilitate traffic movement where required.
Fencing	Wire fencing would be provided along the boundary of the road reserve and private land to demarcate land ownership. Stock proof fencing would be provided along the boundary across agricultural properties to exclude cattle from the road corridor. Fauna fencing would be provided along the alignment with consideration of fauna connectivity measures (refer to Figure 5-1 to Figure 5-10).

5.2.13 Property requirements and adjustments

The project would involve rationalising local property access connections and modifying local access roads to ensure safe access between properties and the bypass.

The project would change existing access arrangements for several properties. Driveway adjustments and tie-ins would be made including along Ringland Lane, Wilfords Lane, Green Street and the existing Princes Highway. Property access would be reinstated where existing access would be affected by the project.

Property adjustment works may also include installation of property fencing, demolition and removal of buildings.

The project is designed to minimise impacts on property where reasonably practicable. However, some properties would still be subject to partial or full acquisition. Partial acquisition was preferred where the project would not impact the whole of the property. Ten privately owned properties are impacted by full acquisition.

Land acquisition is to be carried out in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), the Land Acquisition Information Guide (NSW Government, 2014) and (where applicable) the *Crown Lands Management Act* (2016) (NSW).

The extent of property acquisitions is outlined in Section 13.1.3 of Chapter 13 (Land use and property).

5.2.14 Utilities

A number of utilities currently exist within the project boundary including water, sewer, electrical and telecommunication. The known existing utilities, general location and proposed management activities are detailed in Table 5-7.

Table 5-7: Utilities requiring relocation or protection

Location	Asset owner	Asset type	Potential impact
Little Forest Road Ringland Lane Croobyar Road Wilfords Lane Slaughterhouse Road Central connection Tuckerman Road White Gum Road Pirrlea Road Green Street Kings Point Drive Southern connection Bishop Drive	Shoalhaven Water	Trunk Water mains (250mm to 600mm) Reticulation Water Mains (≤200mm) Rising main Gravity Main	A number of water and sewer mains would be impacted by the project. These assets would be further considered during detailed design and protected or relocated depending on their accurate location and depth.
Green Street (33 kilovolt) Tuckerman Road (132kV) White gum road (132kV) Green Street (132kV)	Endeavour Energy	Transmission Overheads (33kV and 132kV)	33kV overhead transmission lines would be relocated. 132kV overhead transmission lines would be protected in consultation with Endeavour Energy.
Little Forest Road Ringland Lane Croobyar Road Wilfords Lane Slaughterhouse Road Tuckerman Road White Gum Road Pirrlea Road Green St Kings Point Drive Southern connection Bishop Drive	Endeavour Energy	Distribution (LV and HV)	Low and high voltage powerlines would be relocated in consultation with Endeavour Energy.

Location	Asset owner	Asset type	Potential impact
Little Forest Road Ringland Lane Croobyar Road Wilfords Lane Slaughterhouse Road Tuckerman Road White Gum Road Pirrarea Road Green St Kings Point Drive Southern connection Bishop Drive	Telstra/Optus/NBN	Optic Fibre and Copper	Telecommunication cables are located throughout the project boundary and may be impacted by the project. Further surveys to accurately locate these cables would be carried out during detailed design to determine the need for protection and/or relocation.

Details of existing utility services and requirements for their potential relocation or protection would be finalised during detailed design in consultation with the utility service providers. The designs would be completed to meet the relevant utility authority standards, which may require work outside the project boundary.

Procedures would be developed for unexpected utility finds during the detailed design phase.

Some relocation or protection work for utilities may occur as a low impact activity (refer to Section 5.3.3) and would also require work outside of the standard working hours to minimise disruption to traffic and/or customers and minimise disturbance to surrounding residences and businesses.

The project would require connection to existing electricity and telecommunication utilities. This would be required for the operation of street lighting and the traffic signals, as well as CCTV and traffic control systems.

5.3 Construction

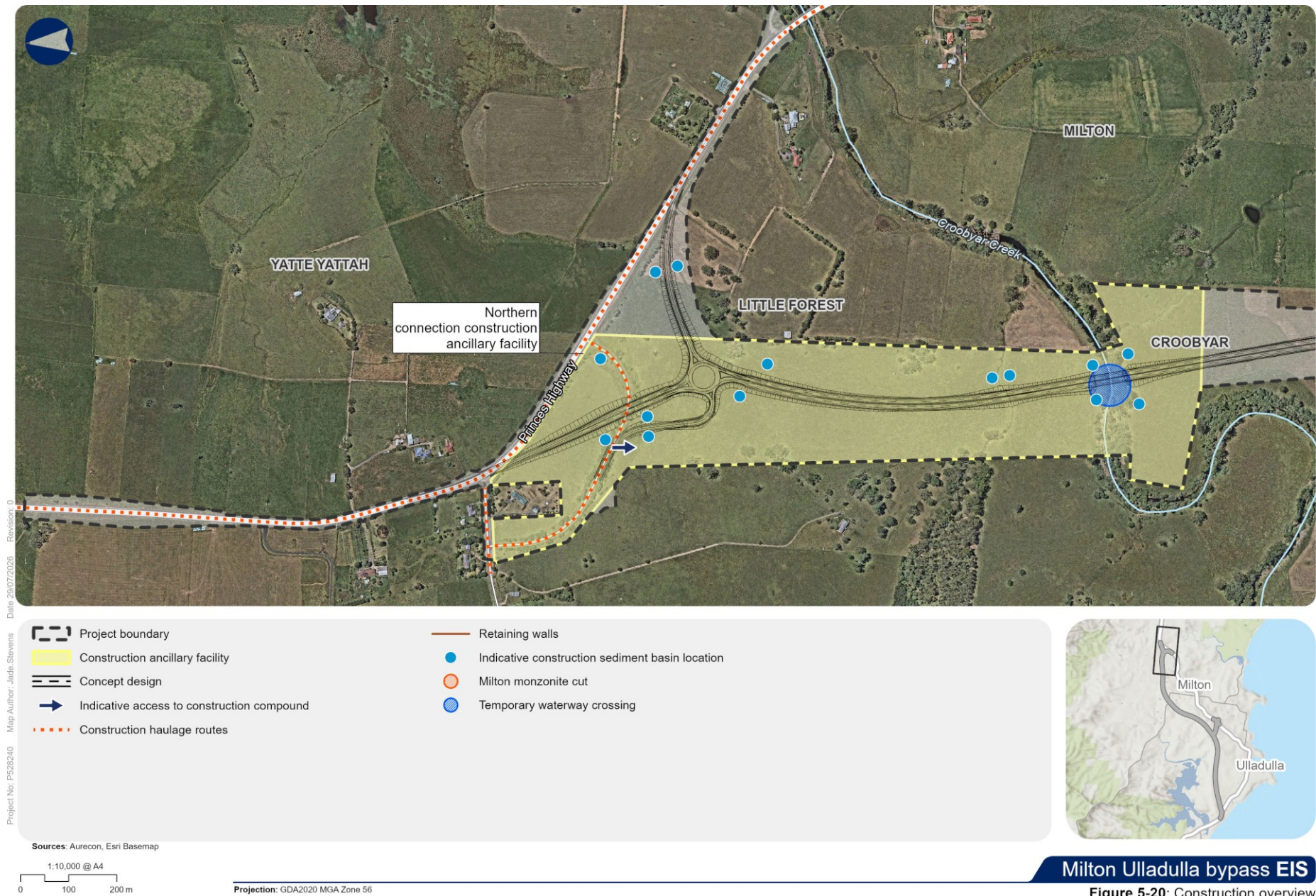
This section provides a description of the proposed construction activities and methodology and maintains flexibility for further design development and construction planning.

