Australian Government

mainroads
WESTERN AUSTRALIA

Tonkin Highway Extension
Stage 3
Thomas Road to South Western Highway

Connectivity and Accessibility Study

Document Control

This document has the following amendment history:

Version	Date	Author	Amendment
DRAFT 1	02/07/2021	JH, SL, DB, BR, TS	First Draft
DRAFT 2	18/10/2021	SL, BH, BR, TS	Second Draft
DRAFT 3	07/11/2022	DB	Preliminary final issue incorporating post-workshop changes
FINAL_Rev1	17/05/2023	DB, BH, AI, AP	Final issue following Main Roads Planning Branch comments
FINAL_Rev2	28/06/2023	BH, JH	Final issue following close-out comments
FINAL_Rev3	13/07/2023	BH, JH, BR	Final issue
FINAL_Rev4	16/02/2024	JH, RS	Final issue following final output of Emergency Egress Review – Addendum
FINAL_Rev5	012/03/2024	JH, RS	Final issue following Main Roads stakeholder review

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Executive summary

The *Tonkin Highway Extension Stage 3 (Tonkin Extension)* has long been identified as a future project to create a high standard north-south transport link and improve freight efficiencies in Perth's Eastern corridor. With the implementation of the project, connectivity and accessibility is expected to be impacted. Impacts to the movement network are expected in the form of:

- Modifications to local access roads and regional distributors adjacent to the project
- Impediments to existing desire lines to key destinations
- Modifications to recreational and equestrian trails.

The purpose of the Connectivity and Accessibility Study is to identify measures or interventions for the Tonkin Highway Extension project that will meet the project objectives outlined below.

Objectives

Objective 1: Provide reasonable connectivity to key local and regional destinations, with the aim of minimising travel time impacts.

Objective 2: Provide safe, convenient access for active transport users and to minimise interface points with vehicular traffic.

Objective 3: Provide connectivity at strategic points to support regular recreational and equine activity.

Phase 1: Kick-off meeting

Phase 2: Accessibility assessment (Do Minimum)

Phase 3: Fatal Flaw analysis (Long List)

Refer Appendix A

Phase 4: MCA (Short List)

Refer Appendix B

Phase 5: Accessibility Analysis (Pref Opt.)

Refer Appendix C and D

Phase 6: Reporting

To meet these objectives for the project, a six phase approach was undertaken to assess the existing context, establish the baseline (do nothing) scenario, develop options and then agree on the final options to be recommended for implementation on the project – these phases are outlined in the figure left.

Throughout the development of the study, a total of four workshops were held across the project phases with stakeholders from Main Roads (incl. Metropolitan Asset Management), Department of Transport, the Shire of Serpentine Jarrahdale and Department of Fire and Emergency Services (DFES). These workshops were held to generate, assess and agree the options for the study.

A long list of connectivity options by location was generated, and then filtered to short listed options based on a fatal flaw analysis discussed further within Section 6.

Using a multi-criteria assessment and accessibility modelling, a final 28 options were selected as recommendations for the Tonkin Extension design. These recommendations are to either be incorporated into the Tonkin Extension project case design or ultimate case design – this is summarised in the table (right), with further commentary in Section 8 of this report.

Due to separation of projects during the develop phase, preferred options associated with the Mundijong Freight Rail Realignment, shown as red options in the summary table (right), have since been withdrawn following the formal long list and short list process for the analysis. These preferred options will be addressed separately from this analysis.

Refer Section 8 for Preferred Option Details Option #	Incorporate into Tonkin Extension Project Case design	Incorporate into Tonkin Extension Ultimate Case design	Incorporate into Thomas Road Duplication design	Incorporate into Mundijong Freight Rail Realignment design
1.4**	✓	✓	✓	
2.2	✓	✓		
3.8	✓	✓		
3.9	✓	✓	✓	
4.7*	✓	✓		
5.1**	✓	✓		
5.9**	✓	✓		
6.2	✓	✓		
6.3**	✓	✓		
7.3	✓	✓		
7.5*	✓	✓		
8.2		✓		
8.7*		✓		
9.2**	✓	✓		
9.4*	✓	✓		
10.2	✓	✓		
10.3**	✓	✓		
11.2	✓	✓		
11.3	✓	✓		
*12.1***				✓
13.2	✓	✓		
14.4	✓	✓		
14.5		✓		
*15.1***				✓
15.4*	✓	✓		
*16.4***				✓
17.5	✓	✓		
18.2	✓	✓		
19.1**	✓	✓		
20.1	✓	✓		
21.1****	✓	✓		

