Stantec

304001042 - DUNNS CREEK ROAD: WESTERN PORTION ROAD RESERVE

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Queanbeyan-Palerang Regional Council

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1 Intent of Memo

Queanbeyan-Palerang Regional Council has requested that Stantec prepare options to consider the viability of a southern connection to Canberra via Old Cooma Road/Monaro Highway to the south and upgrades to existing road links and intersections through Queanbeyan. The request has been raised to consider community feedback from public consultation undertaken by council. The options will consist of the following:

- No Dunns Creek Road (southern option)
- No Dunns Creek Road (northern option)

The proposed investigations are being undertaken in two stages to provide Stantec and Council a better understanding of any further investigations which are required. The first stage of the investigations are the subject of this memorandum which will be presented to QPRC for further discussion. This is also to inform QPRC for further discussions with Councillors and any further investigations for Stage 2 if it is to proceed.

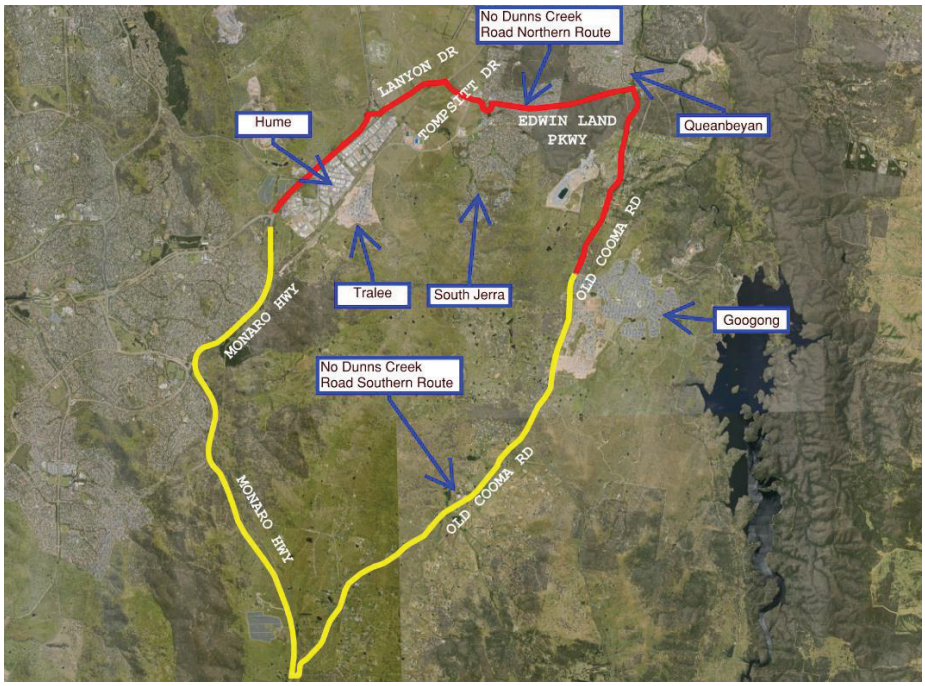


Figure 1-1: Site overview

2 Scope

A description of the works are outlined below. This memo documents the investigations as part of the Stage 1 works. Stage 2 works have not been undertaken and are subject to further discussions between Stakeholders, Council and Stantec.

No Dunns Creek Road – Northern Option

For the No DCR northern option, QPRC has requested further investigations into improvement with a more detailed approach:

- Undertake traffic modelling with proposed upgrades along the northern No-DCR alternative route, including upgrades.
    - 6-laning Old Cooma Road.
    - Edwin Land Parkway (ELP) duplication (plus, Stringybark Drive signalisation).
    - Edwin Land Parkway/Ellerton Drive intersection.
    - Jerrabomberra circle (signals).
    - Jerrabomberra circle (grade separation viability).
    - Lanyon Drive/Tompsitt Drive intersection.
    - Ellerton Drive/Yass Road/Bungendore Road intersection (2027 inclusion).
    - Pialligo Ave duplication.
- Prepare 2D concept sketches for each of the proposed intersection upgrades based on the traffic model. These include:
    - Jerrabomberra circle (signals) x 2 options.
    - Jerrabomberra circle (grade separation viability).
    - Lanyon Drive/Tompsitt Drive intersection
    - ELP/Numeralia Drive/Stringybark Drive.

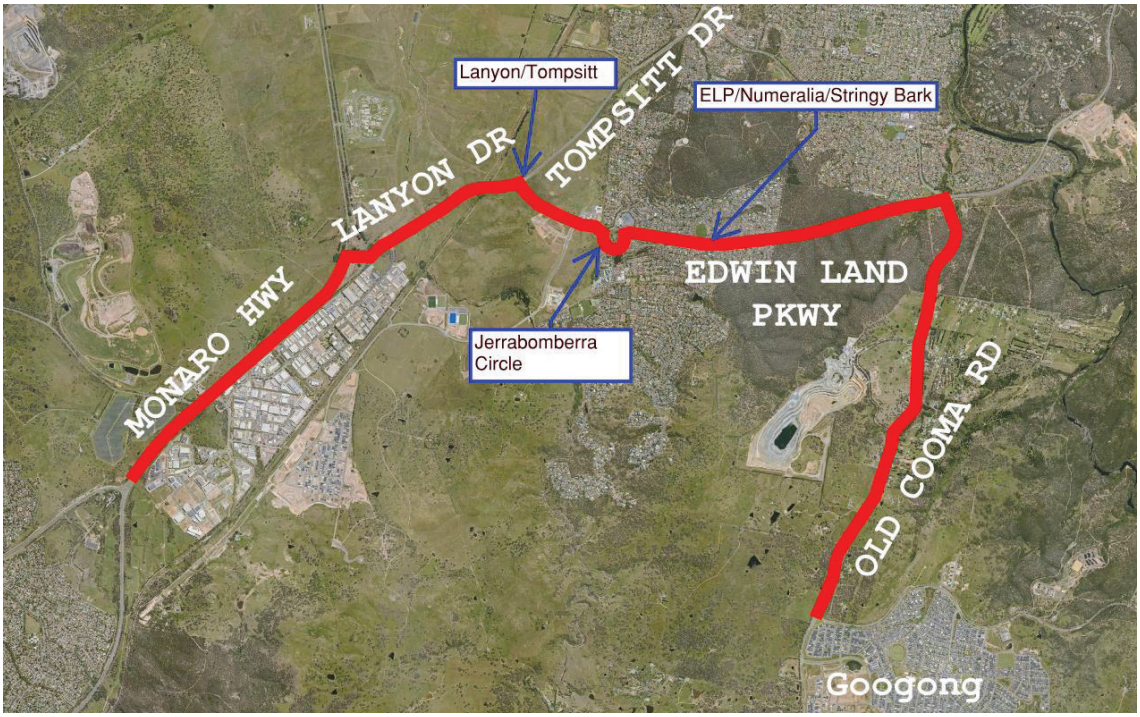


Figure 2-1: Detailed northern route plan

No Dunns Creek Road – Southern Option

For the stage-1 works for the No-DCR southern option route the following activities are undertaken:

- Traffic modelling for southern No-DCR route with consideration of the following elements:
  - Side roads and intersections
  - Monaro Hwy intersection
  - Rail crossing
  - Need for duplication of any segments.
  - Potential road safety improvements
    - Geometry
    - Signage
    - Sight lines (estimated as no model)
- 2D sketch layouts for Monaro Highway/ Old Cooma Road intersection.
- Supporting memorandum as a summary for above elements.