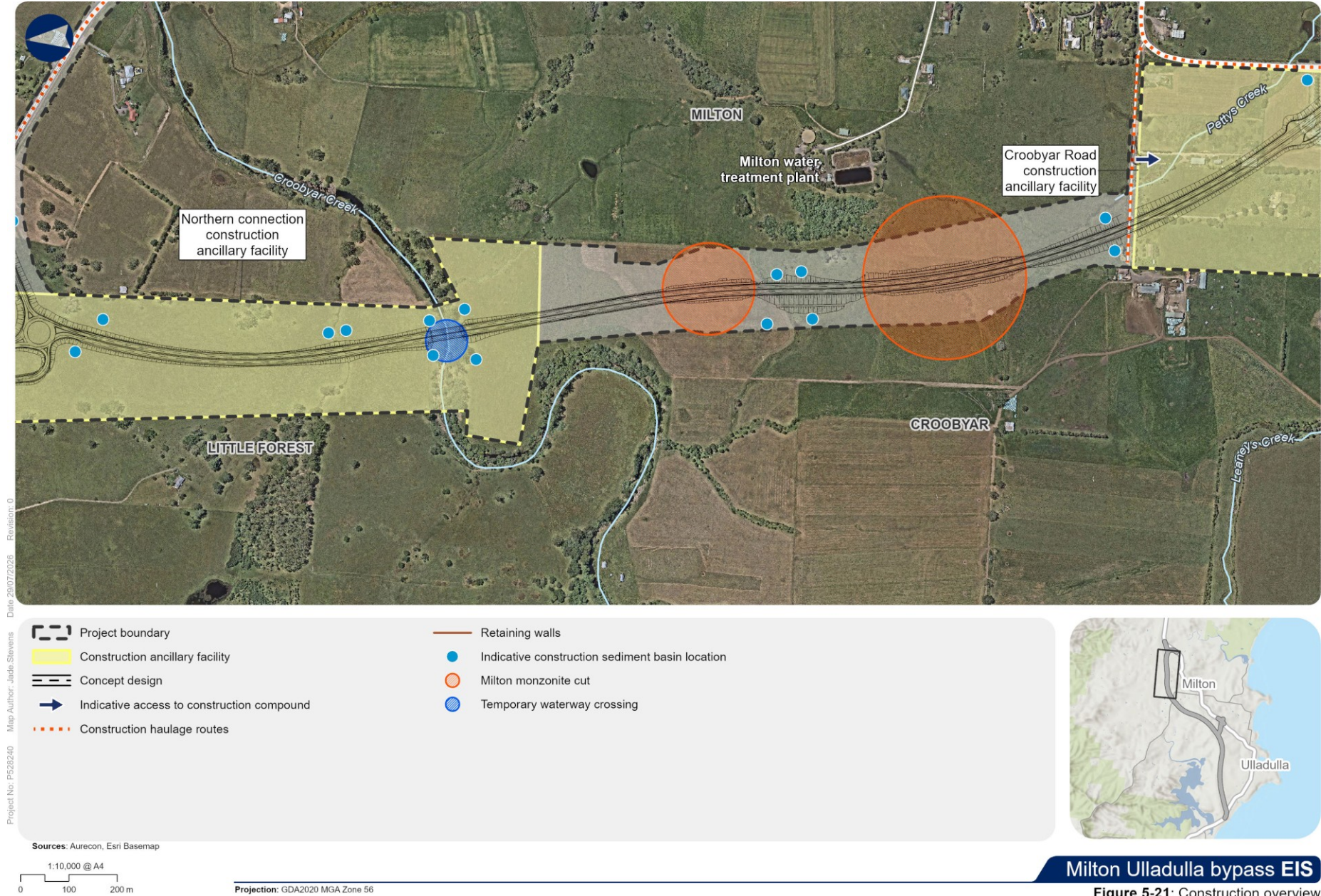
5.3.1 Construction footprint

The construction footprint (shown as the project boundary in Figure 5-20 to Figure 5-29) includes the area required for construction and operation of the project. This includes the area required for all construction work including temporary and permanent drainage structures, temporary waterway crossings, temporary and operational water quality basins, construction ancillary facilities and access roads.

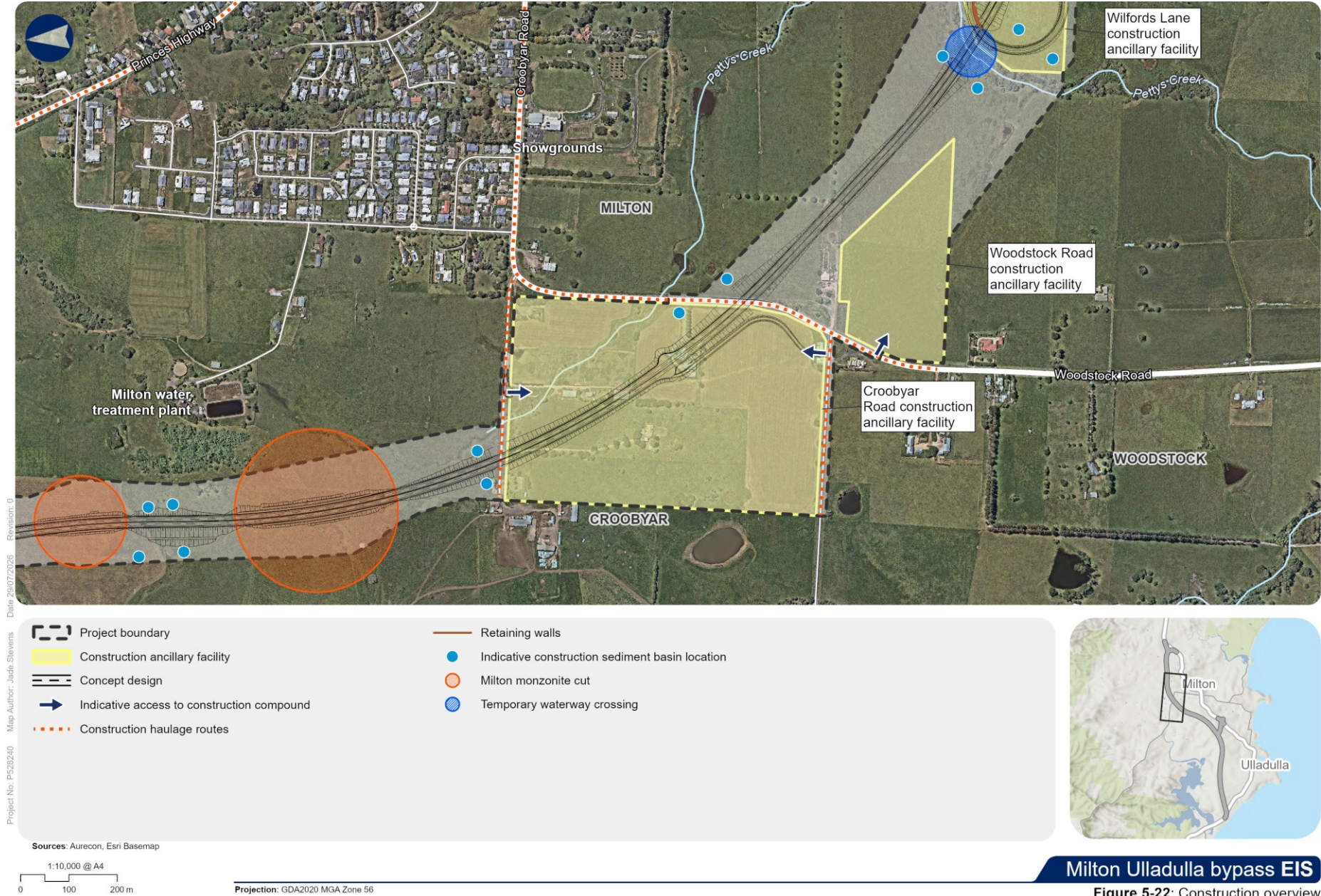
The project boundary was developed and refined to minimise impacts to vegetation and other sensitive features, while providing sufficient space to construct the project in an efficient and safe manner. The construction footprint would be around 259 hectares and would encompass the 200 hectares of the operational footprint.

