5.3.3 Interchanges and local and regional road network connections

Interchange design objectives

The Wagga Wagga Road interchange and southern interchange have been designed with consideration of the following objectives:

- Maintaining a high standard of access to and from Holbrook.
- Retaining Holbrook as a regional service town.
- Avoiding impact on significant Aboriginal areas.
- Minimising impact on native vegetation.
- Minimising impact on properties.
- Facilitating nearby property access.
- Taking into account road safety design.

Bridge and interchange locations are shown in Figure 5.6.

Wagga Wagga Road interchange

The Wagga Wagga Road interchange would be grade-separated with Wagga Wagga Road passing over the proposed bypass on its existing alignment. Northbound and southbound on-load and off-load ramps would connect the proposed bypass to Wagga Wagga Road and the existing Hume Highway.

Southern interchange

The southern interchange would be grade-separated. Northbound and southbound on-load and off-load ramps would connect the proposed bypass to the existing Hume Highway, and provide access to two properties west of the project

Local and regional road connections

The existing Hume Highway north of the Wagga Wagga Road intersection would be closed, with a cul-de-sac provided. The intersection of Anderson's Lane and Wagga Wagga Road would be closed.

The intersection of Wagga Wagga Road and the existing Hume Highway would be modified such that Wagga Wagga Road becomes the priority road. At this intersection, access north to the existing Hume Highway would be via a right-hand turn lane.

As noted in Section 5.3.2 Tip Road would be relocated to the west of its current position. The final location of the intersection of the new Tip Road and Culcairn Road would be subject to detailed design, carried out in consultation with affected landowners, Access to the remnant portion of Tip Road east of the project would be provided via Wallace Street.

Figure 5-1 shows the likely alterations to local and regional road connections.

5.3.4 Overpasses

Wagga Wagga Road interchange overpass

The Wagga Wagga Road interchange would provide an overpass crossing for traffic on Wagga Wagga Road and traffic entering and exiting the project. The bridge would likely be a multi-span structure of 90 metres length, crossing the carriageways at about a 10 per cent skew.

The bridge would comprise two 3.5 metre wide traffic lanes with standard shoulders. Safety screens about three metres high are proposed along each side of the bridge. The bridge would span the carriageways with about six metres vertical clearance.

Culcairn Road twin bridge overpass

Twin bridges are proposed over Culcairn Road. Each bridge would likely be a multi-span structure about 90 metres long.

Each bridge would comprise two 3.5 metre wide traffic lanes with standard shoulders. Safety screens about three metres high are proposed along each side of each bridge. The bridges would span Culcairn Road with about six metres vertical clearance.

An indicative cross section of the proposed Culcairn Road overpass is provided in Figure 5-7.

Southern interchange overpass

The southern interchange overpass would provide a crossing for traffic accessing and exiting the project, including access for properties to the west of the project. The bridge would likely be a multi-span structure of 90 metres length, crossing perpendicular to the carriageways.

The bridge would comprise two 3.5 metre wide traffic lanes with standard shoulders. Safety screens about three metres high are proposed along each side of the bridge. The bridge would span the carriageways with about six metres vertical clearance.

5.3.5 Property access

Property access

Two at-grade property accesses with median crossover to accommodate turning of an articulated vehicle of up to 26 metres long (ie a B-double) would be provided at approximately chainage 118300 and 118700.

The southern interchange would provide for property access for two properties west of the proposed bypass, south of Culcairn Road.

Any other property accesses affected as a result of the project would be reinstated in consultation with the relevant landowner.

5.3.6 Bridges, culverts, creek realignments and drainage

Ten Mile Creek twin bridges

Twin bridges are proposed over Ten Mile Creek and its floodplain (refer Figure 5-7). The bridges are likely to be multi-span structures about 120 metres long. The bridges would be designed to minimise the impacts of flood flows.

Each bridge would comprise two 3.5 metre wide traffic lanes with standard shoulders. Safety screens about three metres high are proposed along each side of each bridge. The bridge would span Ten Mile Creek with around 10 metres vertical clearance from the creek bed.