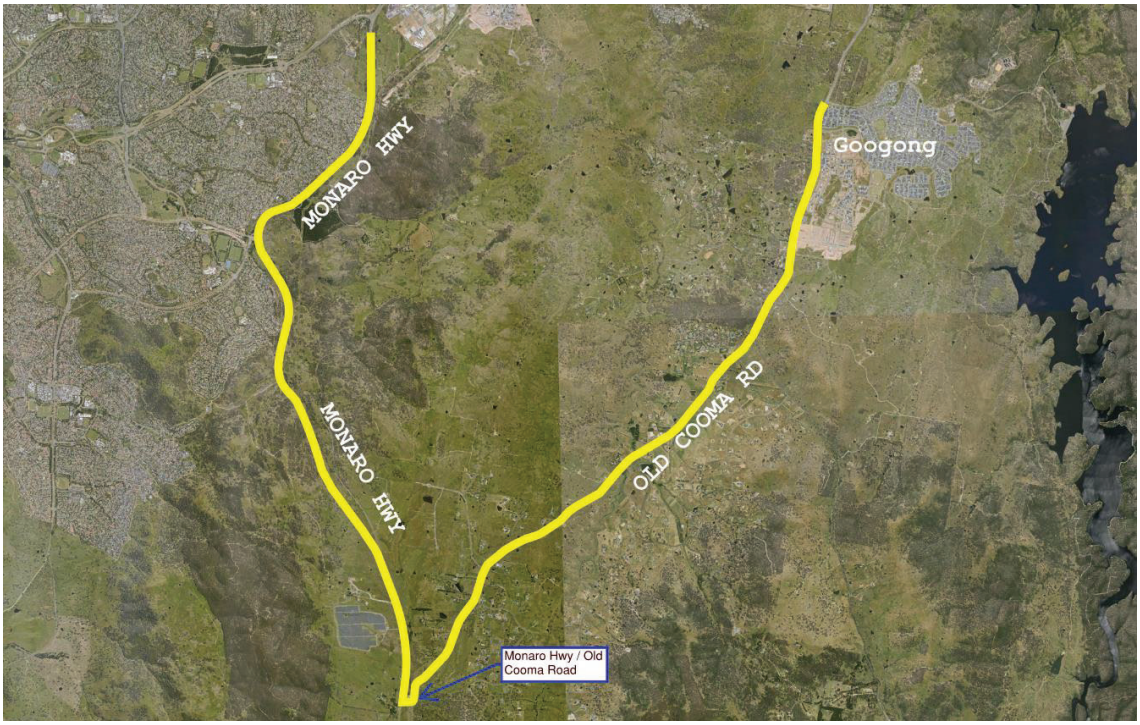


Figure 2-2: Detailed southern route plan

3 Northern Route

3.1 Traffic Modelling

The modelling analysis of the proposed upgrades for the No Dunns Creek Road – Northern Option, was undertaken as a group of improvements rather than an assessment of individual projects as most of the upgrades were along a single traffic corridor. This package of upgrades was added to each future year's previously agreed improvement works as determined in the "Queanbeyan-Palerang Timing of Works Analysis 2023" report. As such, a number of proposed upgrades were already included in the previous Timing Analysis Improvements and therefore not included in this upgrade package; namely the Ellerton Dr / Yass Rd / Bungendore Rd traffic signals from 2027, Pialligo Avenue duplication from 2041 and the 6-laning of Old Cooma Road from 2041.

The additional upgrades included in the package were the following:

1. Edwin Land Parkway (ELP) / Stringybark Dr traffic signals
2. Lanyon Dr / Tompsitt Dr signal upgrade
3. Edwin Land Parkway duplication
4. Jerrabomberra Circle upgrade.

Appendix A contains the Sidra outputs resulting from the traffic modelling which is discussed in the following sections.

Previous Works

- Old Cooma Road has been included in the traffic model as a 6-lane configuration as identified in Queanbeyan-Palerang Timing of Works Analysis Report, 2023.
- Upgrades at the following intersections have been included in the traffic modelling as per Queanbeyan-Palerang Timing of Works Analysis Report, 2023, with no sketches being undertaken as they are currently in various forms of design phases for upgrade.
    - Ellerton Dr / Yass Rd / Bungendore Rd (signals)
    - Pialligo Avenue Duplication and intersection upgrades

Stage 1 – Dunns Creek Road

The link between the ACT border and Tralee / South Jerra sub-division has been included in traffic modelling.

Lanyon Dr / Tompsitt Dr

The intersection upgrades from traffic modelling showed that an additional through lane was required for Lanyon Drive eastbound. (See 30401042-SK-0100). Layouts are discussed further in Section 3.2.

Jerrabomberra Circle

There were three variations considered for the Jerrabomberra Circle upgrade and each was included separately with the other upgrades to form three sub-packages:

1. Traffic signals installed on the eastern roundabout approach only – no linking of traffic signals was practical. (See 30401042-SK-0110).

2. Circle replaced with full traffic signals – this variation allows for the linking of traffic signals along the Tompsitt-ELP corridor (See 30401042-SK-0120).

3. Flyover over the Circle removing east-west Tompsitt-ELP traffic. (See 30401042-SK-0130).

Edwin Land Pkwy/ Stringybark Rd / Numeralia Rd

This intersection has been upgraded to cater for the duplication of ELD and intersection upgrade based on a double diamond. (See 30401042-SK-0140).

Results Summary

The latest QPRC Tracks model was used to assess these sub-packages for the future years of 2031/2036/2041/2046 and for the AM Peak/Inter Peak/PM Peak.

Each of the intersection upgrades (sub-packages) considered largely produced similar impacts on the future road network with impacts primarily concentrated along the Tompsitt Dr - ELP corridor. The following pages show ‘change of flow' plots indicative of those changes for the AM and PM Peaks and generally show the following:

1. The upgrade packages have no impact on the volume of traffic expected to use Old Cooma Rd and as a result the 6-laning will still need to be implemented in 2041 as per the previous Timing of Works Analysis.

2. More volume is attracted to ELP in all of the sub-packages irrespective of the improvement undertaken at the Jerrabomberra Circle. However, the package that includes the replacement of the Circle with a full signalised intersection attracts the most flow as it provides the opportunity to link the operation of the Tompsitt Drive/Environa Drive intersection, ELP/Jerrabomberra Drive and ELP/Stringybark Drive signals into a coordinated system thereby further reducing travel time along the corridor. (See Figure 3-3 and Figure 3-4 below).