* Options developed/ revised at Main Roads Stakeholder Meeting 6th August 2021
** Option further modified/refined following Tonkin Highway Extension design development in November 2022
*** Options to be addressed within Mundijong Freight Rail Realignment project
**** Option preferred following Emergency Egress – Addendum 1st February 2024

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Abbreviations

BTC	Byford Town Centre
DFES	Department of Fire and Emergency Services
DoT	Department of Transport
DPLH	Department of Planning, Lands and Heritage
DSP	District Structure Plan
GIS	Geographic Information System
LGA	Local Government Area
LPS	Local Planning Strategy
LSP	Local Structure Plan
Main Roads	Main Roads Western Australia
MCA	Multi-Criteria Analysis
PSP	Principal Shared Path
PTA	Public Transport Authority
RAV	Restricted Access Vehicle
SA2	Statistical Area Level 2
SoSJ	Shire of Serpentine-Jarrahdale

1 Introduction

Main Roads WA is planning to extend Tonkin Highway (H017) from Thomas Road (H038) in Oakford to South Western Highway (H009) in Mundijong. The extension of the highway includes 5 major intersections at Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway along with modifications to the transport network adjacent to the corridor. The project area is entirely located within the Shire of Serpentine Jarrahdale (SoSJ) LGA.

In addition to the above works, consideration has also been made for the extension of Tonkin Highway further south of Mundijong Road, as well as the proposed Mundijong Freight Rail Realignment (Freight Rail Realignment).

The extension of Tonkin Highway south of Thomas Road and associated changes in access and connectivity are the focus of this report, which currently considers two stages, an intermediate project case and a final ultimate case, as defined below:

- 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 Orton Road, Mundijong Road and South Western Highway, and interchange treatments (grade separated) at Thomas Road and Bishop Road. Grade-separated flyovers are additionally proposed over Abernethy Road, Line 13 (Kwinana South Western) Railway, Wright Road/Line 2 (Perth to Bunbury) Railway, and Shanley Road.
- The ultimate case consists of 3 lanes in each direction between Thomas Road and Mundijong Road, and 2 lanes in each direction between Mundijong Road and South Western Highway. In the ultimate case all intersections will be grade separated.

Arup have been engaged to undertake a Connectivity and Accessibility Study to analyse impacts caused by the Project Case and Ultimate Case Tonkin Highway Extension. This review aims to identify and propose solutions where connectivity and access adjacent to the project area are impacted.

This Connectivity and Accessibility Study will build on, and be informed by, the completed Tonkin Highway Extension Ultimate Case and Project Case Multi-Criteria Analysis' (MCAs).

1.1 Purpose of study

The Tonkin Highway Extension has long been identified as a future project to create a high standard north-south transport link and improve freight efficiencies in Perth's Eastern corridor. With the implementation of the project, connectivity and accessibility is expected to be impacted for residents and visitors accessing both local and regional destinations. Changes in network connectivity to local access roads and regional/local distributors, as well as accessibility changes to recreational and equestrian trails are expected.

The purpose of the Connectivity and Accessibility Study is to identify measures or interventions that will meet the project objectives (refer Executive Summary) in line with the desired outcomes (right).

The project is advised to deliver the following:

- Provide a minimum of one primary access, and a secondary bushfire access, where connectivity to a catchment is severed as a result of the primary works.
- Provide east-west active transport facilities and equine facilities at discrete positions along the Tonkin Extension alignment. This includes localised active transport connections to the Tonkin Highway PSP as defined by the WA Long Term Cycle Network.
- Provide alternative driveway access where a property driveway is severed as a result of the primary works.

The project is not required to deliver the following:

- Upgrades to major side roads beyond the Tonkin Highway Extension primary works project extents.
- Upgrades to active transport facilities and equine infrastructure beyond the Tonkin Highway Extension primary works project extents.
- Active transport connections to the Tonkin Highway PSP not defined within the WA Long Term Cycle Network.
- Connectivity and access considerations related to the Mundijong Freight Rail Realignment Planning Study. These access provisions will be accounted for during Mundijong Freight Rail Realignment project delivery. Preferred options from Locations 12, 15 and 16 within the analysis have since been requested to be withdrawn following the formal long list and short list process documented with Appendix A and Appendix E.