Culverts and drainage

In addition to Ten Mile Creek, the project crosses approximately 11 minor watercourses/drainage lines. Culverts would be located at these watercourse crossings to convey runoff across the project. Culverts would be located and aligned to follow natural depressions, ensuring minimal change to existing flow paths. This should also ensure minimal channel excavation and reshaping at the inlet and outlet of culverts. Culverts would be designed to accommodate the 100 year flood (ie the edge line on the pavement surface would be above the 100 year flood level).

Culverts and drainage would be designed in accordance with Department of Industry and Investment (formerly DPI) *Policy and Guidelines for Fish Friendly Waterway Crossings* (Fairfull and Witheridge 2003).

The locations of proposed culverts are shown in Figure 5-9.

In a number of locations, channels or catch drains would be provided to direct flows from the culvert outlet to an existing natural watercourse or to maintain existing water flows, for example to existing farm dams. Where flow velocities within this channel are high, the channel would be protected against scour using a rock or concrete channel lining, or other suitable measure.

Structural and non-structural measures would be used to ensure that the waterway of Ten Mile Creek is protected from pollution during operation. This may include swales and spill containment basins.

Creek diversions and realignments

The concept design does not indicate a requirement for diversion and/or realignment of Ten Mile Creek.

If it is determined, following more extensive geotechnical investigation and detailed design development, that realignment or diversion of Ten Mile Creek is required, the need for, and design of, the diversion or realignment, would be determined in consultation with DECCW, the Department of Industry and Investment and other relevant stakeholders.

Excavating or reclaiming the beds of banks of waterways

Some excavation or reclamation works would be required in Ten Mile Creek and the several drainage channels crossed by the project. Excavation or reclamation would be related to the construction of temporary creek crossings over Ten Mile Creek and culvert works and scour protection in the drainage channels. Excavation or reclamation works would be minimised as far as practical and affected areas would be rehabilitated upon completion of construction works. The Department of Industry and Investment would be notified of any excavation or reclamation works.

