



transport planning
traffic engineering
transport modelling

Technical Note: No 1

Date: 30/07/2021

Project No: t21.190

Project: Tonkin Highway Extension Stage 3 Connectivity & Accessibility Study

Subject: Peer Review of Main Roads WA/Arup's report

INTRODUCTION AND BACKGROUND

Main Roads WA is planning to extend Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong. The extension of the Highway includes five connections at Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway and the potential closure of a number of existing intersections and accesses along the extension corridor. The project study area is located within the Shire of Serpentine Jarrahdale (SoSJ).

Arup has undertaken a Connectivity and Accessibility Study on behalf of Main Roads WA to analyse impacts caused by the "Project Case" and the "Ultimate Case" Tonkin Highway Extension to identify and propose solutions to improve accessibility for all transport modes within the project study area.

The SoSJ has commissioned Transcore to provide a technical peer review of the Draft Tonkin Highway Stage 3 Connectivity and Accessibility Study by Arup, with provision of independent traffic advice, particularly where the Tonkin Highway extension affects the Shire's local roads.

This technical note documents the outcome of Transcore's peer review of the Arup's TIA dated 02 July 2021 (DRAFT1). The peer review is undertaken in two parts: The first part includes general comments on the process of the Arup study and the report for developing the connectivity and access strategy on Tonkin Highway extension. The second part addresses the Shire's specific identified concerns with respect to the proposed connectivity and access strategy.

Transcore has provided traffic-engineering services for a number of projects within the Shire including Whitby Local Structure Plan (LSP); Lot 33 Hopkinson Rd, Cardup – LSP and the Glades LSP and as a result has developed a 2031 EMME strategic transport model of the locality. This model includes the Stage 3 extension of Tonkin Highway. As part of this peer review, Transcore has utilised this model as appropriate to investigate Shire's identified concerns.

PART 1: GENERAL PEER REVIEW

The Connectivity and Accessibility Study undertaken by Arup needs to be backed up by appropriate transport modelling and analysis in Macro, meso and micro level to accurately analyse impacts caused by the Project Case and the Ultimate Case Tonkin Highway Extension on regional and local roads and the impacted intersections. The report does not provide any information regarding level of traffic projections on the regional and local roads for the Project Case and the Ultimate Case, particularly does not report on and undertake assessments of the traffic pattern impact of the proposals.

The proposed Tonkin Highway extension will change the existing traffic pattern on some of the local roads (within the study area identified in Arup report) and would result in the need for major upgrades on some local roads. The Arup study does not establish the traffic impact and the level of upgrades required on local roads to accommodate the additional traffic which will be redistributed to the local roads as a result of the proposed extension and road closures.

The Arup report states that the extension of Tonkin Highway south of Thomas Road considered two stages, an intermediate Project Case and a final Ultimate Case. Even though, the number of lanes on Tonkin Highway and layout and control of the main Tonkin Highway connections has been defined in the report, there is no indication of timing for these two stages. The report states that *“The project case design consists of 2 lanes in each direction from Thomas Road to South Western Highway. Current planning for the project case proposes at-grade intersection treatments at Thomas Road, Orton Road, Mundijong Road and South Western Highway, and interchange treatment (grade separated) at Bishop Road. This has been confirmed by the Main Roads Steering Committee at the meeting on 28th May 2021”*.

Considering that the timing for ultimate case has not been defined in the Arup report satisfactory operation of Tonkin Highway (as 2 lanes in each direction) and the proposed at grade intersections during the interim stage is a critical issue that should be investigated and addressed.

It therefore is recommended that traffic operation of the Tonkin Highway and the proposed at grade intersections during the interim stage should be investigated and assessed through traffic modelling and analysis to ensure satisfactory traffic operation for the interim stage and establishing the timing for each at grade intersection along Tonkin Highway. This should be an important hold point in the project before it proceeds any further. Further, the outcome of these investigations and assessment should be subject to further stakeholder consultation.

PART 2: SHIRE'S SPECIFIC CONCERNS

ABERNETHY ROAD CONNECTION WITH TONKIN HIGHWAY

Abernethy Road currently intersects Hopkinson Road as a four-way at-grade priority-controlled intersection. The Tonkin Highway Extension will sever the east-west connectivity resulting in Tonkin Highway bridging over Abernethy Road with no connection to Abernethy Road which does not facilitate turning movements at this location.