Outcomes

- A rigorous assessment of connectivity and accessibility impacts, options for improvement and recommended treatments for vehicle, pedestrian, cyclist and equestrian movements relevant to the Tonkin Highway Extension Stage 3 project; utilising geospatial analysis, fatal flaw assessments and multi-criteria analysis.
- An agreed list of access solutions to be recommended for further investigation.
- Robust engagement with relevant Main Roads personnel and other stakeholders throughout the development of the analysis to ensure strong buy-in, and agreement on how connectivity and accessibility will be addressed for the project.
- Analysis and reporting that can be presented to the public in engagement sessions to demonstrate that a thorough and considered analysis has been conducted for the connectivity and accessibility outcomes for all modes of transport, and how the decisions and solutions were determined.

1.2 Study area

The study area, as shown in Figure 1, is bordered by South Western Highway to the east and interfaces with Mundijong Road at its southern tie-in extents. The area comprises district centres in Byford and Mundijong and emerging residential expansion/ investigation area in Cardup.

The wider Local Government Area (LGA) of Shire of Serpentine-Jarrahdale (SoSJ) was home to just over 32,000 people as recorded by the 2021 census (ABS, 2021). Based on the same data, the population of the Byford Statistical Area Level 2 (SA2) was just over 11,000 people, with an additional 7,400 people living within the Mundijong SA2.

Servicing the residents of the study area are a number of community facilities and destinations such as employment centres, schools, retail centres, emergency services, equestrian centres and recreational centres/ trails. The study will focus around the local areas adjacent to the proposed extension, while considering connections to key destinations, and wider linkages to regional employment hubs and activity centres.

It is noted that the Tonkin Highway Extension project boundary does not interface with existing public transport infrastructure or proposed bus routes; this is rather associated with the interfacing Thomas Road Duplication project.