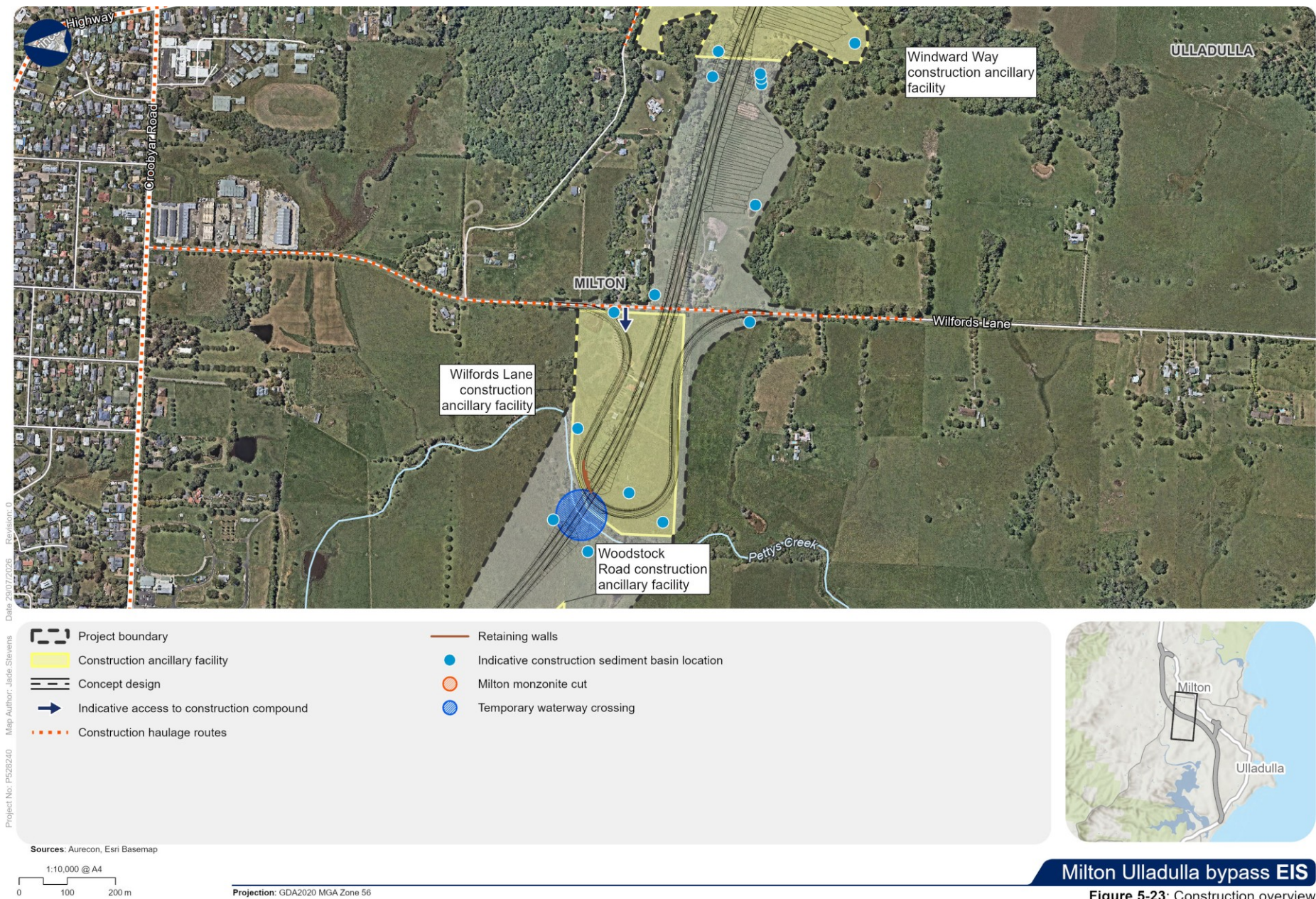
Construction of the project would require the clearance of 103.89 hectares of native vegetation and 96.17 hectares of non-native vegetation. A detailed description of vegetation clearing requirements is included in Section 7.3.1 of Chapter 7 (Biodiversity).