The Shire has concern regarding the Abernethy Road connectivity to Tonkin Highway *“that Abernethy Road not having an interchange with Tonkin Highway will cause rat running along Karden Boulevard and Briggs Road, impacting schools (along Karden) and the trotting complex (along Briggs)”*.

Select link analysis undertaken by Transcore for Thomas Road immediately east of Tonkin Highway (using 2031 EMME model) indicates that some traffic from the existing and proposed developments to the south and east of Abernethy Road would utilise Karden Boulevard to access Tonkin Highway at Thomas Road intersection/interchange. It is therefore recommended that appropriate transport modelling and analysis should be undertaken to establish the level of “rat run” along Karden Boulevard and Briggs Road and investigate if the current standard of these roads would be able to accommodate the additional future “rat run” traffic. The impact of the potential “rat run” traffic on these roads needs will need to be assessed and investigated.

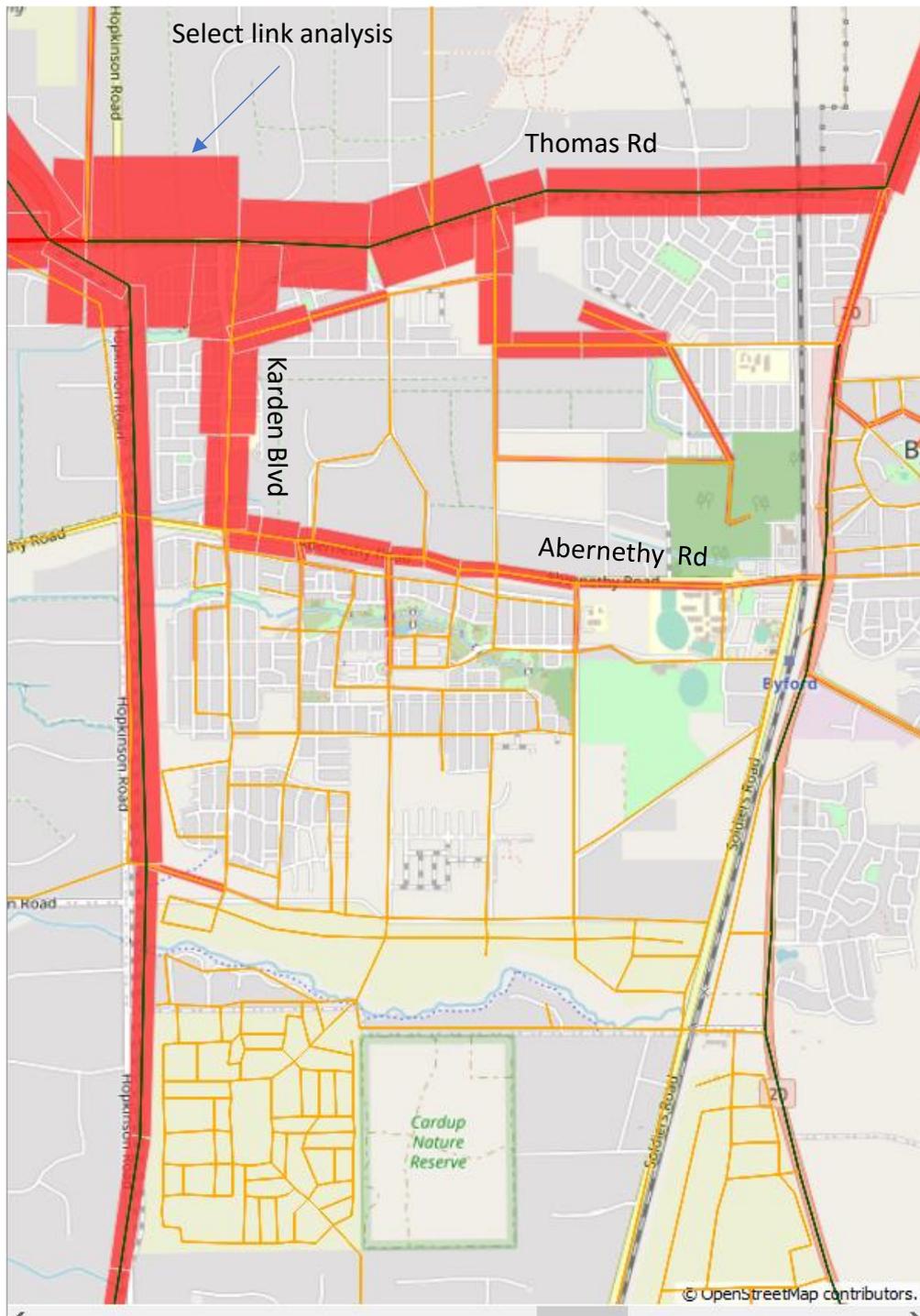


Figure 1: Select link analysis for Thomas Road immediately east of Tonkin Highway

INTERSECTION OF THOMAS ROAD/ TONKIN HIGHWAY DURING PROJECT CASE

The Arup report indicates that ultimately Thomas Road/ Tonkin Highway would operate as a full interchange however, due to funding constraints at the Project Case stage, additional optioneering for at grade solutions at the interchange locations was undertaken. The Shire is concerned with the operation of the proposed at grade intersection during the Project Case *“that Thomas Road and Tonkin Highway can only safely operate through a grade separated interchange, and that any attempt to*

retain a staggered right hand turn traffic signal at grade is both unsafe, short term and inoperable”

Review of the existing traffic counts on Thomas Road and Tonkin Highway at this locality indicates that both of these roads currently carry more than 20,000vpd. With the Project Case the traffic volumes are expected to increase significantly and therefore, it is a valid concern by the Shire that an at grade intersection at this location may not operate satisfactorily and safely during the Project Case. This concern is magnified by the fact that timing for the Ultimate Case has not been defined in Arup report, and therefore it is not clear for how long the at grade intersection would operate be operating. It should also be noted that Tonkin Highway and Thomas Road (west of Tonkin Highway) have been defined as strategic freight routes and would accommodate significant volumes of large heavy vehicles which would adversely impact the traffic operation of the proposed at grade intersection at this location.