3. The packages provide some small relief to northbound flows along Cooma St and Ellerton Dr during the AM Peak however it comes at the cost of a small increase in southbound flow.

4. The Level of Service (LOS) plots for the 2046 works package are indicative of the improvement in LOS in the area as a result of the flow changes. The morning peak LOS changes are shown, which is very similar to the PM peak results. The LOS are shown in figures Figure 3-5 and Figure 3-6 below. Link and Intersection operation along the Tompsitt-ELP corridor generally improves with links and intersections returning them to LOS C or better. The improvement in operation along the Tompsitt- ELP corridor also changes traffic flow along Southbar Road corridor and results in some improvement in intersection LOS along that corridor.

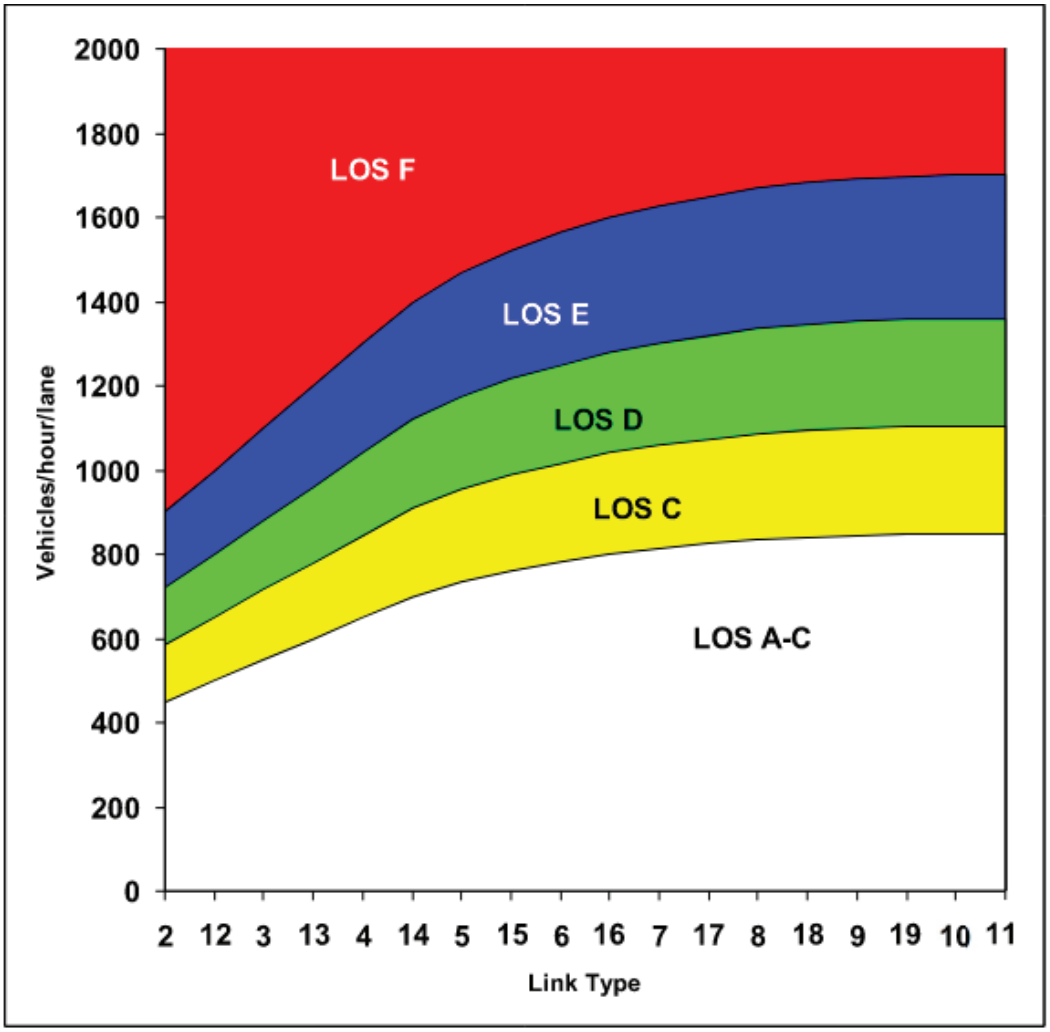
Level of Service

LOS is a subjective measure of the way in which a network is operating, given the traffic demands that are placed on it. It is a concept developed by American engineers and has been generally adopted internationally. As part of the "Queanbeyan-Palerang Timing of Works Analysis 2023" report the LOS criteria was defined as per the below figures with a focus on LOS F, E, D and C with a particular focus on LOS F and E. The same parameters have been adopted for this memorandum.

LOS	AustRoads Description	HCM LOS criteria		
		Link (vehicles per hour)	Intersection (average delay/veh)	
			Priority	Signal/Rotary
LOS F	Forced flow. The amount of traffic approaching a point exceeds that which can pass it. Flow breakdowns occur, and queuing and delays occur.	In excess of **900-1700** depending on link type	50 sec	80 sec
LOS E	Traffic volumes are at or close to *capacity and there is virtually no freedom* to select desired speed and to manoeuvre within the traffic stream. Flow is unstable and *minor disturbances within the traffic stream will cause breakdowns in operation*.	Between **720-1360** depending on link type	35 sec	55 sec
LOS D	Approaching unstable flow where *all drivers are severely restricted* in their freedom to select desired speed and to manoeuvre within the traffic stream. The general level of *comfort and convenience is poor* and small increases in traffic flow will cause operational problems.	Between **585-1105** depending on link type	25 sec	35 sec
LOS C	Stable flow but most drivers *are restricted to some extent* in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of *comfort and convenience has declined noticeably*.	Between **450-850** depending on link type	15 sec	20 sec
LOS B	Stable flow where drivers still *have reasonable freedom* to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is less than LOS A.	Not Applicable	Not Applicable	
LOS A	Free flow in which drivers are *virtually unaffected* by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high and the general level of *comfort and convenience is excellent*.			

NB The LOS for priority intersections is dictated by the delay on the worst approach and the LOS for roundabouts and signalised intersections is calculated based on the weighted average delay across all approaches.