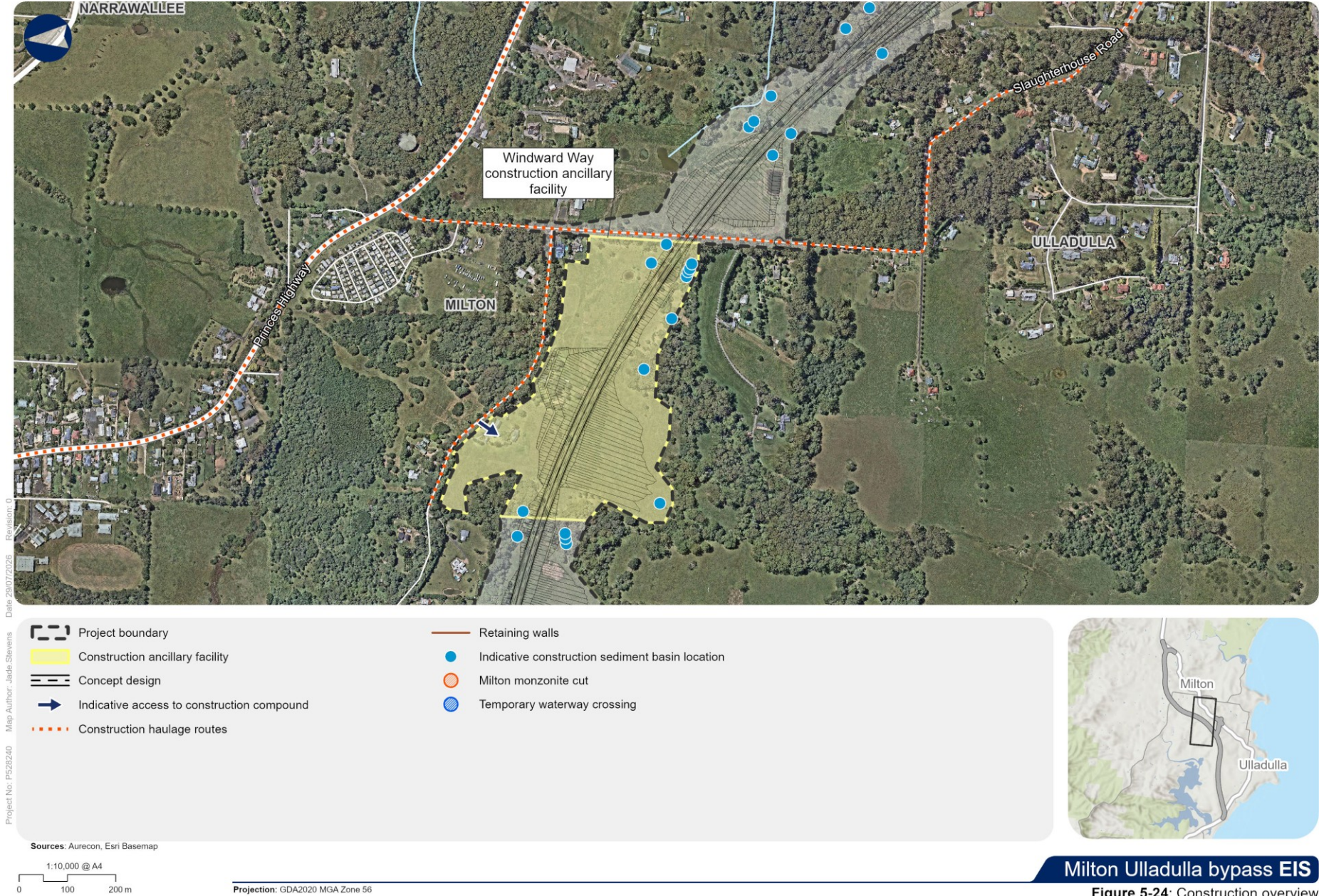




Milton Ulladulla bypass EIS
Figure 5-21: Construction overview









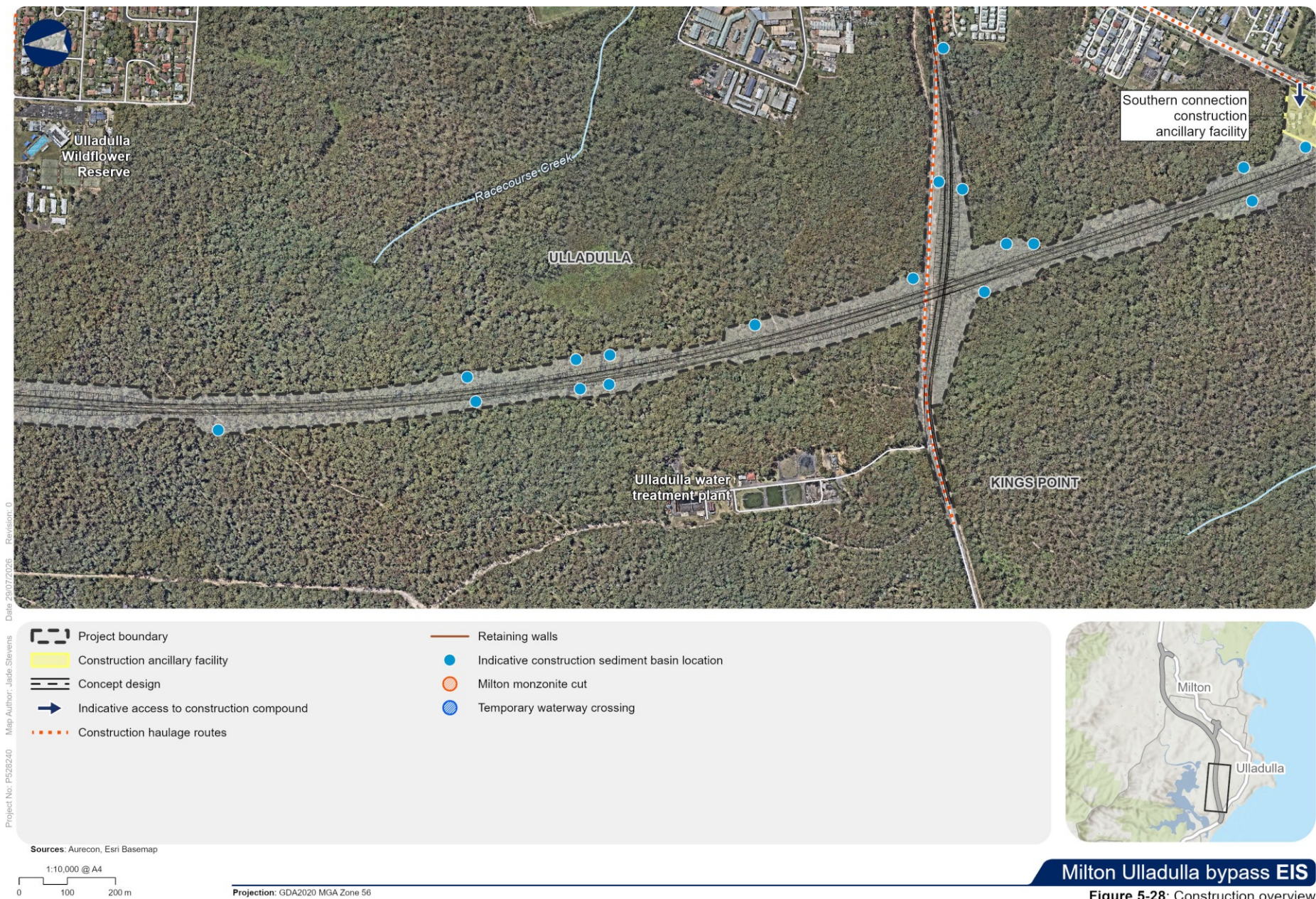
Milton Ulladulla bypass EIS
Figure 5-25: Construction overview



Milton Ulladulla bypass EIS
Figure 5-26: Construction overview



Milton Ulladulla bypass EIS
Figure 5-27: Construction overview





5.3.2 Construction overview and program

Construction of the project would likely use conventional construction methods typically used on most highway projects. Key construction components and associated activities are outlined in Table 5-8. These activities, plant and equipment are indicative and would be further refined by the construction contractor during detailed design.

The activities and equipment listed below provide sufficient detail to allow an assessment of the likely nature and extent of environmental impacts during construction. These listed components and construction activities are described in more detail in the sections below.

Construction of the project is expected to start in 2028 and take about three to four years, subject to planning approval and weather. The indicative construction program is shown in Table 5-8. The program is subject to ongoing design development and construction planning and would be refined by the construction contractor. Project delivery would be staged, construction sequencing would be confirmed by the contractor and would likely align with Table 5-8 below.

Table 5-8: Indicative construction timeline based on a four-year construction program

Key activities	First year				Second year				Third year				Fourth year			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Preliminary activities and site establishment																
Early works																
Earthworks																
Drainage																
Fauna connectivity																
Bridge work																
Road work and road surfacing																
Commissioning and finishing work																

5.3.3 Site establishment and low impact work

Before commencement of construction, mobilisation and site establishment activities, some low impact activities may be required. These activities are considered to have negligible to minor environmental and/or community impact and can be undertaken before the Construction Environmental Management Plan (CEMP) is approved (requirements for the CEMP are detailed in Appendix E Mitigation measures). The purpose of these activities would be to prepare the site, gather additional information and install any environmental controls required during construction. This low impact work would be managed through implementation of standard environmental management/mitigation measures or an activity-specific environmental management plan or work method statement.

Site establishment and low impact activities would include the following:

- conduct comprehensive survey work, including installation of survey controls, general alignment surveys, existing and future utility surveys, repeater station setup and assessment of building and road conditions to establish accurate project baselines
- perform geotechnical and site investigations such as investigative drilling, contamination assessments, and excavations to inform design and risk management strategies
- set up and use of minor ancillary facilities that have a minor impact on the environment and community

- undertake treatment and remediation of contaminated sites strictly following recommendations outlined in approved remediation action plans to ensure site safety and compliance (refer to Chapter 17 (Soils and contamination))
- install environmental management controls including erosion and sediment control measures, and temporary exclusion fencing around sensitive areas
- implement at-property noise mitigation treatments prior to major construction commencing to reduce community impacts and comply with operational noise management requirements
- conduct archaeological testing in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* and implement archaeological salvage strategies where archaeological materials are encountered
- conduct pre-clearing biodiversity surveys and manage relocation of threatened species or habitat augmentation following approved biodiversity management plans or strategies to protect ecological values as detailed in Chapter 7 (Biodiversity)
- undertake property acquisition adjustment works including installation of property fencing, demolition and removal of buildings and changes to property access
- relocation or adjustment of utility connections (water, sewer, telecommunications, electricity) that would have a minor impact to the environment and community
- maintain existing buildings and structures critical to project delivery, ensuring their condition supports ongoing activities without interruption or demolition of any existing structures
- execute minor clearing of native vegetation
- site establishment works such as fencing installation, placement of signage, temporary traffic control measures, including building minor access roads approved under a Site Establishment Management Plan
- installation of fauna connectivity structures that require only minor vegetation clearing other activities determined by the Environmental Representative (ER) to have minor impact on the environment and the community, which may include but not be limited to construction of minor access roads, temporary relocation of pedestrian and cycle paths and the provision of property access, including out-of-hours work.

5.3.4 Early works

The main construction phase may be staged to include an early works phase. Early works may include activities previously identified as low impact works, however, when undertaken as part of construction may result in more than minor impacts on the environment and community. In addition, early works may also include:

- connections to the existing road network such as signalised intersections and local road adjustments within the project boundary to accommodate construction traffic
- temporary haul road and creek crossing construction
- utility relocations, adjustments and connections ensuring continuity of services and coordination with utility providers as described in Section 5.2.14
- set up and use of ancillary facilities
- vegetation clearing, grubbing and mulching
- installation of construction, directional and wayfinding signage.

5.3.5 Earthworks

Earthworks would be required to achieve a stable formation suitable for drainage and structures work, bridge work, and road work and surfacing. These activities would likely be carried out using conventional cut and fill techniques in which material is carted from each cut using excavators and trucks to fill areas requiring additional material.

Earthworks would be required along the entire length of the project and likely activities would include:

- vegetation clearing, grubbing and mulching
- installation of erosion and sediment controls
- mulching of vegetation for re-use in landscaping activities, where possible
- stripping topsoil and stockpiling for reuse in landscaping
- excavating cuttings using excavators, graders, scrapers, bulldozers and blasting (where required)

- drilling blast holes and undertaking controlled blasting (refer to the following section)
- use of rock hammers and rock breakers
- crushing and screening excavated material
- hauling materials from excavated cuttings and external sources to fill embankment locations
- creation of temporary haul roads and creek crossings
- constructing fill embankments
- stockpiling material for use on the project
- benching and stabilising cut and fill batter slopes
- installing transverse drainage and longitudinal and vertical drainage alongside embankments.