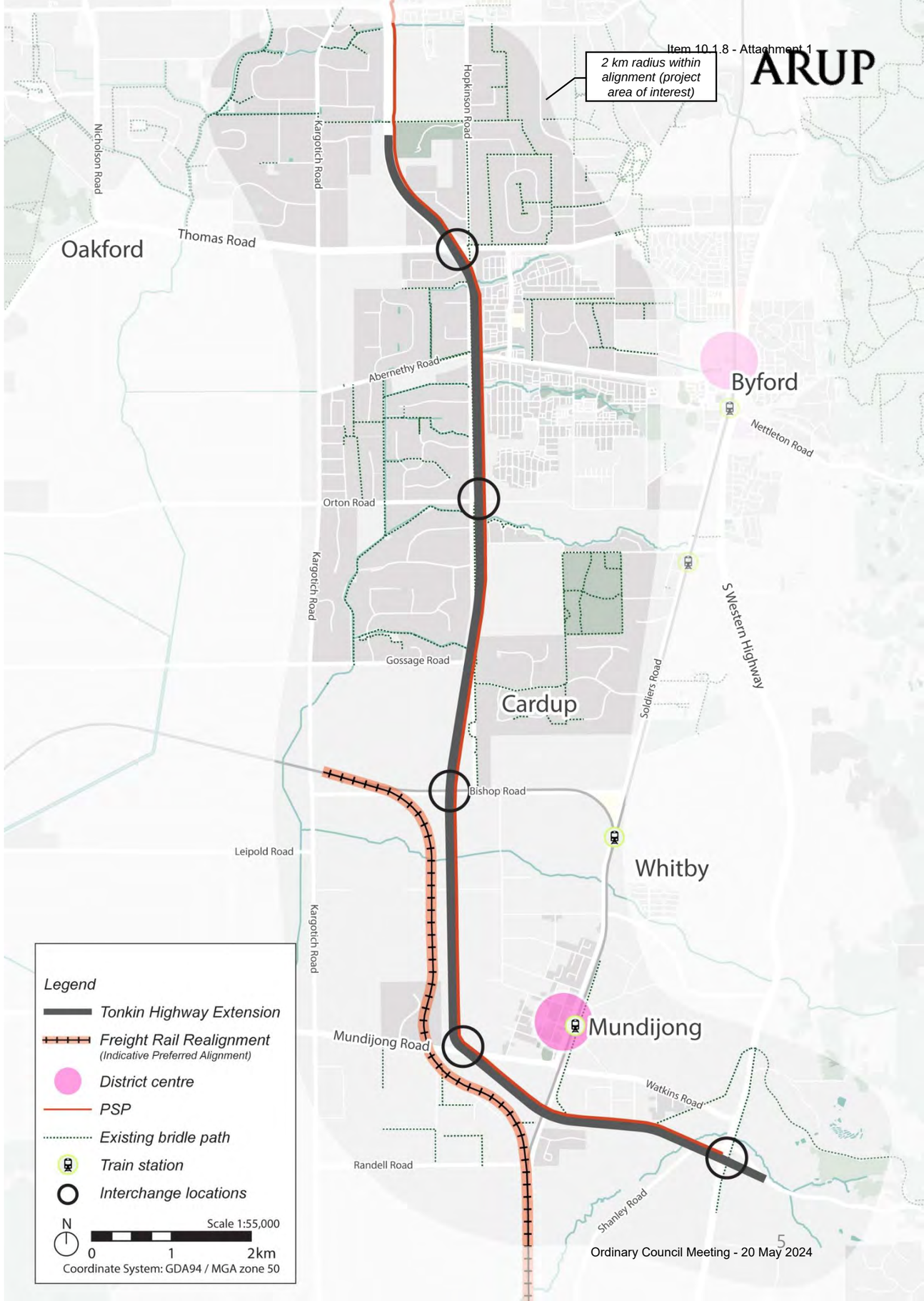


Figure 1
Study area

2 Project approach

2.1 Methodology

The methodology utilised in undertaking this study is outlined in Figure 2 below.

Phase 1: Kick-off meeting

Initial kick-off meeting with Main Roads project team to:

- Agree scope and request additional data
- Agree guiding principles to build the Long List fatal flaw assessment
- Agree Short List MCA criteria.

Phase 2: Accessibility assessment (Do Minimum)

- Review background documents to identify future land use and committed network access
- Confirm key origins and destinations
- Undertake accessibility analysis (travel isochrones from key origins/ destinations)
- Identify impacts related to the two assessment scenarios
- Identify opportunities and constraints

Phase 3: Fatal Flaw analysis (Long List)

- Develop Long List of potential solutions
- Undertake initial 'fatal flaw' assessment of Long List, to confirm progression to 'short list' based on its alignment with the agreed guiding principles
- Meet with representatives from Key Stakeholder bodies to run through fatal flaw assessment of long list options and confirm short list of solutions through engagement with key stakeholders.

Phase 4: MCA (Short List)

- Draft MCA of Short List options based on reduced criteria agreed in phase 1
- Hold a one-hour meeting with Key Stakeholders to confirm a recommended option from the MCA outputs.

Phase 5: Accessibility Analysis (Pref Opt.)

- Undertake accessibility study of the recommended option by analysing existing and future travel times and catchment isochrones from key origins and destinations
- Hold a workshop with Key Stakeholders to present and discuss findings of the accessibility study.

Phase 6: Reporting

- Prepare and issue Draft Connectivity and Accessibility Study Report to Key Stakeholders for review
- Undertake required updates and issue Connectivity and Accessibility Study Report to Main Roads.

Figure 2 △

Methodology

3 Background documents and stakeholder engagement

3.1 Background documents

A review of strategic and local planning documents, policy and plans was conducted to ensure the study outcomes were consistent with this context. An overview of the relevant sections from local planning documents are provided in this section. The strategies and policies reviewed include:

- The Shire of Serpentine-Jarrahdale (SoSJ) Local Planning Strategy (LPS)
- Byford District Structure Plan (DSP)
- Mundijong DSP
- SoSJ Walking and Cycling Plan
- SoSJ Equine Strategy
- SoSJ Horse Trails Maps for Tonkin Highway Extension.
- Department of Transport (DoT) Long Term Cycling Network Plan

It is also noted that the Tonkin Highway Extension project boundary does not interface with existing public transport infrastructure or proposed bus routes; this is rather associated with the interfacing Thomas Road Duplication project.

3.1.1 SoSJ Local Planning Strategy

The Shire of Serpentine-Jarrahdale Local Planning Strategy (LPS) was prepared in 2019 and provides a coordinated strategic planning framework to summarise the long-term vision and guidance for future growth and development of the Shire's Local Government boundary. The strategy identifies issues, constraints and objectives for the future development of the shire, with a key focus on the settlements of Byford, Mundijong, Serpentine and Jarrahdale, in facilitating an expected population of approximately 68,000 people in 2036 and 110,000 people in 2050.