Figure 3-1: Definitions of LOS



Free Flow Speed (km / hr)	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	110

	LINK TYPE																	
LOS BAND (Veh/Lane/Hour	2	12	3	13	4	14	5	15	6	16	7	17	8	18	9	19	10	11
LOS C	450	500	550	600	650	700	734	760	782	760	814	825	835	841	846	849	850	850
LOS D	585	650	715	780	845	910	954	988	1016	988	1058	1073	1085	1093	1100	1104	1105	1105
LOS E	720	800	880	960	1040	1120	1175	1216	1250	1216	1302	1320	1335	1346	1354	1358	1360	1360
LOS F	900	1000	1100	1200	1300	1400	1467	1520	1563	1520	1627	1650	1669	1682	1692	1698	1700	1700

Figure 3-2: LOS Criteria adopted in Queanbeyan-Palerang Timing of Works Analysis 2023 report

2046 Base Model vs Proposed Upgrades – Change of flow

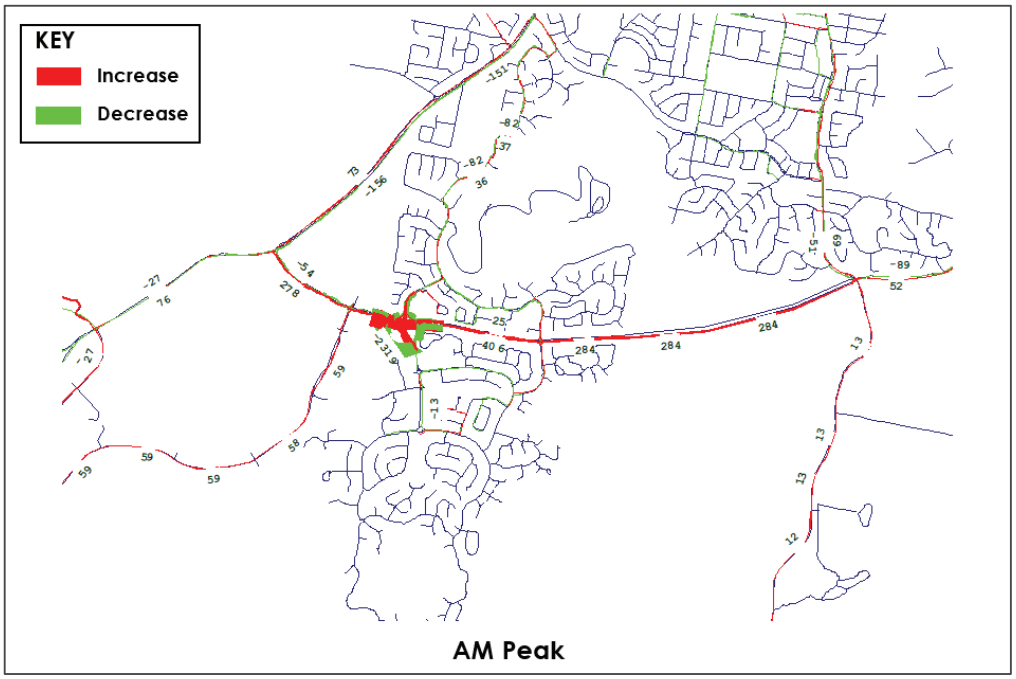


Figure 3-3: Flow changes for AM Peak traffic

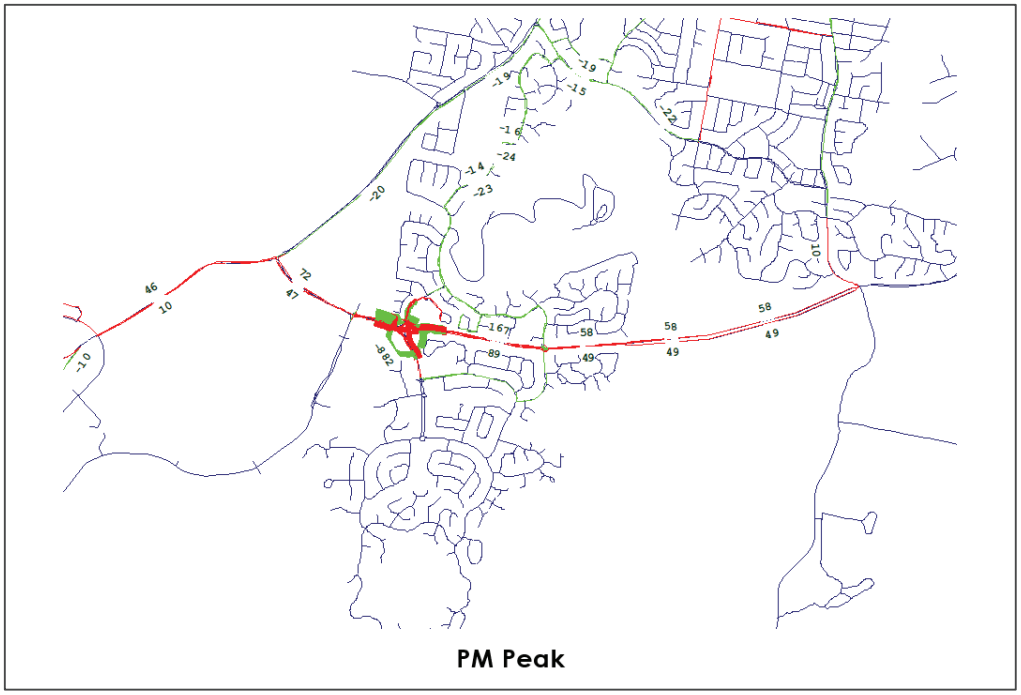


Figure 3-4: Flow Changes for PM peak traffic

Base Model vs Proposed Upgrades – AM Peak Level of Service Change

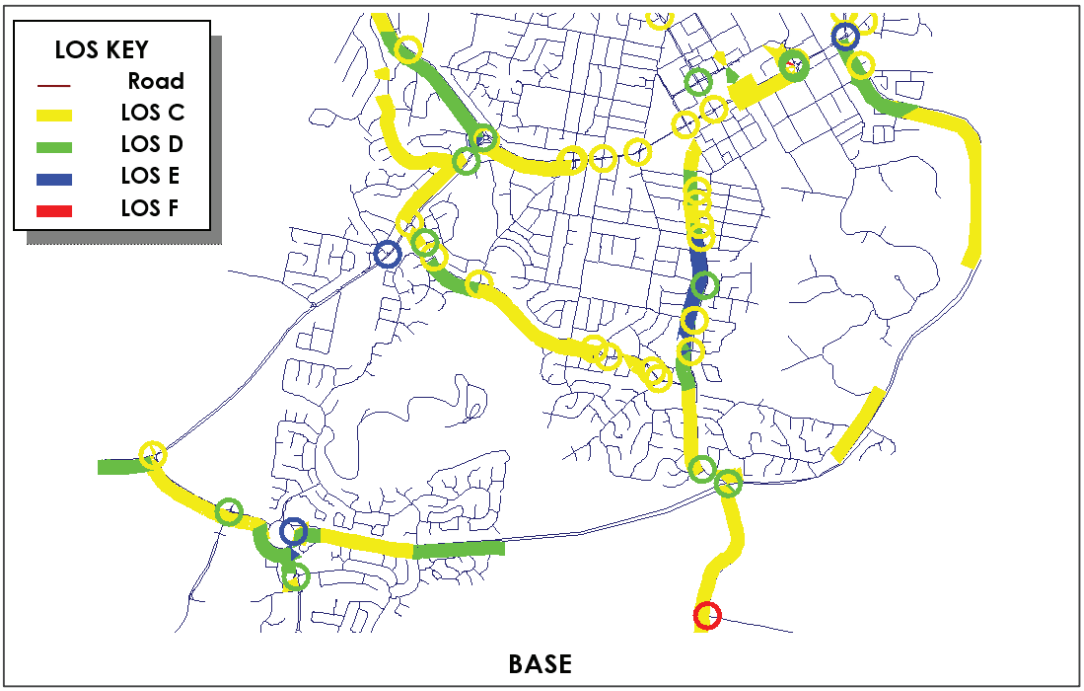


Figure 3-5: Network level of service diagram (base case)