It is estimated that the project earthworks are likely to result in a balance of cut and fill volumes. Although cut and fill volumes are balanced, material suitability, construction staging and weather conditions may limit the reuse of material on site. Should excavated material be found to be unsuitable for reuse on site, it would be disposed of, at an appropriately licensed facility. Estimated cut and fill volumes would also be amended during detailed design development and may necessitate the importation of fill material should a balance not be maintained.

Indicative types and volumes of material required for the project are outlined in Table 5-9:

Table 5-9: Indicative bulk earthwork quantities

Type of material	Approximate quantity (m ³)	Approximate weight (t)	Management approach
Total cut material to be excavated (excluding topsoil)	1,400,000	2,520,000	Excavate, process, stockpile and reuse
Milton monzonite (included in total cut volume)	125,000	350,000	Blast, stockpile and reuse as ground treatment rock fill, bridging and drainage layers
Total fill material required	1,400,000	2,520,000	Stockpile to fill
Total fill deficit expected to be imported	0		-
Topsoil (balance)	230,000	414,000	Stockpile and reuse across batters and landscape areas

Road cuttings would generally be excavated by a combination of rock hammering, ripping and excavators. Controlled rock blasting may be required in selected locations, indicatively shown on Figure 5-21 and Figure 5-22 and described in the following section on Milton monzonite blasting.

Milton monzonite blasting

Milton monzonite is a hard rock which would require removal by controlled rock blasting where mechanical excavation is not feasible. Two monzonite cuts that would require blasting form part of the design. Both cuts are along the alignment south of Croobyar Creek and west of the wastewater treatment plant.

Onsite processing of the monzonite is intended to be carried out to allow for reuse. Mobile crushing and screening plant would be located within the project boundary adjacent to the cut locations or at the nearby Croobyar Road construction ancillary facility.

Controlled rock blasting may also be used at selected locations close to sensitive receivers (such as at the central connection) where it is anticipated that blasting could minimise the duration of impacts. These locations would be explored during detailed design.

A Blast Management Strategy would be prepared before blasting begins to identify exact blasting locations and requirements. The Blast Management Strategy would provide safety measures for the general and travelling public, including exclusion zones and safe distances. Refer to Chapter 12 (Noise and vibration) for further consideration of blasting vibration impacts.

5.3.6 Drainage

Permanent and temporary drainage structures would be constructed progressively alongside bulk earthworks and road work to address erosion and sediment risk (refer to Section 5.2.11). Installation methods would vary according to drainage type and site-specific conditions, and would generally include:

- excavating for drainage structures using excavators, graders, scrapers
- laying of geofabric layers (where required)
- installation of pipe bedding material
- installation of pipes
- backfilling over pipes
- installation of drainage headwalls and backfilling around these
- installation of scour protection work, such as riprap, rock blankets, or engineered linings
- construction of diversion and catch drains along the formation and erosion and sedimentation basins or swales where required
- installation of subsurface drainage
- installation of drainage channel lining (erosion-resistant fibrous materials, concrete or rock lining)
- erection of retaining walls where required.

Temporary diversions and watercourse crossings may be implemented during construction phases to facilitate critical activities such as placement of drainage rock blankets or culvert/bridge pier installation. These temporary measures are described in Section 5.3.12.

Indicative quantities of materials required for construction of drainage structures are provided in Section 5.3.16 and Table 5-12.

5.3.7 Fauna connectivity structures

Construction of fauna connectivity structures across the project alignment would likely include:

- installation of fauna exclusion fencing
- installation of ledges and fauna furniture within culverts where required and possible
- installation of fauna land bridges
- installation of overhead structures
- landscaping and finishing work including connecting of ropes and structures.

Fauna connectivity structures would be installed as early as possible in construction to maintain fauna connectivity across the project boundary.

5.3.8 Bridge work

A total of 10 bridge structures, including two pedestrian underpasses, are required for the project as described in Section 5.2.4. Bridge construction would generally consist of:

- vegetation clearing and earthworks to create piling and crane pads – this may include rock caissons, cofferdams or temporary access roads over waterways
- installing bridge foundations such as driven or bored piles
- construction of pile extensions, piers and abutments
- installation of bearings
- erection of precast planks or Super T girders
- construction of precast or cast in situ bridge decks, approach slabs and barriers
- installation of drainage
- placement of asphalt wearing course

- construction of stairs and handrails
- installation of scour rock
- erecting noise walls where required.

Indicative quantities of materials required for bridge construction are provided in Section 5.3.16 and Table 5-12.

The construction methodology for bridges would be confirmed by the construction contractor and is subject to change.

5.3.9 Road work and road surfacing

Road work and road surfacing would be required along the entire length of the project and construction would include:

- implementing local traffic diversions
- forming the road by excavating existing materials or placing fill embankments
- progressive installation of road surface drainage structures including pits, pipes, kerbs, culverts, and open drains or swales
- placement and compaction of base and select foundation material where required
- placement and compaction of asphalt road surface layers
- building concrete medians and roundabouts as required
- installation of kerbs and drainage inlets
- temporary and permanent line marking.

Asphalt placement is likely to be undertaken as a single stage to avoid multiple establishments of batch plants and paving plant. Indicative quantities of materials required for road construction are provided in Section 5.3.16 and Table 5-12.

5.3.10 Commissioning and finishing work

Finishing work would be carried out towards the completion of construction, prior to opening of the project. Activities would include:

- removal of all temporary construction areas and work
- permanent line marking
- installation of barriers such as concrete, wire rope fencing and guardrail
- installation of traffic signals, line marking, signage, roadside furniture and lighting
- installation of intelligent transport system devices including directional signage, variable message signs and associated infrastructure (such as gantries), CCTV, traffic and other signage and other roadside furniture including lighting
- landscaping and revegetation work
- removal of environmental controls
- site demobilisation and rehabilitation work.

5.3.11 Construction ancillary facilities

Construction ancillary facilities would be required to support the construction of the project. These construction ancillary facilities would typically include:

- main site construction ancillary facilities including site offices, restrooms and worker parking
- overnight vehicle parking
- asphalt batching plants to meet substantial asphalt volumes required for construction work
- mobile screening and crushing plants
- material laydown and stockpiling including for precast elements, and fill, spoil, mulch and topsoil
- processing of site won material
- concrete pre-cast facilities to build bridge deck segments and girders.

There are three concrete batching plants near the project, and it is intended that concrete would be sourced from commercial suppliers rather than from an on-site concrete batching plant where possible.

Where possible, construction ancillary facilities identified in this EIS have been nominated in locations that:

- are within or adjacent to land where key construction activities are occurring
- have ready access to the road network
- minimise the need for heavy vehicles to travel through residential areas
- avoid areas of known contamination that would require remediation before use
- minimise impacts to sensitive ecological communities
- minimise noise impacts close to noise sensitive receivers
- minimise impacts to social infrastructure
- minimise impacts to known Aboriginal and non-Aboriginal heritage items.

Areas of land that are leased by Transport for construction ancillary facilities would be rehabilitated upon completion of construction and restored to their existing condition, or as otherwise agreed with the landowner. Construction ancillary facilities would be progressively rehabilitated where possible to minimise soil exposure and the potential for dust generation, erosion and sedimentation and visual impacts, in accordance with mitigation and management measures detailed in Appendix E Mitigation measures.

The location of proposed construction ancillary facilities is shown in Figure 5-20 to Figure 5-29, and the proposed use and layout of the construction ancillary facilities are described in Table 5-10. Access arrangements for construction ancillary facilities are described in Section 5.3.13. The final use, locations and layout of the construction ancillary facilities would be determined by the construction contractor. Where buildings or sheds occur on Transport acquired property or leases in a nominated construction ancillary facility, those buildings may be reused as site offices or ancillary facilities. Some minor additional changes along existing roads or within the road reserve, outside of the project boundary may be required to facilitate access into construction ancillary facilities.