This would translate into an additional 42,000 people over the next 15 years and an additional 84,000 people over the next 29 years.

The proposed Tonkin Highway extension traverses the northern section of the LPS area, intersecting the Oakford/ Oldbury areas on the west and the Byford/ Mundijong areas on the east before connecting with South Western Highway at Jarrahdale Road. The extension is highlighted by the LPS as an encouraged improvement to the existing transport network in the area, minimising the impact of freight on urban areas and sensitive land uses while also improving regional connections for residents to major employment opportunities and activity centres.

While the LPS is a strategy viewing the area holistically (focusing largely on regional issues and constraints between settlements), improving the amenity and efficiency of short trips by public transport and active transport is an objective identified in this strategy.

3.1.2 Byford District Structure Plan

The Byford DSP was prepared in 2018 to replace the original 2009 DSP and provides high-level strategic guidance on future planning and development in the locality of Byford. The DSP considers a number of LSPs that provide more detailed guidance on planning within local areas. The proposed Tonkin Highway Extension traverses the DSP area between the landholdings of Oakford and Byford, intersecting the western portion of Cardup.

The plan proposes an outlook for future development in facilitating the growth intended by the Shire's long-term growth targets of approximately 50,000 people by 2050 in Byford. Proposed development highlighted by the plan, concentrates activity and density within and around the Byford Town Centre (BTC) to R40-100 within the immediate town centre, including an additional increase in area of the centre. This is shown by the situation of all existing LSPs within the suburb of Byford, on the east of Hopkinson Road and the proposed Tonkin Highway extension. Identified LSP's are also situated on the eastern portion of the DSP area, in relation to the alignment of the Tonkin Highway extension.

While the extension of the Tonkin Highway is expected to release the concentration of heavy vehicles within the BTC, connections from Oakford and the western portion of Cardup will be greatly impacted. In line with the South Metropolitan Peel Sub-Regional Framework, the DSP recommends upgrades to the future regional road network, including upgrading the hierarchy of east-west route Abernethy Road to a local distributor on the west of the extension.

This is however the only improvement to capacity for all transport modes on the west of the extension, increasing the risk of isolating these largely residential and equine areas from the BTC and existing equestrian and trotting areas.

For the purpose of this accessibility study, proposed development guidance of the Byford DSP will be considered with a focus on recommending improved access for residents on the west of the extension in providing access for the various transport modes to major destinations.

3.1.3 Mundijong DSP

The Mundijong DSP was prepared in 2018 to replace the original 2011 DSP following the release of the South Metropolitan and Peel Sub-Regional Framework, and provides high-level strategic guidance on future planning and development in the locality of Mundijong. The DSP considers a number of LSPs that provide more detailed guidance on planning and development within existing and future local areas. The proposed Tonkin Highway Extension severs the landholding of Mundijong between Bishop Road and Mundijong Road just east of Adams Street, while also intersects part of Mardella, modifying access to a northern section, north of Lampiter Drive, from the south.

The plan proposes an outlook for future development in facilitating the growth intended by the Shire's long-term growth targets of approximately 50,000 people by 2050 in Mundijong. Proposed development highlighted by the plan, concentrates density of up to R40-100 around the area's two district centres in Mundijong and Whitby, with further density surrounding two neighbourhood centres. In addition, a development framework for the Mundijong Industrial Area situated on the west of the Tonkin Highway extension reserve between Bishop Road and Mundijong Road is included in the plan.

The proposed Mundijong Industrial Area is set to leverage off the extension of the Tonkin Highway by providing direct access to a considerable range of destinations regionally. The plan also recognises the challenge of implementing access improvements and amenity buffers on the western edge of the Mundijong landholding while also investigating the impacts of the future Freight Rail Realignment.

3.1.4 SoSJ Walking and Cycling Plan

The Shire of Serpentine-Jarrahdale's Walking and Cycling Plan was prepared in 2020 and provides an aspirational interim and long-term active transport network for the LGA with an attached implementation program for individual projects. The Plan was developed in alignment with the DoT's Perth & Peel Long-Term Cycle Network Plan and suggests generally the same recommendations.

The key objectives of the plan were to:

- Complete key missing links
- Avoid duplication of infrastructure
- Allow works by others to contribute to the development of the network
- Focus on local improvements close to major trip attractors and generators (i.e. schools, town centres, employment hubs and key tourism/ activity nodes).