It is therefore recommended that traffic operation of the Tonkin Highway/ Thomas Road at grade intersection should be assessed to ensure satisfactory traffic operation during the course of interim stage and to establish the timing for upgrading to an interchange. It is likely that the result of the assessment would indicate that the intersection should be built to interchange standard from the outset or at least the operation of the at grade intersection can only continue satisfactorily for a relatively short period.

ORTON ROAD UPGRADES

Orton Road is currently a rural road and constructed with a 3.0 to 3.5m wide sealed carriageway with unsealed shoulders on both sides (refer **Figure 2**).



Figure 2: Existing standard of Orton Road at proximity to Hopkinson Road (source: near map April 2021)

It is expected that the traffic projections on Orton Road would increase at the outset of the Project Case and continue to grow after the Ultimate Case. The Byford District Structure Plan (refer **Appendix A**) shows Orton Road as a “District Distributor” road which is equivalent of “Integrator B” road (with 30m reserve) as per Liveable Neighbourhood Guidelines. The Byford District Structure Plan also shows that Orton Road would continue eastward to connect to South Western Highway with a railway crossing west of the South Western Highway.

The Shire has raised a concern *“that the Orton Rd interchange design needs to recognise that Orton Road currently comprises a 3-metre-wide bitumen seal east and west of its interchange with Tonkin. This needs to be upgraded to a proper Integrator B (30m) road connecting at-grade across the rail through to South Western Highway”*.

It is therefore recommended that the level of upgrades and appropriate standard of Orton Road should be investigated at the Project Case and Ultimate Case (depending on traffic projections) and the upgrades should be implemented as part of the Project to ensure it can provide a safe and practical connection to Tonkin Highway. It is anticipated that Main Road WA would upgrade Orton Road immediately to the east and west of the Tonkin Highway as part of the Tonkin Highway extension project, however the extent and nature of these upgrades will need to be established.