Table 5-10: Construction ancillary facility locations and proposed uses

Construction ancillary facility	Description	Indicative uses
Northern connection construction ancillary facility	The northern connection construction ancillary facility would be located in a farmland area of about 1.84ha near Little Forest Road (refer to Figure 5-20). The uses would generally occur in higher locations away from creeks and residences during the standard working hours, with access off Little Forest Road. This also provides access to the bridge construction site.	• secondary smaller site office & amenities • worker parking • material management • bridge construction site.
Croobyar Road construction ancillary facility	The Croobyar Road construction ancillary facility would be located in a farmland area of about 27.09ha south of Ringland Lane and west of Croobyar Road (refer to Figure 5-22). The uses would occur across the site, with access off Ringland Lane and Croobyar Road (near RFS site). After hours and oversize deliveries are likely at this site.	• main earthworks site with smaller site office & amenities • some worker parking • asphalt batching plant • material processing and crushing plant • concrete pre-cast facility • large item holding yard • material management.
Woodstock Road construction ancillary facility	The Woodstock Road construction ancillary facility would be located in a farmland area of about 7.24ha south of Croobyar Road and east of Woodstock Road (refer to Figure 5-22). The uses would generally occur in higher locations away from creeks and during the standard working hours.	• large item holding yard • material management.

Construction ancillary facility	Description	Indicative uses
Wilfords Lane construction ancillary facility	The Wilfords Lane construction ancillary facility would be located in a farmland area of about 9.55ha to the west of Wilfords Lane (refer to Figure 5-23). The uses would generally occur in higher locations away from creeks during the standard working hours, with access off Wilfords Lane. This also provides access to the bridge construction site.	- secondary smaller site office & amenities - worker parking - bridge construction site.
Windward Way construction ancillary facility	The Windward Way construction ancillary facility would be located in a farmland area of about 21.46ha to the west of Slaughterhouse Road and south of Windward Way (refer to Figure 5-24). This is likely to be the main site office location with demountable buildings and worker parking off Windward Way. The construction uses would generally occur away from residences and during the standard working hours, with access also off Windward Way.	- main project site office - main worker and visitor parking - material processing and crushing plant - material management.
Central connection construction ancillary facility	The central connection construction ancillary facility would be located in a farmland area of about 7.26ha east of Turnbull Lane (refer to Figure 5-25). The central connection site adjoins an area of environmental constraint which would limit access in areas to the north. Further detail is provided in Chapter 7 (Biodiversity). The uses would generally occur away from the sensitive environmental areas and residences and during standard working hours, with access off Turnbull Lane and Tetley Place.	- secondary smaller site office & amenities - some worker parking - material processing and crushing plant - bridge construction site.
White Gum Road construction ancillary facility	The White Gum Road construction ancillary facility would be located in an area of about 2.66ha to the south of White Gum Road and east of Pirralea Road (refer to Figure 5-25). The uses would generally occur in higher locations away from creeks during the standard working hours, with access off White Gum Road initially, before changing to access from Green Street.	material management.
Blackburn Road construction ancillary facility	The Blackburn Road construction ancillary facility would be located in an area of about 1.84ha to the east of Blackburn Road and north of Kings Point Drive (refer to Figure 5-28). The Blackburn Road construction ancillary facility adjoins an area of environmental constraint at the creek, which would limit access in areas to the east. Further detail is provided in Chapter 7 (Biodiversity). The uses would generally occur away from the sensitive environmental area, and during the standard working hours, with access off Blackburn Road. After hours deliveries are likely at this site.	- material processing and crushing plant - asphalt batching plant - concrete precast facility - material management - large and small item holding yard.
Southern connection construction ancillary facility	The southern connection construction ancillary facility would be located in an area of about 0.86ha to the west of the Princes Highway just above the proposed southern roundabout (refer to Figure 5-28). The southern connection construction ancillary facility adjoins an area of environmental constraint to the north and a creek to the south, which would limit use of the site. Further detail is provided in Chapter 7 (Biodiversity). Access would be from the Princes Highway.	- secondary smaller site office & amenities - worker parking - small item holding yard.

5.3.12 Temporary work

Temporary work would be required throughout the project to enable the safe construction of the permanent work. Temporary work would be removed following completion of the supported activity and the area restored.

The following temporary work are expected to be undertaken during construction and may include:

- site fencing and signage
- utility connections
- access track and haulage roads
- sediment basins (other than water quality basins)
- waterway diversions
- waterway crossings
- drainage connections
- traffic safety barriers
- temporary road construction signage (project information, directional signage)
- retaining walls
- traffic control signals (TCS)
- working platforms and support structures for bridgeworks.

The above list is indicative, with the scope of temporary work to be confirmed by the construction contractor. Additional information on key temporary work activities is provided below.

Temporary creek crossings

To facilitate off-road haulage within the project boundary, temporary creek crossings would be required at Croobyar Creek, Pettys Creek and Millards Creek. While not part of the main off-road haulage route, other unnamed creeks and tributaries which are also crossed by the project may require a temporary crossing to facilitate work either side of the creek. Construction of these temporary creek crossings would require in-stream work, with work being undertaken to maintain water flows in the creek during this work. Temporary creek crossing construction would generally consist of:

- laying of a geofabric layer on existing channel bed
- installation of pipes, with pipe size suitable to maintain existing flow
- placement of clean coarse rock fill around pipes and across existing creek surface and extending up the banks to the creek
- installation of cement stabilised capping.

The construction methodology for temporary creek crossings would be confirmed by the construction contractor and is subject to change.

Where required, the temporary crossing structure would be designed, constructed and maintained in accordance with the following requirements:

- low-flow conditions would be maintained
- where required, fish passage would be maintained in accordance with the waterway classification and DPIE (Regions, Industry, Agriculture and Resources) guideline *Why Do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge 2003)
- material used in temporary crossings would be selected to minimise risk of fine sediment material entering the waterway
- include erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom 2004)
- any material used in the temporary creek crossing would be removed following construction and the site rehabilitated to its existing condition.

These temporary measures are carefully planned and managed to mitigate impacts on sensitive receiving environments, avoid alterations to flow regimes, protect aquatic habitats, and ensure that natural watercourses are reinstated to their original condition promptly after construction.

Haul roads

To avoid ongoing construction haulage traffic impacts to the townships of Milton and Ulladulla, it is proposed early in the construction period to establish an off-road temporary haulage route within the project boundary. This haul road would run adjacent to the permanent road formation where possible. The haul road would cross the Croobyar Creek and Pettys Creek via temporary creek crossings as mentioned in the preceding section.

Haul roads would generally consist of:

- temporary access pavements of existing roads
- gates and fencing
- stabilised access hardstand area for parking, laydown and truck marshalling

Erosion and sediment controls

During construction, drainage would be required to divert clean water away from construction areas, to prevent dirt and clean water from mixing and to prevent erosion. This risk would be addressed via installation of either operational drainage structures or temporary drainage as early as possible in construction.

Sediment basins would be needed for most catchments disturbed during construction, to manage the capture of dirty water from the site and treat it prior to discharge. Indicative construction sediment basin locations are shown on Figure 5-20 to Figure 5-29 with the final size and location of all basins to be confirmed during detailed design and construction. Sediment basins would be designed in accordance with the Blue Book Volumes 1 and 2D and would be required in any disturbed catchment exceeding 2,500 square metres where the erosion hazard exceeds the threshold of 150 cubic metres per year (equivalent to approximately 200 tonnes per year). The size of basins would vary depending on catchment size and conditions.

Alternative erosion and sediment control measures would be implemented in locations where designed sediment basins are needed but cannot be provided because of site, soil and drainage constraints to constructing sediment basins. Typical sediment and erosion control measures and practices would include, but not be limited to, the following:

- temporary diversions until permanent stormwater devices can be used
- temporary controls such as large mulch bunds or sediment traps until permanent sediment basins can be installed
- temporary sedimentation basins to capture sediment from construction runoff
- sediment fences and filters
- covering of batters and exposed slopes with vegetative ground cover and/or biodegradable soil binder
- large mulch bunds secured down with biodegradable matting/mesh, rock filter bunds/dams, sediment sumps and online sediment basins/traps within cuts
- linear sediment traps at the toe of work as a mulch bund (or similar) or sediment fencing
- shallow, linear swale type infiltration basins
- irrigation to land rather than traditional basin discharges subject to any Environment Protection Licence requirement and consideration of other environmental risks, e.g. waterlogging).

The proposed ancillary facilities would also include appropriate controls to divert clean water around the site as far as possible and to manage sediment laden waters.