Routes have been recommended comprising three categories: primary, secondary and local; distinguishing the type of investment and giving an indication of the amenity provided. Primary routes have been recommended adjacent to major distributors, secondary routes between urban centres and local routes have been given a recreational and short commute focus between community facilities, shops and residential areas.

Primary routes have been recommended along the north-south distributor of Soldiers Road, with another primary route along the Tonkin Highway extension connecting with the existing PSP which currently terminates at Thomas Road. Secondary routes have been recommended along the east-west distributors of Thomas Road, Orton Road, Gossage Road and Mundijong Road, all intersecting with the Tonkin Highway extension. Local routes have been recommended along numerous links within the area, intersecting with the Tonkin Highway extension at Abernethy Road, Orton Road, Learmouth Turn and Karbro Drive, with a number of routes on yet to be constructed links.

As summarised, a number of walking and cycling routes have been recommended in the plan that intersect with the proposed Tonkin Highway extension, including four secondary routes. This study will consider the locations identified in the plan, and make recommendations regarding potential progression of links as part of the project works.

3.1.5 SoSJ Equine Strategy

The Shire of Serpentine-Jarrahdale's Equine Strategy was prepared in 2018 and seeks to both highlight the rich and diverse equine culture felt throughout the region and ensure continued support and development of the sector into the future. At the time of writing, the strategy found that the Shire had 3,876 registered horses and an additional estimated 4,499 unregistered horses. As part of the strategy, a community survey was undertaken asking respondents to indicate their horse riding patterns, including ownership, stabling location, most frequently used trail networks and ride distance. Of the responses, only 14% of residents didn't own a horse, with 47% of residents owning 3 or more horses, and 27% owning 2. Of those who owned a horse, 80% kept it on their property within the Shire, which suggests that most rides originate from numerous unique locations within the study area and not from pinpoint locations.

Trail, recreational and cross country riding on horse trails was indicated as the most popular involvement in equine disciplines over the 12 months prior to the strategy, with 62% and 54% of respondents indicating they undertook this kind of activity respectively. Up to 49% of people indicated they were involved in activities that required equestrian centres such as dressage, show jumping and horse clubs.

In supporting the sector, the Shire has a comprehensive trail network totalling more than 150km, which attracts both residents of the immediate LGA and from regional locations. The trail network is split at Bishop Road into a northern and southern hub. The three most popular networks included the Darling Downs Trail Network, Jarrahdale Trails and Oakford Trails Network (North), with 57% of riders preferring a ride that is over 6km in distance. For the purpose of this study, the strategy suggests that the origin of rides is specific to residential addresses, and not only from stables.

3.1.6 Long Term Cycle Network

The Department of Transport's (DoT) Long Term Cycling Network (LTCN) is a plan of key planned cycling routes defined by the Western Australian Cycling Network Hierarchy. The hierarchy is arranged by route function and defines the types of activities that are anticipated to occur on those routes.

In December 2020, DoT prepared a LTCN for the Byford-Mundijong area comprising numerous strategic primary, secondary and local routes, as illustrated in Figure 3.

As shown, the strategic cycling vision for the area includes the extension of the Tonkin Highway PSP through to Watkins Road in Byford, including the provision of a PSP heading southbound down the Byford Rail Extension. A number of secondary routes are also included providing east-west connectivity along Thomas Road, Orton Road, Gossage Road and Mundijong Road.