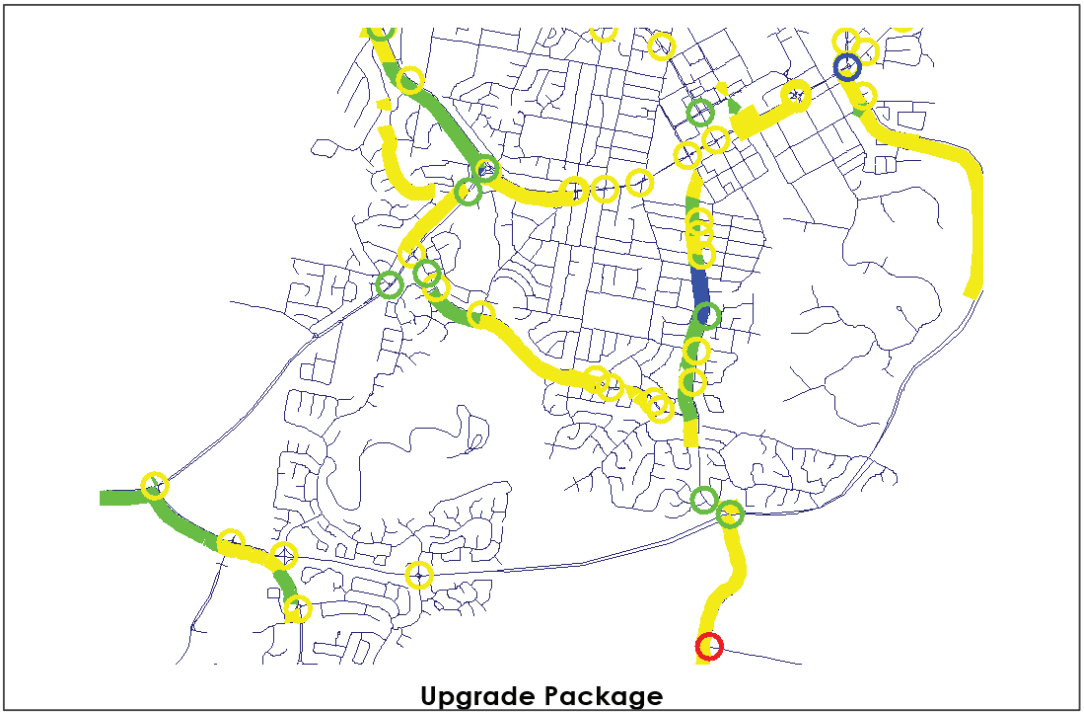


Figure 3-6: Network level of service diagram (with proposed upgrades)

3.2 Road Design

Based on the SIDRA analysis layouts from the TRACKS Model, sketches detailing the geometry of the upgrades proposed at all intersections identified in Section 3.1 were developed to illustrate the layouts identified from the traffic modelling.

The concept design sketches are provided in Appendix A, with brief summaries of the intersection layouts outlined in the following sections.

As part of the traffic modelling, Old Cooma Road has been treated as upgraded to 6 lanes (3 in each direction) and Edwin Land Parkway has been treated as duplicated between Old Cooma Road and Jerrabomberra Circle. The below intersections have been designed in consideration of the additional lanes for the approach and departures as appropriate.

Lanyon Drive / Tompsitt Drive

To cater for future traffic volumes, only minor modifications would be required for the Lanyon Drive leg of the intersection. This would involve an additional straight/through lane for eastbound traffic towards Queanbeyan. (See 30401042-SK-0100).

We have proposed leaving the intersection in its current arrangement, with widening works occurring in the northern verge only to include a 170m long lane on the intersection approach, including development of the new lane. This however will require relocation of several items including streetlights, traffic signals, traffic safety cameras and drainage infrastructure. Additionally, the footpath network and retaining wall in the verge will also need to be modified to suit the new road layout. The additional lane ties into the existing 2-lane arrangement 150m after the intersection.

The design aims to minimise additional pavement works via a horizontal shift back towards the south and the existing dual lane pavement as soon, and safe as possible using the lateral shift limits and desirable horizontal curve geometry under Austroads Guide to Road Design Part 3.

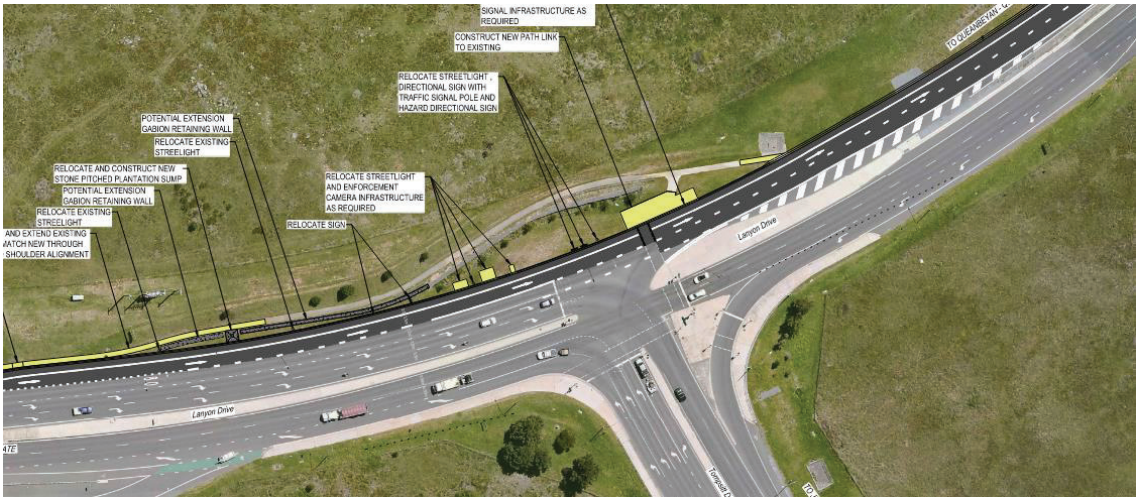


Figure 3-7: Snipped of proposed upgrade

Jerrabomberra Circle

Three options have been identified as potential upgrades for the Jerrabomberra Circle intersection. From the traffic modelling, it is apparent that all the below solutions work in similar effectiveness for network wide improvement, however, offer different advantages and disadvantages for other areas of design.

Westbound Approach Signalisation

From the traffic model, it was shown that providing signals at the intersection of circulating traffic of Jerra Circle and the westbound approach would be the simplest solution to improve traffic flow. This design does not require much additional work beyond installation of the traffic signals and incorporating the Edwin Land Parkway Duplication on approach and additional line marking. Due to the minor changes to the overall layout and character of the Jerra Circle it would maintain a similar feel to the current operation of Jerrabomberra circle.