5.3.13 Construction transport management and access

The construction of the project would require construction traffic to use various local and regional roads to access the project. During the initial stages of construction, the existing Princes Highway through Milton and Ulladulla and local roads would be used to haul material around site until an off-road haul road is established along the alignment. This would increase the traffic volumes (especially heavy vehicles) through these areas. Haulage along local roads would also consider peak travel hours and times, particularly during school and public holiday periods, to minimise the potential for delays on the existing Princes Highway to the travelling public and to minimise impacts to local roads. Haulage of excavated material would be carried out within the project boundary. Delivery of oversized plant or structures would be along the designated Oversize-Overmass routes or in accordance with Road Occupancy Licenses (ROLs). Further detail of construction transport management and access are provided in Chapter 8 (Traffic and transport).

To minimise construction traffic passing through Milton and Ulladulla townships, during site establishment, a dedicated haul road would likely be constructed within the project boundary. This would be accessible to project construction traffic only and would become operational once temporary waterway crossings are completed across the Croobyar Creek, Millards Creek and Pettys Creek.

Access to the construction site and/or construction ancillary facilities would be established at the intersections of the project and the following:

- Princes Highway at Little Forest Road (northern connection), Little Forest
- Ringland Lane, Milton
- Croobyar Road, Milton
- Woodstock Road, Milton
- Wilfords Lane, Milton
- Windward Way, Milton
- Slaughterhouse Road, Ulladulla
- Princes Highway and Bishop Drive, Ulladulla
- Tetley Place and Slaughterhouse Road, Ulladulla
- Pirralea Road, Ulladulla
- White Gum Road, Ulladulla
- Blackburn Road, Ulladulla
- Green Street, Ulladulla
- Kings Point Drive, Kings Point
- Princes Highway Burrill Lake.

Construction ancillary facility access locations are shown on Figure 5-20 to Figure 5-29. Some of these local roads may require temporary traffic management to be suitable for construction traffic. Changes may include changes in road alignments, closures of turning lanes, local road closures and/or diversions, changes to active transport infrastructure such as footpath closure, relocation or shoulder closures. Construction activities may require temporary traffic control and minor modifications to the existing roads, which may have potential onflow impacts to nearby local roads such as Tuckerman Road and Tetley Place. Where required, alternative traffic arrangements would be established to minimise impacts on local roads. Appropriate traffic control would be implemented to ensure the safety of workers and the public. Any work on existing roads would be undertaken under a Road Occupancy Licence (ROL) obtained from the relevant roads authority.

Temporary speed restrictions and traffic controls would be required to manage traffic during construction of the project when construction activities are being carried out on/over or near the above listed roads. Temporary directional and advisory signs, along with variable message signs, would be used throughout construction where necessary. It is envisaged that the construction contractor would maintain the current level of serviceability with only minor disruptions to traffic during final road surfacing and line marking.

A Traffic Management Plan would be prepared for the construction of the project including traffic management measures to be employed to manage short-term traffic impacts expected during construction, particularly for areas where works would be adjacent/intersect with the existing Princes Highway and along still operational local access roads. Road traffic measures would be developed in accordance with the Traffic Control at Work Sites Technical Manual (Roads and Maritime Services 2018c). The Traffic Management Plan would also confirm measures to minimise impacts to local roads. Impacts to traffic and access from the construction of the project are detailed in Chapter 8 (Traffic and transport).

Construction activities would generally be completed while maintaining traffic movements either on existing roads or detoured routes. During construction, the local roads mentioned above would be modified or closed, with work on local roads maintaining access, or identifying alternative access provided to properties with impacted access. Alternative provisions would be agreed with affected property owners where required. Prior to the closure of Slaughterhouse Road, Transport would work with Ulladulla Buslines to identify impacts to bus routes and stops along the road and identify alternative solutions. These changes would be communicated to the community.

Workforce parking would be accommodated within construction ancillary facilities. Indicative construction ancillary facility uses including proposed parking locations are summarised in Table 5-10, though parking zones would be confirmed by the construction contractor. On-street parking of construction vehicles would be restricted with sufficient parking provided for all workers within construction ancillary facilities.

5.3.14 Workforce and construction work hours

Workforce

An estimated peak workforce of about 650 to 740 people is anticipated. The average size of the construction workforce on site would be about 380 people, including management staff and subcontractors, during the three to four years of construction.

The construction workforce would comprise trades and construction personnel, subcontractor construction personnel and engineering, functional and administrative staff. The size of the workforce would vary depending on the construction activities being carried out.

Where non-local workers require accommodation within nearby towns, this may increase demand for rental housing, short-term accommodation and tourist accommodation, particularly during holiday periods. This has the potential to influence accommodation availability, vacancy rates and rental prices in the short term. It is expected that not all workers would require accommodation, with some likely to be recruited from the local area and already live locally. The project would implement measures to reduce reliance on the local private rental market during construction. Chapter 15 (Social and economic) includes further detail on workforce accommodation and rental market pressure.

Working hours

The *NSW Interim Construction Noise Guideline* (ICNG) (DECC, 2009) identifies the standard construction working hours as:

- Monday to Friday: 7am to 6pm
- Saturdays: 8am to 1pm
- Sundays and Public Holidays: no work.

All work carried out during construction would be managed through implementation of mitigation measures identified in Chapter 12 (Noise and vibration).

Extended working hours

Extended construction may be required for the project. Extended construction hours would apply across the full project and would be limited to daylight hours, with potentially shorter working periods throughout winter months. The proposed extended construction hours are:

- Monday to Friday: 6am to 7pm
- Saturday: 8am to 5pm
- Sunday and Public Holidays: no work.

Most construction work would be carried out within these proposed working hours. This could include (but is not limited to):

- construction ancillary facility operation including batching, stockpiling and general office duties
- removal and delivery of materials, plant, and equipment such as cranes
- establishment of temporary traffic management controls and facilities enabling traffic switches so that traffic flows can be maintained during construction
- earthworks including haulage, placement, and compaction
- concrete works associated with concrete batching, pouring and curing
- bridge structure works when launching the bridge deck
- pile driving and/or boring at bridges and retaining walls
- utility adjustments and relocations
- pavement and concrete finishing works.

The reasons for the proposed extended working hours are presented in the following section.

Justification for the extended working hours

Transport is investigating opportunities for extended working hours for the project to complete construction sooner, allowing relief from construction activities for the travelling public and local communities. Milton, Ulladulla and Mollymook have a strong tourist economy, and the population increases during school holiday and summer periods. This is compounded by holiday through traffic using the existing Princes Highway to travel further south. This results in greater congestion and impacts to local access during these periods.

By extending standard working hours by two hours every day and four hours on a Saturday, this would:

- reduce the volume of traffic on the roads during peak hours due to construction staff and some construction vehicles travelling to and from the work site outside peak traffic periods
- potentially bring forward the opening date for the project
- cause less traffic disruption, noise and visual amenity impacts to the community, local businesses, motorists, pedestrians and cyclists as work would be completed earlier than currently predicted
- provide a safer road and active transport network earlier than planned.

Longer working days would result in a direct increase in productivity across the project, making maximum and most efficient use of existing equipment and resources.

It is noted that the project may increase demand for rental housing, short-term accommodation and tourist accommodation, particularly during holiday periods. By extending working hours, the competing demand on local accommodation would be over a shorter period.

The proposed extended construction working hours are likely to impact affected sensitive receivers, particularly from Pettys Creek south to Green Street. However, as construction would be completed sooner, the impact duration would be shorter. For large areas of the project (from south of Little Forest Road to Pettys Creek and south of Green Street), extended working hours would be unlikely to result in substantial impacts on the amenity of affected sensitive receivers, due to the sparse rural residential nature of the area and the intact vegetation with limited residences to the south.

The implementation of management measures identified in Chapter 12 (Noise and vibration) would make sure impacts were limited, including for sensitive receivers near the central connection.

The proposed construction hours and consideration of the effects would be discussed with the community and potentially affected receivers before construction. The assessment of construction noise is detailed in Chapter 12 (Noise and vibration).