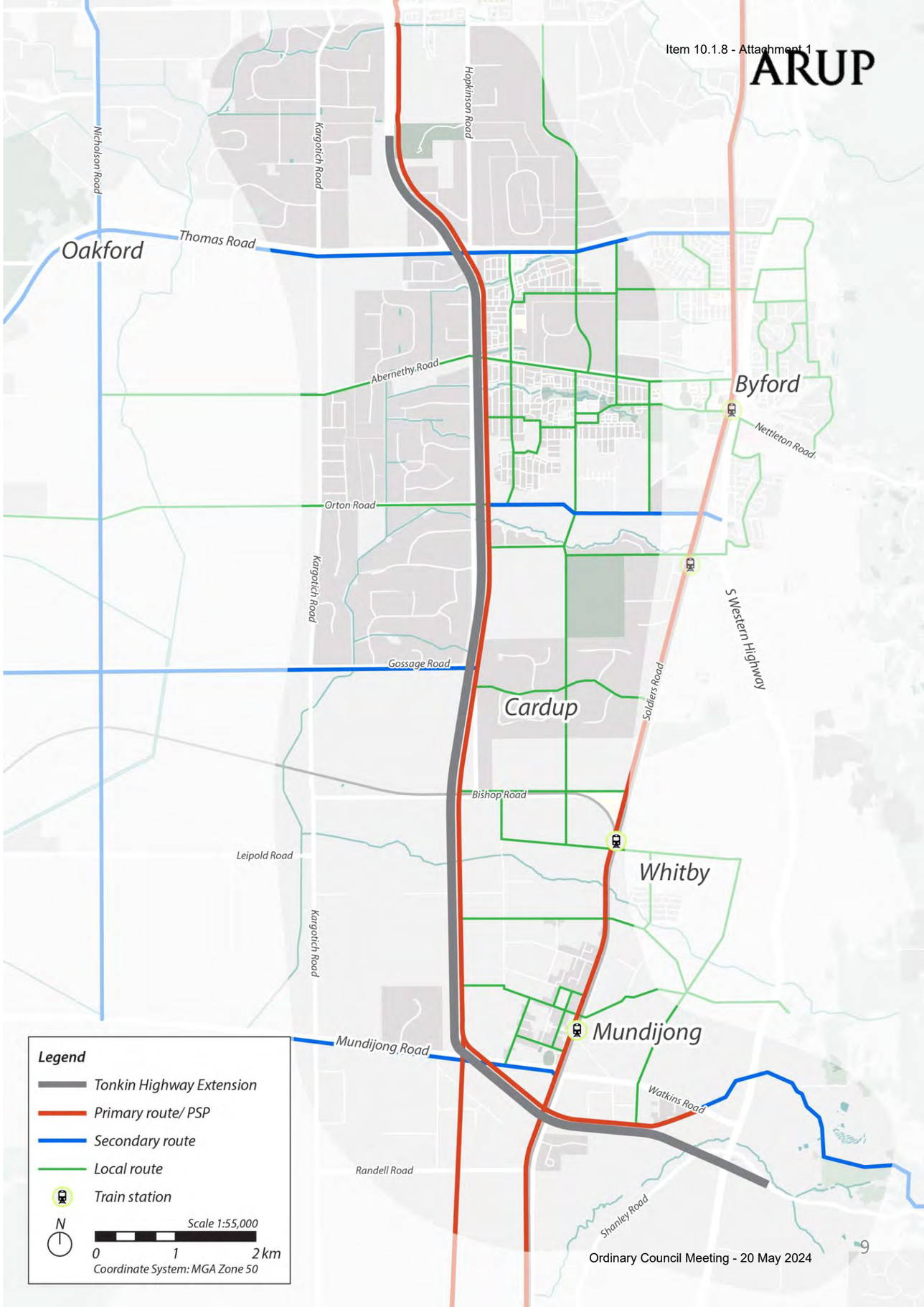


Figure 3

LTCN for the Byford-Mundijong area (DoT, 2020)

3.1.7 SoSJ Horse Trails Maps for Tonkin Highway Extension

In February 2020, SoSJ provided maps of existing and potential future horse trails to Main Roads to be considered as part of the Tonkin Highway Extension design and associated studies. It is the intention of this study to consider each of these proposed horse trails and assess them alongside additional solutions.

A map of the existing and potential future horse trails is provided in Figure 4 (adjacent). Key recommendations to note include proposed horse trails interfacing with the extension at:

West of Tonkin Hwy alignment only

- Charolais Court
- Orton Road
- South of Cavanagh Close
- North of Gossage Road
- Scott Road.

West and east of Tonkin Hwy alignment

- Abernethy Road
- North of Leaver Road along waterway
- North of Lang Road along waterway
- Mundijong Road
- Wright Road.

East of Tonkin Hwy alignment only

- Continuation of existing trail north of Stockmans Close
- Continuation of existing trail north of Bullock Drive
- Karbro Drive
- Between extension and Cardup Nature Reserve
- Bilya Road.