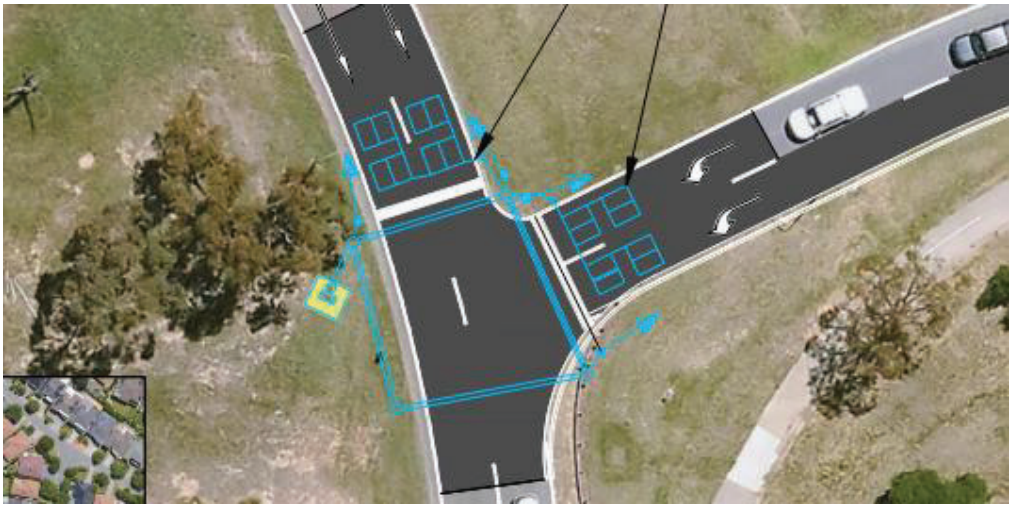


Figure 3-8: Jerra eastern leg (westbound approach)

Under AS1742.10 the existing pedestrian crossing facilities (See

Figure 3-12) are considered suitable with the centre refuge island in the median allowing pedestrians and cyclists to cross only 2-lanes of the same direction at a time. Signage similar to existing can be used. There is an opportunity however for the signalised approach to incorporate a pedestrian crossing. This should be paired with a set of signals on the other eastbound carriageway as a pedestrian activated crossing only.

Full Signalisation

For full signalisation of the intersection to be realised, requires a large amount of new pavement and civil works to be built. Due to the proximity of the existing communications tower, the southern leg of the intersection has been designed to avoid impacts to the existing infrastructure as it is expected to be expensive to modify/relocate.

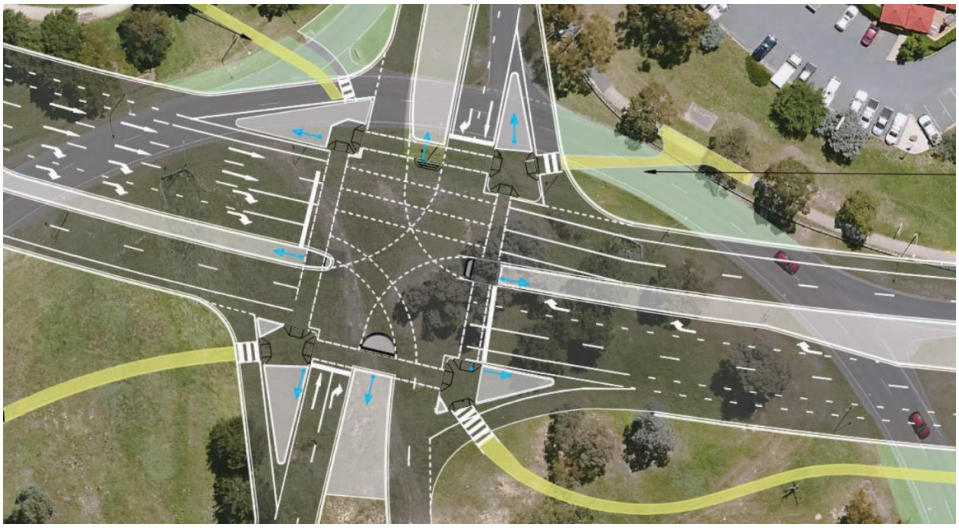


Figure 3-9: Jerra Circle proposed full signalised option

The northern and southern extents have intentionally been designed to reduce to single lanes, bringing drivers back into the local road environment for the shopping centre and residential area in attempt to reduce speed for vehicles. The reduction of all traffic to single lanes is shown in Figure 3-10 and Figure 3-11.

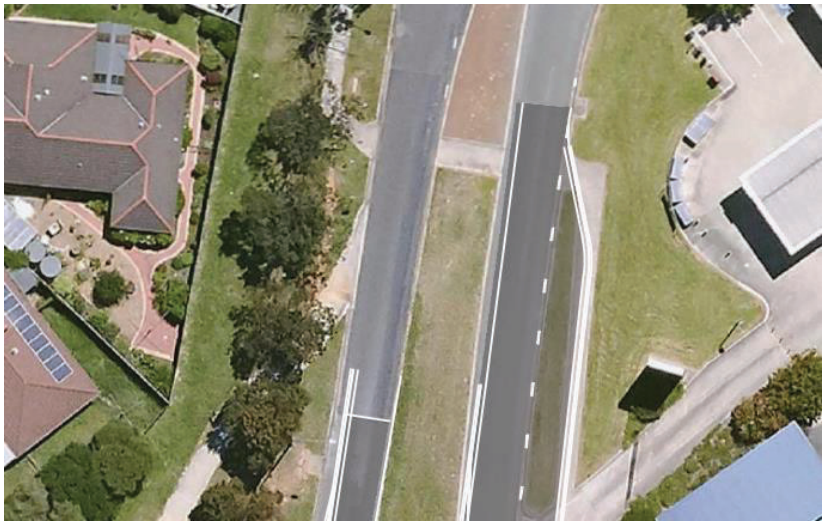


Figure 3-10: Northern tie in (Limestone Dr)



Figure 3-11: Southern tie in (Jerrabomberra Pkwy)

For this intersection, dual right turn lanes are provided for westbound traffic heading towards Jerrabomberra, which is reduced to single lane on the southern approach to Jerrabomberra (Figure 3-11). The intersection will operate with double diamond configurations on the opposing turning movements. This layout is considered marginally favourable for traffic flow as it can be synchronised with the intersections immediately east and west of its location. High angle entry slip lanes are provided for left movements for each approach.

Pedestrian safety for movements in all directions can be improved with controlled crossings provided across all legs of the intersection. Generally this improves the pedestrian network but does relocate the north/south desirable link between the Jerrabomberra shops and Jerrabomberra Parkway closer to the intersection to the west. The indirect path may cause pedestrians to continue using the existing alignment if control measures are not included in the intersection upgrade. The existing route is traced red in figure 3.1 below.