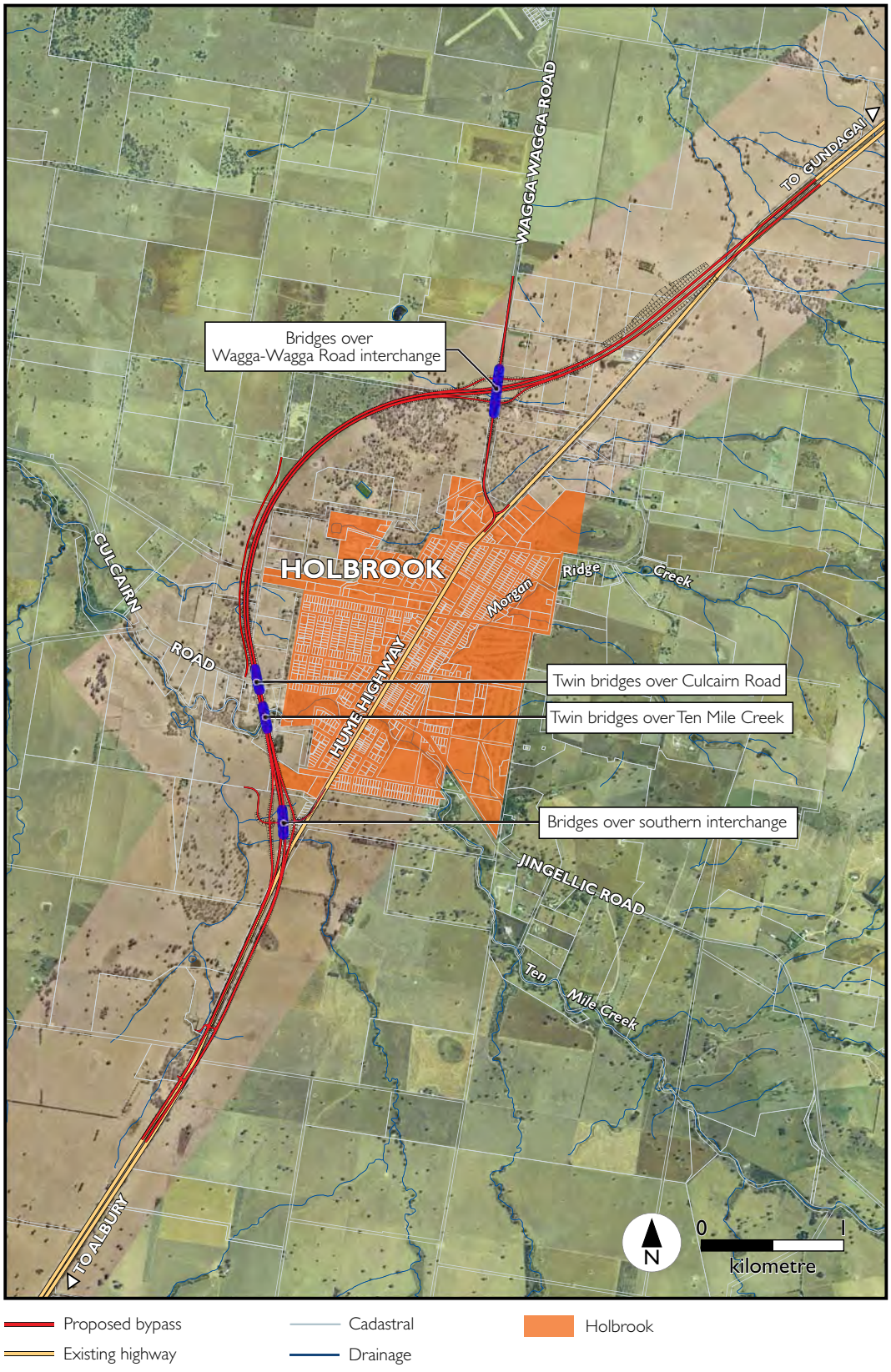


Figure 5-6 **Approximate bridge locations along the project**

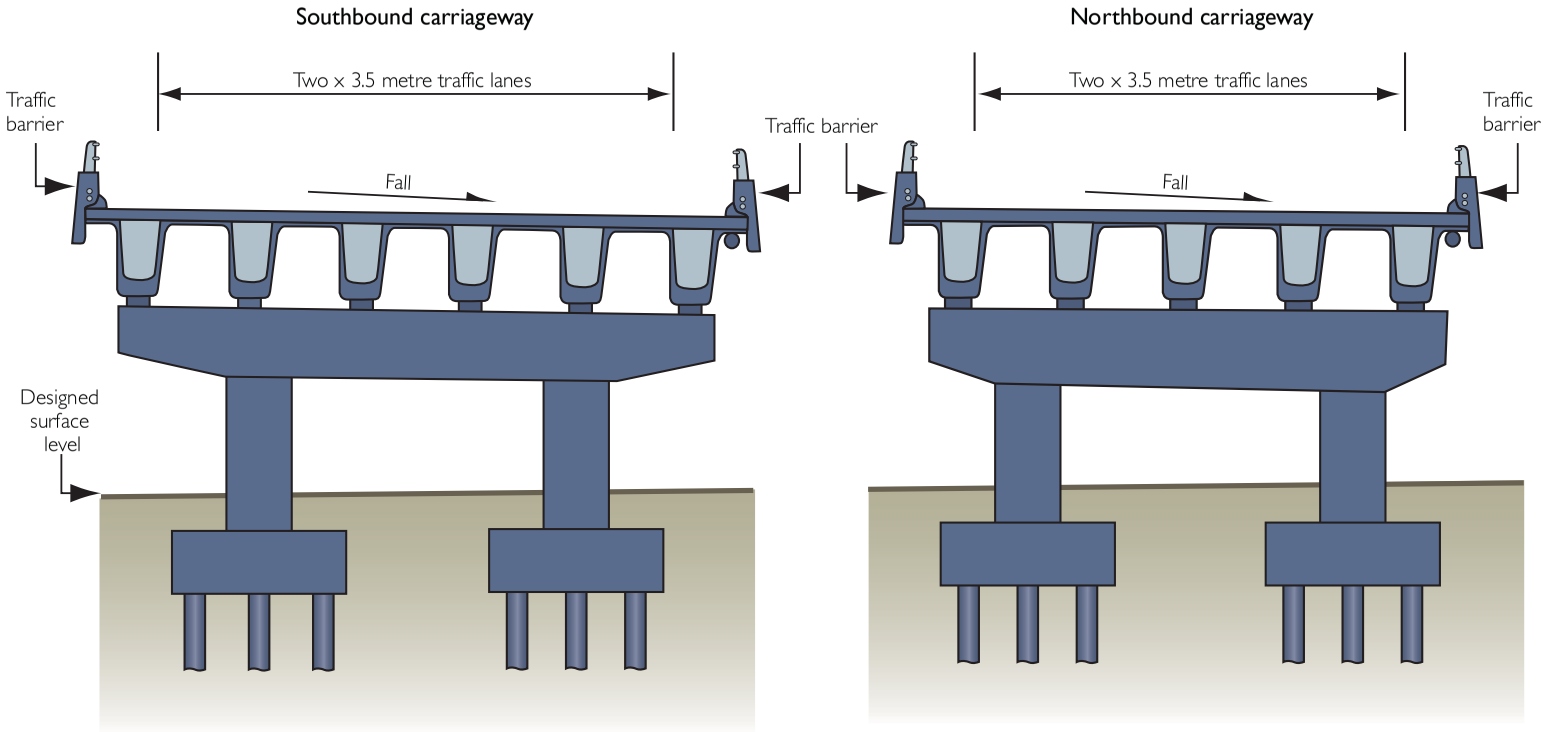


Figure 5-7 **Indicative cross-section – Ten Mile Creek and Culcairn Road bridges**

5.3.7 Geotechnical investigations

Geotechnical investigations undertaken to inform the environmental assessment consisted of a review of published geological data, consideration of existing geotechnical information collected on adjacent Hume Highway projects and site visits. Investigative drilling, assessed under part 5 of the EP&A Act, has recently commenced to inform the detailed design process. The impacts of the investigations