Consultation proposed for the extended working hours

Section 2.3 of the ICNG indicates construction activities are permissible outside of standard hours for “public infrastructure works that shorten the length of the project and are supported by the affected community”. Community consultation would be required for extended working hours in line with guidance from the ICNG. Out-of-hours work and extended working hours have been socialised with the community through project communications, and targeted consultation would occur during the public display of this EIS.

The community consultation could include:

- identification of receivers potentially impacted by construction activities through the construction noise assessment (refer to Chapter 12 (Noise and vibration)). Impacts would be based on predicted noise impacts from the adopted extended working hours
- notification of the proposed hours via letterbox drop and/or doorknocking, including request for comment and feedback. This would include justification for the proposed extended working hours along with the benefits the community can expect
- individual or community meetings to address any further issues where residents request further clarification on or raise concerns about the proposed hours. Discussions would be sufficiently detailed to provide a general summary of the expected impacts, and an explanation of how the proposed working hours relate to individual receivers
- implementation of complaints management procedures
- while community engagement would be ongoing, feedback received during this consultation period would inform the final adopted working hours for the project.

Out of hours work

The ICNG also recognises there are some situations where specific construction work may need to be carried out outside of the recommended standard construction hours. The following are the categories of work that may be carried out outside the recommended standard hours:

- delivery of oversized plant or structures that the police or other authorities determine require special arrangement to transport along public roads
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- public infrastructure work that shorten the duration of construction and are supported by the affected community
- work where a proponent demonstrates and justifies a need to operate outside the recommended standard construction hours.

Certain work may need to occur outside the proposed extended construction hours (known as night work) to minimise disruption to customers, pedestrians, road users and nearby sensitive receivers. Any night work would be undertaken in accordance with the *Construction Noise and Vibration Guideline* (CNVG) (Transport, 2023). Typically, specific work and activities that may be required to be undertaken out-of-hours would include:

- tie-in work and/or adjacent work on the existing Princes Highway for asphalt paving to maintain safety of road users
- adjustment to line marking
- temporary safety barrier placement
- traffic switches and utility work to reduce inconvenience to road users, avoid traffic delays during daytime or peak traffic periods and to provide safety for construction workers working on the existing highway
- minor services adjustment
- concrete works associated with concrete batching, pouring and curing
- construction ancillary facility operations required to support any activities which may occur out of hours.

5.3.15 Construction plant and equipment

Construction of the project would likely utilise typical construction plant and equipment used on most highway projects. Specific plant and equipment required to construct the project would be identified during detailed design or construction based on construction methodology, site site-specific environmental or engineering constraints. Typical construction plant and equipment for each component are shown in Table 5-11.

Table 5-11: Construction plant and equipment

Component	Typical plant and equipment	
Pre-construction: Site establishment and low impact work	• trucks • generators • light vehicles • excavators • chainsaws	• mulchers • water carts • cranes • drilling rigs.
Site preparation and utilities relocation	• trucks • bulldozers • excavators • compactors	• graders • scrapers • loaders • water carts.

Component	Typical plant and equipment	
Earthworks	- trucks - bulldozers - excavators - compactors - graders - scrapers	- loaders - water carts - compactors - vibratory rollers - rock breakers/hammers - drilling and blasting equipment for hard rock cuttings.
Drainage	- trucks - bulldozers - excavators	- concrete pumps - concrete trucks - cranes.
Fauna connectivity	- trucks - bulldozers - excavators	- concrete pumps - concrete trucks - cranes.
Bridge work	- piling rigs - concrete pumps - concrete trucks - cranes	- excavators - trucks - cherry pickers - welding equipment.
Road work and road surfacing	- graders - backhoes - trucks - water carts - vibratory compactors - bitumen sprayers - rollers - concrete trucks - concrete pumps	- concrete saws - compressors - bitumen sprayers - generators - milling machines - paving machines - asphalt trucks - curing machines.
Commissioning and finishing work	- trucks - generators	- light vehicles - cranes.

5.3.16 Construction resources and waste management

Construction resources

Typical materials that would be used for the construction of the project include:

- earthwork materials, such as topsoil, general fill and select fill
- aggregates for drainage and producing concrete and asphalt and spray seals
- sand for drainage and concrete, and producing asphalt
- cement and fly ash for producing concrete
- concrete for drainage, road surfaces, bridge work and miscellaneous work such as barrier kerbs, kerbs and gutters, paving and signpost footings
- road base for constructing flexible road surfaces
- bitumen for spray seals and producing asphalt

- precast concrete elements for drainage (culverts, pits and headwalls), bridge work (piles, girders and parapets) and miscellaneous work
- steel for bridge girders and barrier railings.

Indicative quantities of the main materials are listed in Table 5-12. These estimates would be further refined during detailed design.

Table 5-12: Indicative quantities of main materials needed for construction

Material	Estimated quantity
Road work	
Earthwork (cut to fill total including select fill) (m ³)	1,400,000
Earthwork (select fill material) (m ³)	110,000
Concrete (m ³)	15,000
Asphalt (m ³)	70,000
Dense graded base and sub base (DGB and DGS) (m ³)	8,000
Steel reinforcement (tonnes)	45
Bridge work	
Concrete (m ³)	11,000
Steel reinforcement (tonnes)	2,500
Bridge deck wearing surface (m ³)	700
Drainage and structures	
Concrete (m ³) (pipes, pits, culverts and headwalls)	5,500
Concrete (m ³) (retaining walls and noise walls)	1,400
Steel reinforcement (tonnes)	40

Construction materials would generally be sourced from off-site suppliers. Where feasible, local sources of construction materials would be preferred to minimise haulage distances. Preliminary investigations into construction material sourcing have identified three existing concrete batch plants within the local area while asphalt and quarry materials are available within the Illawarra Shoalhaven region. Precast concrete and fabricated steel elements would be available from established suppliers located in NSW.

As outlined in Table 5-12, around 1,400,000 cubic metres of spoil would be beneficially reused for embankments and structural fill within the project boundary. This substantially reduces both the need for imported raw materials and the volume of excess spoil requiring off-site disposal.

Waste management

Construction of the project would produce a number of waste streams including:

- asphalt
- excavated soil, including gravel, clay and sand
- rock and excavated stone
- concrete waste
- green waste including vegetation waste and mulch from the removal of trees, shrubs and groundcovers
- general waste from construction sites, including office wastes, scrap materials, packaging materials and other general solid waste

- wastewater
- special waste including asbestos, and waste tyres
- hazardous waste including contaminated excavated material.

Spoil and waste management and disposal would be carried out in accordance with the management measures for waste disposal in construction outlined in Chapter 22 (Waste). In particular, it is noted that a large amount of mulch would be generated on site due to removal of heavily vegetated areas between the central and southern connections. While some of this would be reused on site, excess material may need to be disposed of at a green waste disposal facility; or rather than felled trees being mulched, these could be sold to timber yards or other interested parties.

On site encapsulation cells would be considered for the disposal and management of contaminated excavated materials, particularly asbestos generated during demolition activities, or asbestos impacted soils. The following criteria would be considered for encapsulation:

- encapsulation sites would be selected with consideration of sensitivity of the existing environment, and suitability of final land use
- only non-leachable contaminants (such as asbestos and metals) would be stored in a cell. Leachability analysis (TCLP) can be conducted for metals impacts to soil to demonstrate they are non-leachable
- a Remediation Action Plan would be prepared detailing testing, construction and validation requirements and indicating location/s of cell/s and would be endorsed by the appointed NSW EPA Site Auditor, prior to cell construction
- a Waste Management Plan would be prepared as part of the CEMP, which would detail ongoing inspection and maintenance activities for each cell/s (refer to Chapter 22 (Waste)).

Water usage

Water would be required for:

- compacting and stabilising earthwork
- dust suppression
- watering landscaped areas
- drilling (e.g. geotechnical boreholes, drill holes for drill and blast activities)
- on-site concrete batching
- washing plant and machinery
- site amenities (e.g. wash basins).

Construction of the project would use around 230 kilolitres of potable water and 2300 kilolitres of non-potable water daily. The actual daily water usage would vary with the weather conditions and the type of activities in progress. Total water usage for construction of the project is expected to be up to around 267,000 kilolitres of potable water and 2,670,000 kilolitres of non-potable water over a three to four year construction period. The estimates are indicative and subject to change based on weather conditions and final construction methodology.