Figure 3-12: Realigned direct north/south active travel route

The residual roundabout pavement south of the intersection also provides an opportunity for a new active travel link as a separate bike path if Council wished to take advantage of this possibility. Otherwise the residual pavement can be removed and landscaped as appropriate.

Overpass

The overpass option investigated assumes that 2 lanes in each direction are provided with on and off ramps for both directions of traffic. The proposed design involves removal of the north western portion of the existing Jerra circle to allow fill to be placed and used for a ramp to a bridging structure over the western portion of Jerra Circle. This was undertaken as a cost-reducing measure by reducing the overall length of the overpass structure and to minimise impacts on the Tompsitt Drive/Environa Drive intersection by raising the carriageway for the approach embankment east of Tompsitt Drive/ Environa Drive intersection. To provide conforming vertical geometry, this requires filling over the western portion of the Jerrabomberra circle.



Figure 3-13: Approximate vertical tie in location

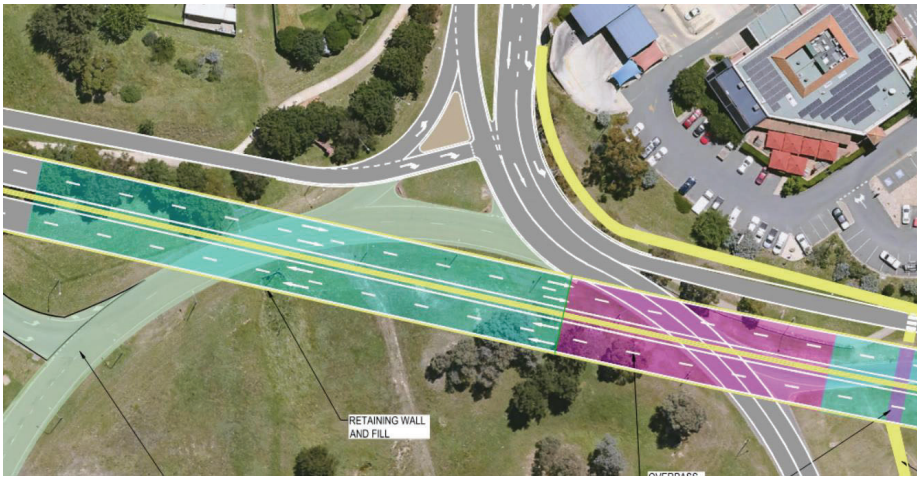


Figure 3-14: Jerra Circle - Overpass

The eastern portion of the existing roundabout is proposed to be a two-way local roads link operating primarily north/south. This two-way road would allow local access to the shopping centre as well as Jerrabomberra and providing connection for the overpass on and off ramps. The northern part of Jerra Circle is shown above as an independent, smaller intersection for all local movements.

Edwin Land Parkway / Stringybark Drive / Numeralia Drive

This intersection is proposed to be upgraded to a 4-way signalised intersection with 2 lanes accounted for in each direction for the Edwin Land Parkway duplication. Both Stringybark Drive and Numeralia Drive require modifications to accommodate the required slip lanes.

Modifications are required for the active travel network around the intersection so formalised, signalised pedestrian crossings are proposed for the eastern and southern legs of the intersection. This provides the best like for like replacement of the existing crossing of Edwin Land Parkway and Numeralia Drive and a safety upgrade required for the duplication. The on-road cycling has been shown to move cyclists off-road through the intersection for westbound cyclists to connect to the shared path adjacent to the housing. On road cycling has been maintained for eastbound cyclists. As a concept design, the final arrangement for on road cycling can be updated for Councils preference.

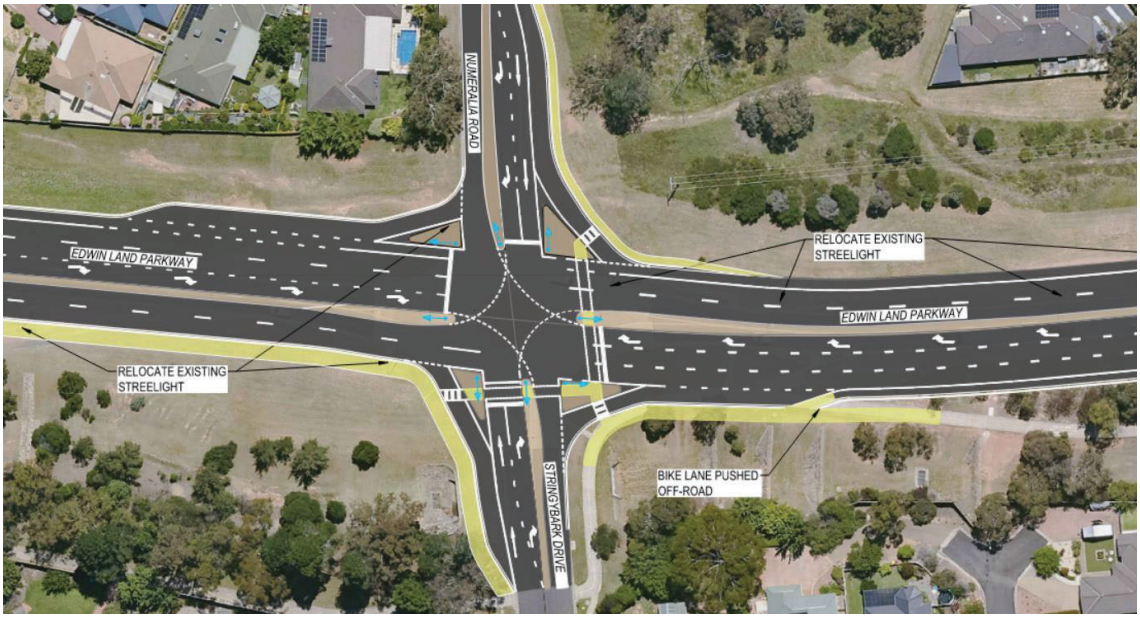


Figure 3-15: ELP, Numeralia and Stringybark proposed upgrade

4 Southern Route

4.1 Traffic Modelling

The modelling analysis of the proposed upgrades for the No Dunns Creek Road – Southern Option involved little change to the previously agreed improvement works as determined in the "Queanbeyan-Palerang Timing of Works Analysis 2023" report. The Old Cooma-Monaro route is relatively lightly trafficked in all future years and therefore is not experiencing poor LOS or large delays at intersections along the route. The only upgrades proposed were to improve the operation of the Old Cooma Rd / Monaro Hwy intersection by replacing the existing Give Way control with either a large single lane roundabout or a large Seagull intersection.

Neither improvement made any difference to vehicle flow along the southern corridor and did not attract any additional traffic off competing routes. Any trips that see an advantage to using this route are already using the route and to increase the flow along this route would require either a significant reduction in travel time or a significant increase in congestion along the northern routes.