have been minimised by application of appropriate mitigation measures. Further investigative drilling is likely to be required as detailed design progresses.

5.3.8 Cuttings and embankments

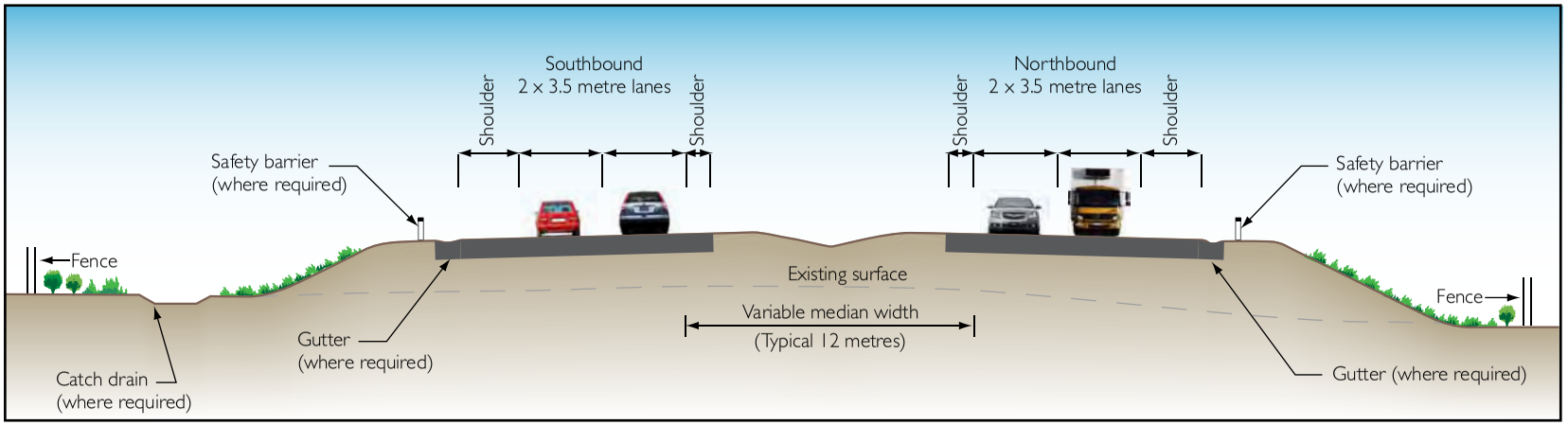
The project would require a cutting at the northern end and several fill embankments. The cutting would be a maximum of about 10 metres deep and extend over a distance of about one kilometre. The remainder of the project would be on embankment approximately two metres high. Higher fill embankments reaching 7.5 metres would be required on approaches to the Culcairn Road twin bridge overpass and the Ten Mile Creek twin bridges.