ADDITIONAL RAILWAY CROSSING ON ORTON ROAD

According to the Byford District Structure Plan Thomas Road and Orton Road are identified as primary east-west connectors between Tonkin Highway and South Western Highway. A new railway crossing is proposed for the potential future extension of Orton Road to South Western Highway. Accordingly, the Shire has raised a concern *“that to offset an additional crossing of Orton Road across the rail to South Western Highway, the existing Cardup Siding Road crossing could be closed”*.

It is important that the proposed connectivity and access strategy undertaken by Arup take into account the objective of the Byford District Structure Plan for Orton Road as a primary east-west connector between Tonkin Highway and South Western Highway. The level of upgrades on Orton Road and the layout and control of the Orton Road connection to Tonkin Highway should accommodate the traffic projections on Orton Road as a primary east-west connector.

It is also understood that the closure of Cardup Siding Road at Tonkin Highway extension as suggested in Arup report would reduce the attractiveness of Cardup Siding Road as an east-west connection between Hopkinson Road and Soldiers Road and therefore, the existing railway crossing at Cardup Siding Road can be closed if needs be to control the number railway crossings in this locality. It is recommended that the Shire should liaise discussions with PTA and Main Roads WA on this matter.

CARDUP SIDING ROAD CLOSURE

Cardup Siding Road is classified as an Access Road. It is rural in nature and is constructed with a 6.2m to 7.0m wide sealed carriageway with 0.5-1.0m shoulders on both sides. Cardup Siding Road forms a basic priority-controlled T-intersection with Hopkinson Road. It entails a railway crossing with warning lights before connecting to South Western highway at a basic priority-controlled T-intersection. According to the Shire's advice, this road carried about 1,339vpd at the western end and about 2,563vpd at the eastern end in December 2020.

Arup's Study recommends closure of Cardup Siding Road at the connection to the future Tonkin Highway extension. The Shire has raised a concern that *"Cardup Siding Road turning in to an effective 2-kilometre long cul de sac is very unsafe, and should be considered for an underpass to connect to the residual leg of Hopkinson Road."*

The closure of Cardup Siding Road with the future extension of Orton Road to South Western Highway (in line with the objective of Byford District Structure Plan) would not undermine safety and traffic operations of Cardup Siding Road. The Byford District Structure Plan also shows no connection to Tonkin Highway at Cardup Siding Road.

PROPOSAL TO CUL DE SAC JERSEY ROAD

The extension of Tonkin Highway would result in closure of Jersey Road at Hopkinson Road therefore the Shire is concerned that *"the proposal to cul de sac Jersey Road and lose its connection to Hopkinson Rd creates a similar cul de sac and bushfire emergency risk"*.

Arup report investigated three accessibility options to support evacuation from the Jersey Road residential catchment, as shown in **Figure 3**. **Option 1** maintains the existing gated access from the north-west of Holstein Court connecting to Thomas Road which requires extension of Holstein Court through a private land. **Option 2** is the extension of Algeri Link to the south (which require land acquisition) then extending east into Hopkinson Road. This option entails land acquisition. **Option 3** is the extension of Jersey Road to the east tying into Hopkinson Road to the south. This option provides a better connectivity for the residential catchment with no land impact at Project Case. The land impact for Ultimate Case should be investigated. Arup report indicates that ultimately this option will likely require land acquisition of Lots 42 and 43.

Considering the issues related to all three Options it is recommended that the evacuation from the Jersey Road residential catchment should be further investigated and resolved. Option 3 provides better connectivity with potentially less land impact and therefore, feasibility and confirmation of this Option would need to be further investigated as part of the proposed Tonkin Highway extension.



Figure 3: Jersey Road evacuation options (Source: Arup)

DEVIATION OF HOPKINSON ROAD TO KARDEN BOULEVARD

In order to ensure access is maintained for residents on Hopkinson Road north of Thomas Road and to maintain Hopkinson Road connectivity, Arup report suggests to realign Hopkinson Road (as per **Figure 4**) to the east which would tie into the

proposed roundabout intersection of Thomas Road/ Karden Boulevard as a fourth leg on the roundabout.