4.2 Road Design

The Southern Route only identified upgrades at the Old Cooma Road / Monaro Highway intersection. A Concept intersection layout has been prepared for the intersection. Traffic modelling for the southern No-Dunns Creek Road alignment showed that upgrades to intersections or driveways are not warranted due to traffic volumes anticipated along Old Cooma Road, south of Googong.

Old Cooma Road / Monaro Highway INTERSECTION

A conceptual layout sketch has been prepared to provide an upgraded seagull intersection with an additional allowance for the property access immediately south of the intersection. The upgrade is realised through additional pavement, line marking and kerbing primarily. The upgraded intersection provides separated through lanes and turning entry/exit lanes to improve driver safety. The upgrade also mitigates the crossing of two different directions of high speed, 100km/h traffic.

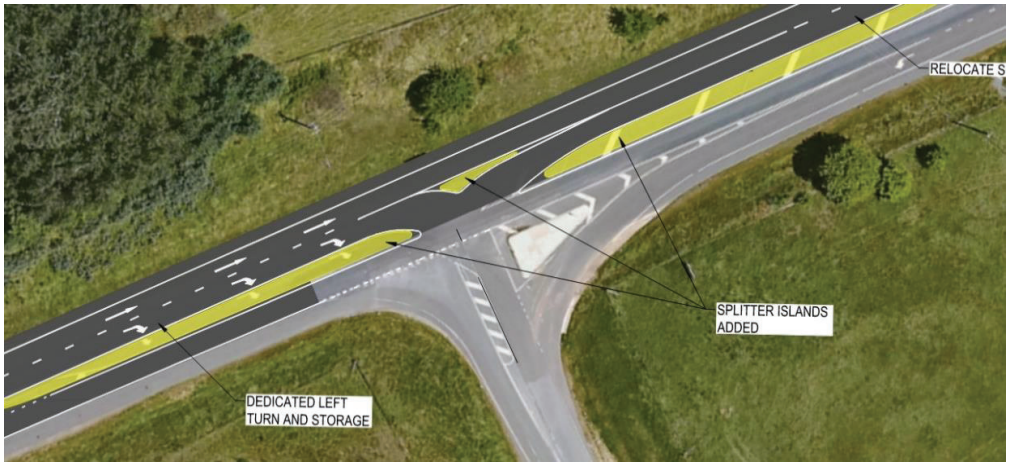


Figure 4-1: Old Cooma Road / Monaro Highway intersection proposed upgrade

Geometry

As part of the assessment for the southern route, a high level horizontal geometry assessment has been undertaken. The assessment has been informed using primarily aerial imagery and Streetview to better understand the Old Cooma Road alignment. If Council was to adopt upgrades for the No-Dunns Creek Road South option, the below non-conformances would be the key items to address for safety concerns. As mentioned in the Traffic Modelling discussion above, improvements to this portion of road does not yield significant benefits for travel times.

Non-compliant horizontal geometry

Using Table 7.6 from Austroads Guide to Road Design part 3, two corners at the southern end of Old Cooma Road were identified to be non-compliant for minimum horizontal radii for a posted speed of 80km/h. The figure below shows the corners to have radii of 119m and 68m which are deemed suitable for a posted speed of ~50km/h and 35km/h respectively (Equation 5).



Figure 4-2: Location of non-conforming horizontal geometry

Driveway and intersection Sight Distance Checks

Preliminary assessments have been undertaken using Table 3.2 from Austroads Guide to Road Design Part 4 -Intersections. Below is a summary of the driveways and intersections which appear to not achieve adequate Safe Intersection Sight Distance (SiSD) values.



Figure 4-3: 1102 Old Cooma Road sight line blocked by crest and trees looking north



Figure 4-4: 1132, 1134, 1136 Old Cooma Road sight line blocked by vertical crest looking south



Figure 4-5: 1290 / 1312 Old Cooma Road sight line potentially blocked by verge vegetation looking south/north respectively



Figure 4-6: 1382, 1384, 1387 Old Cooma Road blocked by vertical crest looking south



Figure 4-7: 1466 Old Cooma Road blocked by vegetation looking south



Figure 4-8: 1735 Old Cooma Road sight line blocked by verge vegetation looking south. Monaro Station potentially also blocked looking north



Figure 4-9: 1800, 1812 Old Cooma Road sight lines blocked looking north and south by vegetation



Figure 4-10: Unmarked property access sight line blocked by vegetation resulting from horizontal geometry

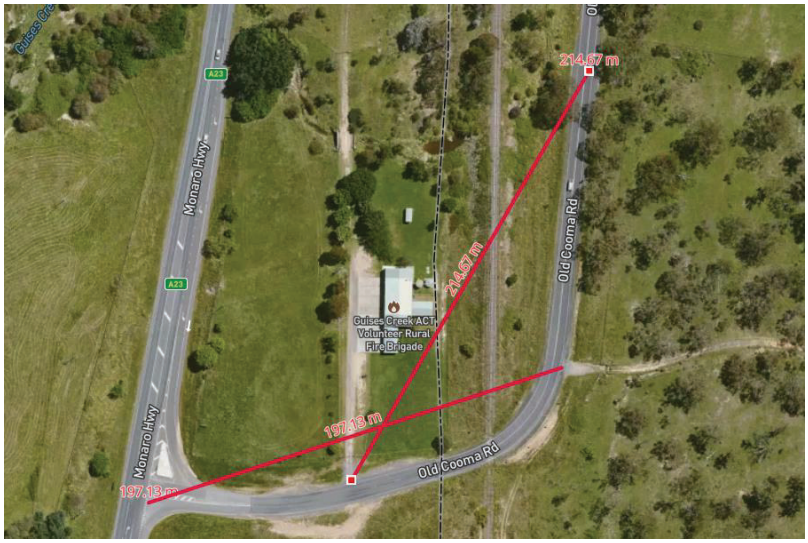


Figure 4-11: Access gate and Fire Brigade access blocked by crest near corner looking north/south

Upgrades could be implemented for both the deficient horizontal curves and sight distance issues for property and side road access points along Old Cooma Road.

Currently the curve deficiencies have been treated with warning and speed advisory signage and appear to generally be working as intended. Upgrades to the road alignment would likely require land acquisition to realign the pavement and increase the curve radii.

Rectifying the sight distance issues will likely require two main actions; Vegetation removal and geometry realignment of small portions of Old Cooma Road. Vegetation removal, within the verge is something that could be undertaken relatively easy by Council, pending any ecological surveys. Similarly vegetation removal in private property could be undertaken with an added complexity of the landowners approving any removal.

Vertical crest correction would be a much larger exercise and likely need detailed design to be undertaken by Council or a consultant. For Old Cooma Road, the issues are around the few larger vertical crests which would need to be lowered or the road either side longitudinally to be raised. Horizontal realignment would also assist in resolving some sight lines, but as with the deficiencies near the fire station, would require land acquisition to be undertaken to be realised.

It is worth noting, that the traffic modelling suggests that upgrading of Old Cooma Road South of Googong does not encourage a large number of additional traffic in the future providing minimal warrant at this stage for upgrades.