The Wagga Wagga Road overpass and access ramps, as well as the southern interchange overpass and access ramps, would also be on high embankments.

The slopes of the cut and embankment batter angles are likely to be angles of around 60 degrees, with steeper or flatter batters where conditions dictate. Shelves would be required for deep cuttings and high embankments to improve slope stability. Relevant geotechnical, urban design and environmental criteria and constraints would be considered when selecting batter slopes.

Indicative cross-sections of embankment and cut are shown in Figure 5-8.

MAIN CARRIAGEWAY EMBANKMENT



MAIN CARRIAGEWAY CUT

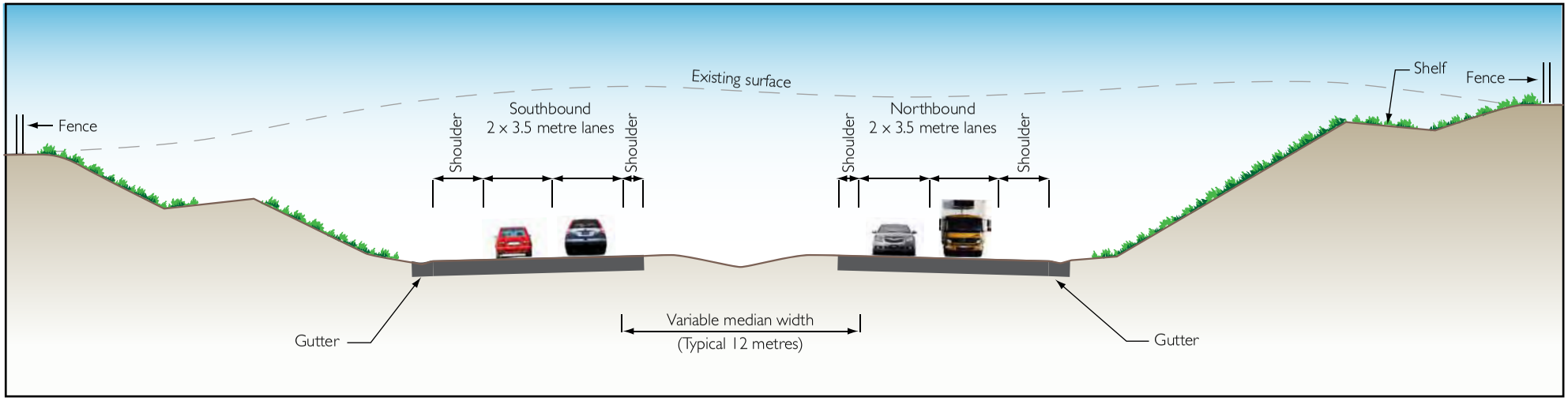


Figure 5-8 **Indicative alignment cross-sections – embankment and cut**

5.3.9 Pavement

New sections of carriageway would have a design life of 40 years with either a concrete or asphalt wearing surface.

Ramps would most likely consist of deep-lift asphalt (thick asphalt over heavily bound sub-base) with a design life of 40 years. It is likely that bridge decks would be surfaced with asphalt surface layers in accordance with RTA specifications. This would be confirmed during detailed design.

Local road connections and private property accesses would comprise full depth asphalt, asphalt overlays or sealed granular pavements depending on traffic loadings.