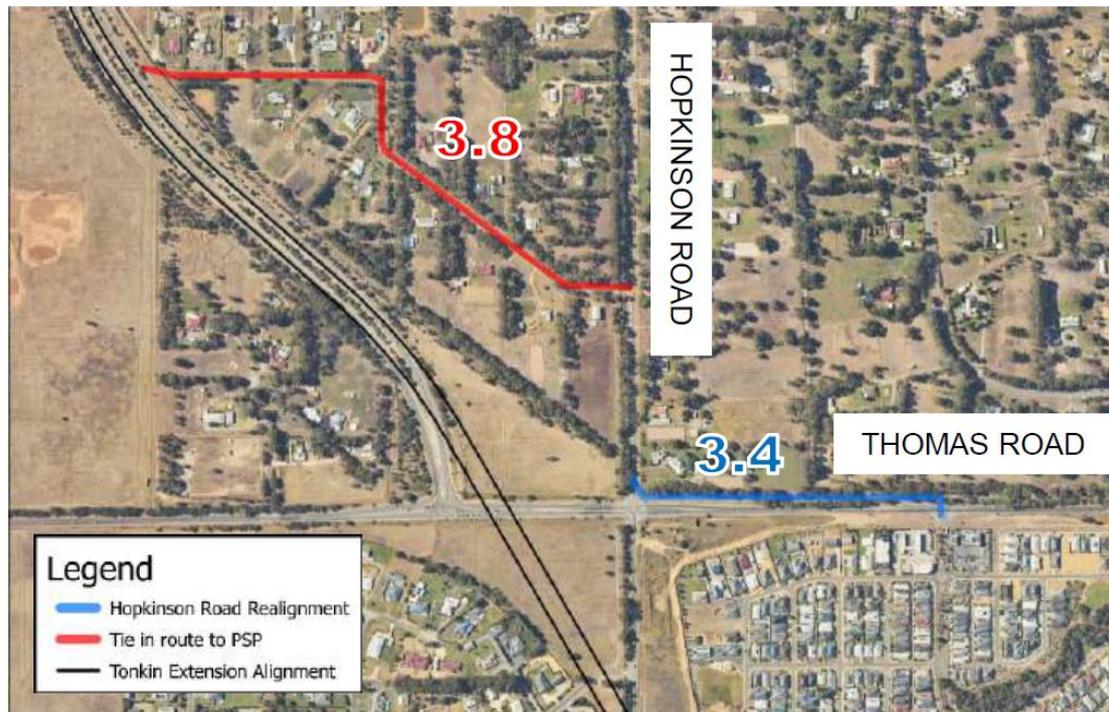


Figure 4: Hopkinson Road connectivity (Source: Arup)

Thomas Road in this vicinity currently is a single carriageway road carrying over 20,000vpd which is due for upgrade to dual carriageway standard. The projected traffic volumes on Thomas Road would increase after duplication and is likely to continue to grow with the Tonkin Highway extension project. The Shire is concerned that *“the deviation of Hopkinson Road to create a new roundabout intersection with Karden Boulevard is unclear in respect of whether it will function given the strong east west traffic flow bias”*.

It is important that traffic operation of the proposed roundabout intersection at Karden Boulevard/ Thomas Road/ Hopkinson Road realignment is investigated to ensure satisfactory traffic operations during the Project Case and Ultimate Case. Further the feasibility of Hopkinson Road realignment should be investigated as it would require land accusation from existing Lots to the north of Thomas Road.

LAMPITER ROAD CONNECTION TO MUNDIJONG ROAD

The existing access from Lampiter Road residential catchment is to the north on Mundijong Road. According to Arup’s report at the Project Case, there is no changes to the network, however at Ultimate Case *“Subject to the preferred alignment of the freight rail and spacing requirements of Mundijong Road interchange, there may be opportunity to maintain the existing access to the north at Lampiter Road.”*

The Shire requires *“protection of the Lampiter Road connection to Mundijong Road as part of the Ultimate Case for Tonkin Highway”*.

The preferred freight rail alignment is located on the western side of Dairy Lane which is the secondary vehicle access out of Lampiter Road residential catchment. Once the freight rail is constructed, the Dairy Lane connection to the west will be lost and therefore Lampiter Road will be the primary evacuation route for the Lampiter Road residential catchment area. AS a result, it is important to keep Lampiter Road connectivity to Mundijong Road not only at Project Case but also at Ultimate Case.

Feasibility of a secondary evacuation route from Ironguard Road should also be investigated as part of the proposed Tonkin Highway extension to ensure sufficient evacuation routes are available for the Lampiter Road residential catchment.

BISHOP ROAD UPGRADES

Bishop Road is currently a rural road and constructed with a 5.0 to 7.0m wide sealed carriageway along its entire length with combination of sealed and unsealed shoulders on both sides (refer **Figure 2**).



Figure 5: Existing standard of Bishop Road (source: near map June 2021)

It is expected that the traffic projections on Bishop Road would increase at the outset of the Project and continue to grow after the Ultimate Case. According to Arup's report the opening year treatment of Bishop Road interchange is consistent with the ultimate design. Therefore, a grade separated interchange is proposed at Bishop Road at the opening year.

The Shire has raised a concern *“That the Bishop Rd interchange design needs to recognise that Bishop Road currently comprises a 5 metre wide bitumen seal east and west of its interchange with Tonkin Highway. This needs to be upgraded to a proper Integrator B (30m) road connecting at-grade across the rail through to South Western Highway”*.

It is therefore recommended that the level of upgrades and appropriate standard of Bishop Road should be investigated and established through traffic modelling and analysis for the Project Case and Ultimate Case. Any required upgrades should be implemented as part of the Project to ensure it can provide a safe and practical connection to Tonkin Highway. It is expected that Main Road WA would upgrade

Bishop Road immediately to the east and west of the Tonkin Highway as part of the Project, however the extent and nature of these upgrades would need to be established.

CONCLUSIONS AND RECOMENDATIONS

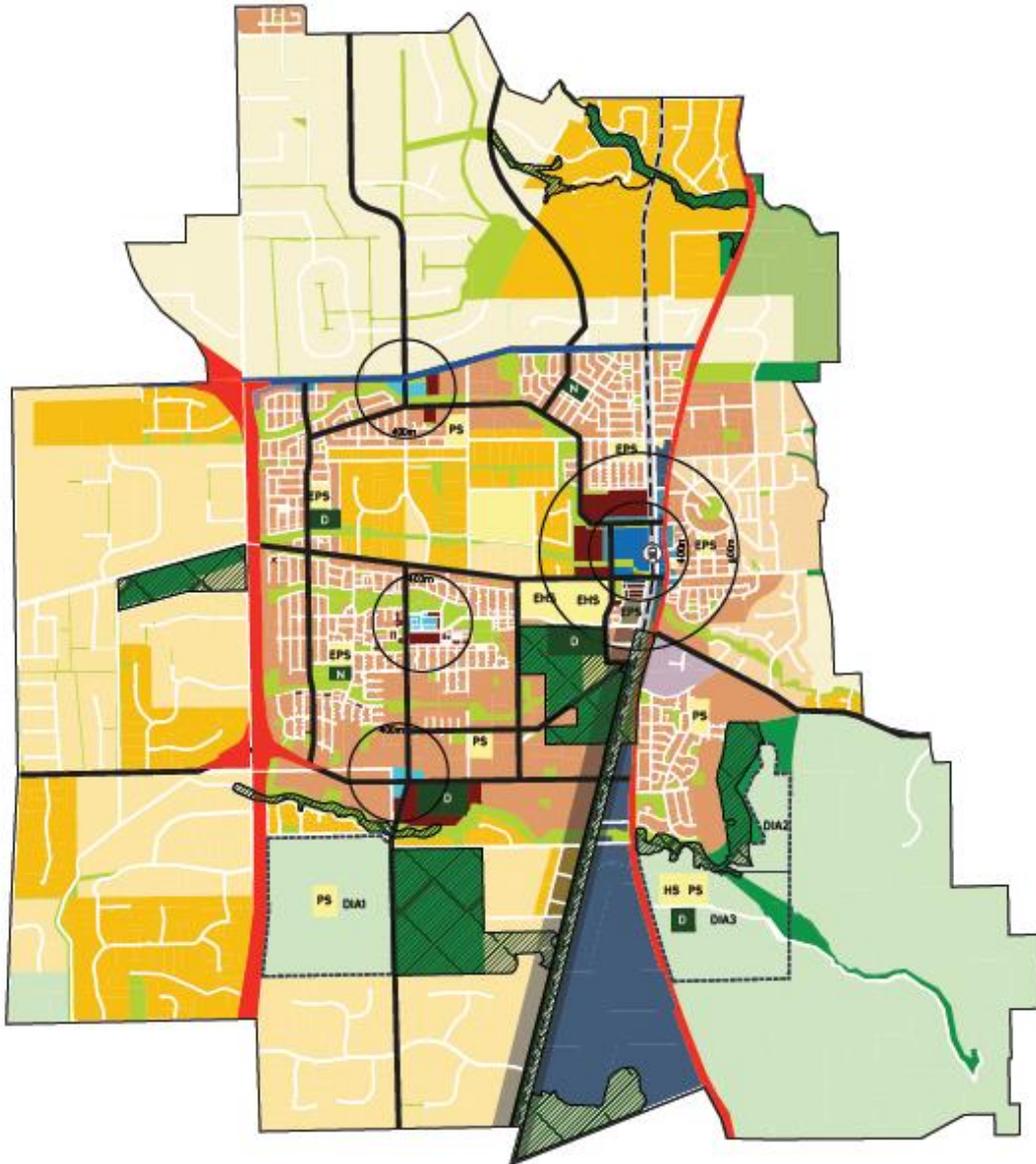
The Arup's Connectivity and Accessibility Study undertaken on behalf of Main Roads WA for the "Project Case" and the "Ultimate Case" Tonkin Highway Extension, does not include any traffic modelling, projections and analysis to test the recommendations of the report and to assess their impacts on the local community and local road network.