Where existing roads are being retained, existing pavements may require reconstruction or upgrading depending on the intended use of the road and its current condition. Depending on surface levels, overlays with varying thickness may be required. The pavement type used at connections to existing pavements would depend on expected traffic volumes and existing conditions, and would be subject to the relevant road authority's acceptance of appropriate materials.

All pavement designs would be undertaken in accordance with RTA specifications and Austroads guidelines.

5.3.10 Emergency and rest area facilities

It is not anticipated that any emergency median crossings or U-turn facilities would be provided. U-turns would be possible using the on-load and off-load ramps at the interchanges.

A shoulder about 2.5 metres wide would generally be provided along the project, allowing vehicles to pull over to the left in the event of sudden breakdowns and emergencies.

The project would not provide separate rest area facilities due to the short length of the project and the desire to encourage drivers to stop, rest and revive in Holbrook.

5.3.11 Pedestrian and cyclist facilities

Due to the large distances between towns and the small population surrounding Holbrook, the number of cyclists using the bypass would be low. Long distance cyclists may want to stop in the town to rest and use the facilities. The distance through town is 600 metres shorter than proposed bypass. Also, the reduction in traffic through Holbrook will create safer and more pleasant riding conditions. So, while cyclists could potentially use the project, it is considered likely that most would choose to use the existing highway through Holbrook.

Cyclists would be encouraged to continue to use the existing highway through Holbrook by the erection of signs before the off-ramps at the start of the bypass in each direction.

There is still the chance that cyclists would use the proposed bypass. To enable this, the road shoulder would be made suitable for use by cyclists. A shoulder width of 2.5 metres would provide a 1.5 metre separation between a bicycle and the traffic lane, which is suitable for a vehicle speed of 100 kilometres per hour *Guide to Traffic Engineering Part 14 Bicycles* (Austroads, 1999). No value is given for speeds higher than 100 kilometres per hour. This does not allow for side clearances to obstructions.

As the project is not located in an urban environment, there would be limited pedestrian activity. Accordingly, there would be no specific provision for pedestrians as part of the project. Should pedestrians need to use the proposed bypass (eg in the event of a breakdown) the provision of a 2.5 metre shoulder would provide for pedestrian access.

5.3.12 Lighting, fencing and signage

Road lighting for the project would be limited to interchanges and local road intersections. This would be confirmed during detailed design and would be in accordance with RTA requirements.

The project would be fenced to identify property boundaries and maintenance access routes.

A road signage strategy would be developed for permanent road signage for the project. The road signage strategy would include a combination of directional signage to provide clear guidance to local and through traffic and signage to promote Holbrook as a service town along the highway and encourage traffic to stop in Holbrook. Signage would be placed within the highway road corridor on the approaches to Holbrook, as well as directional signage on Wagga Wagga Road. The strategy would be considered further during detailed design and in consultation with the Greater Hume Shire Council. All road signage for the project would be in accordance with RTA requirements.