This technical note has identified some of the specific traffic modelling and analysis which are required before the project progresses any further. This technical note has also provided commentary on some of the specific issues identified by the Shire which are associated with the Project.

Traffic and modelling and assessment is a critical stage of the Project and should be undertaken by Main Roads WA to assess the recommendations of Arup's report and to address the issues identified by Shire. The outcome of the traffic modelling and analysis should be subject of another stakeholder consultation process before the Project progress any further.

Appendix A

Byford District Structure Plan



Byford District Structure Plan | Name: Final/Amend/Review/Cancel | Date: Public/Development/Investigation/Other | Scale: 1:20,000 | Project Number: 2225 | Drawing Number: 010 | Date: 16/08/2021 | Hames Sharley

LEGEND

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|--|-----------------------------|--------------------------------------|
| — BYFORD DSP BOUNDARY | ■ MEDIUM - HIGH: R40-100 | ■ RAILWAY RESERVE |
| ■ DISTRICT CENTRE | ■ LOW (SUBURBAN): R20-35 | ■ HIGH FREQUENCY TRANSIT CORRIDOR |
| ■ NEIGHBOURHOOD CENTRE | ■ LOW (TRANSITIONAL): R2-10 | --- PASSENGER RAIL LINE |
| ■ MIXED USE | ■ SPECIAL RESIDENTIAL | ⊙ RAIL STATION |
| ■ COMMUNITY AND PUBLIC PURPOSE | ■ RR-1 | --- DIA BOUNDARY |
| ■ LIGHT INDUSTRIAL | ■ RR-2 | ■ DIA DEVELOPMENT INVESTIGATION AREA |
| ■ SERVICE COMMERCIAL | ■ RURAL SMALL HOLDINGS | ■ EHS EXISTING HIGH SCHOOL |
| ■ BUSH FOREVER | ■ RURAL | ■ EPS EXISTING PRIMARY SCHOOL |
| ■ DISTRICT/ NEIGHBOURHOOD OPEN SPACE | ■ PRIMARY DISTRIBUTOR | ■ HS HIGH SCHOOL |
| ■ RESERVE | ■ SECONDARY DISTRIBUTOR | ■ PS PRIMARY SCHOOL |
| ■ MULTIPLE USE CORRIDOR/LOCAL OPEN SPACE | ■ DISTRICT DISTRIBUTOR | ■ D DISTRICT OPEN SPACE |
| | | ■ N NEIGHBOURHOOD OPEN SPACE |