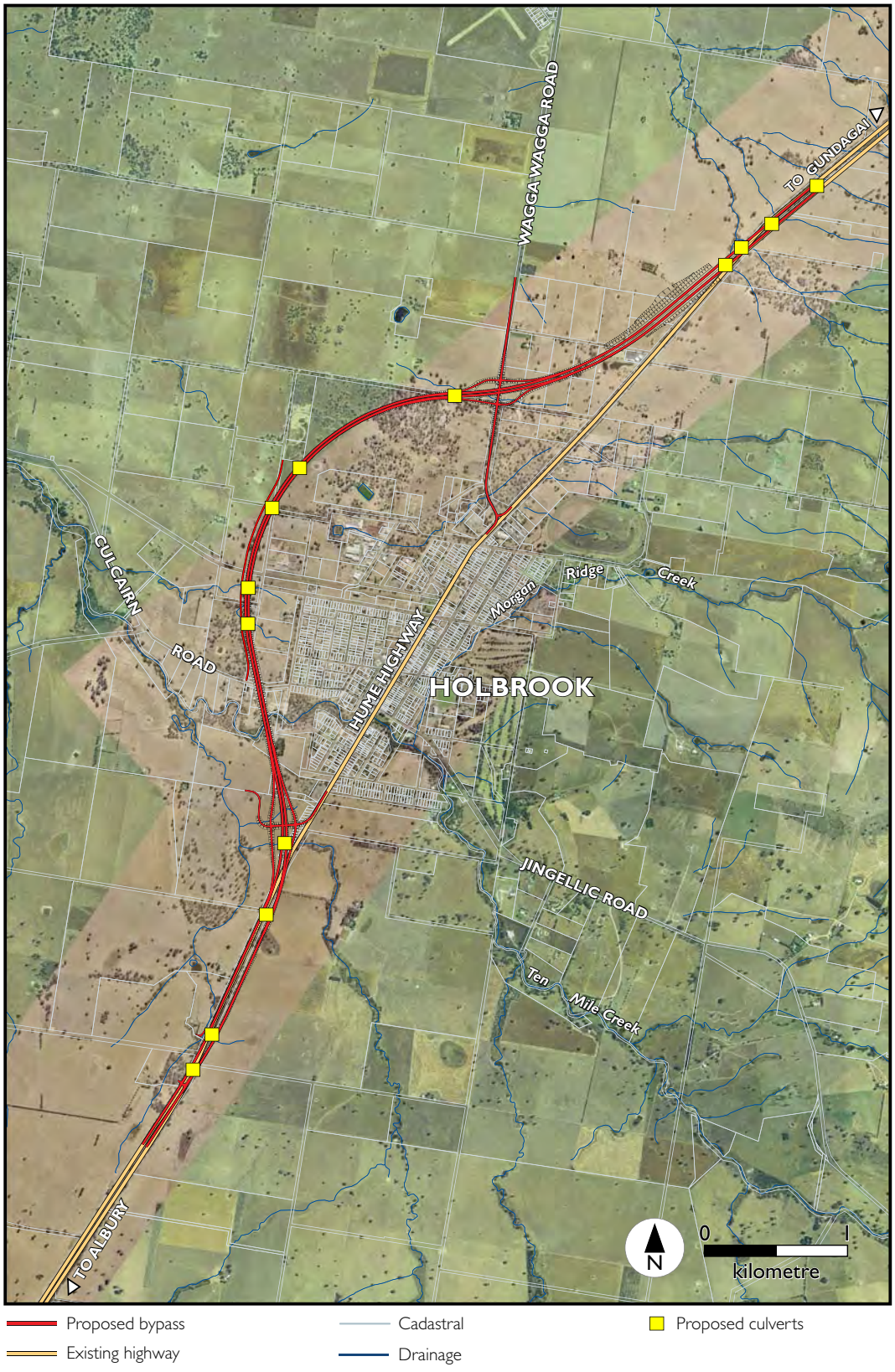


Figure 5-9 **Proposed culverts for the project**

5.3.13 Utilities and services

The project would affect a number of existing utilities and services:

- Fibre optic cable (in the southern portion of the project) — Nextgen.
- Telecommunications — Telstra.
- Electricity (domestic supply) — Country Energy.
- Water — Riverina Water County Council.
- Gas — Country Energy.

In consultation with service providers, a review of the existing overhead and underground utilities was undertaken to identify any potential adjustments required for the project. Table 5-2 identifies the existing utilities and services.

Table 5-2 Existing utilities and services potentially affected by the project

Chainage[1]	Utility	Provider
109700 to 111180 112380 to 112520 115500 to 115720 116040 to 116060 116680 to 119220	Underground copper cable	Telstra
116700 to 119280	Underground optic fibre	NextGen
115700	Underground gas pipe	Country Energy
110920 111660 112400 115620 to 115760 116160 116320 116860 to 119280	Overhead power lines	Country Energy
116420 115680	Underground water pipe	Riverina Water County Council

Note: 1. Refer to Figure 5-2 to 5-5 for chainages along the project.

The nature and extent of utility relocations would be finalised in consultation with relevant authorities, organisations and landowners through the detailed design and construction of the project.

Services required for operation of the project would include power for lighting (refer Section 5.3.9). The conduits for these services would be located within the road reserve of the project.