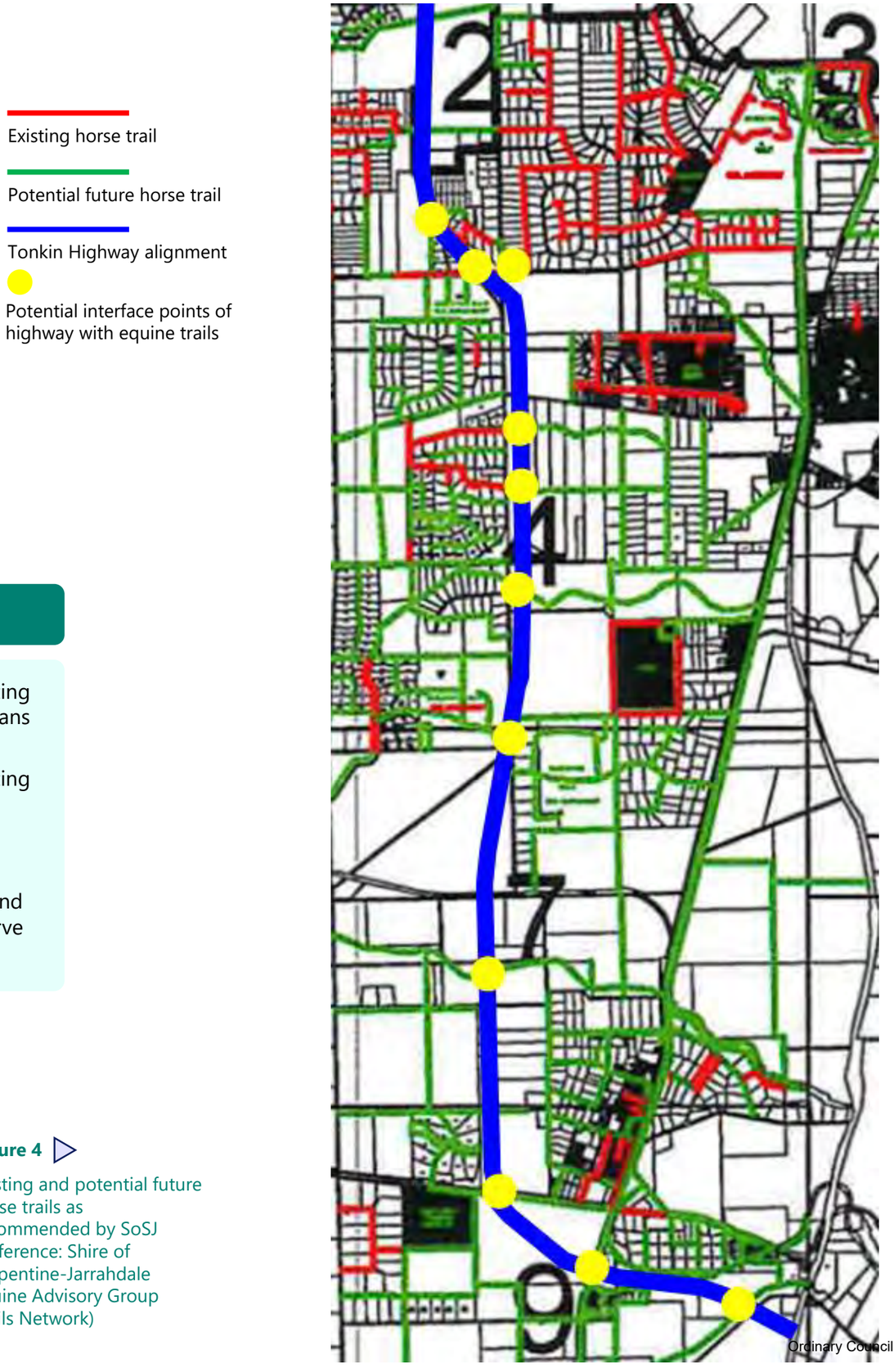


Figure 4

Existing and potential future horse trails as recommended by SoSJ (Reference: Shire of Serpentine-Jarrahdale Equine Advisory Group Trails Network)

3.2 Key opportunities and limitations

This section summarises limitations and opportunities that may influence possible solutions for the project and the extent of their impact.

Figure 5 (adjacent) identifies land use trends to feed into the guiding principles of the project. These land use trends were also assessed in relation to their key impacts on future accessibility improvements for residents and visitors.

Key east-west desire lines are illustrated in Figure 13, later within this report.

3.2.1 Key opportunities

Given high growth and density projections for the study area, particularly within Byford and Mundijong town centres, key opportunities relate to providing connectivity to centres, community facilities and residential areas where possible. The following key opportunities have been identified:

- Significant urban development planning has been undertaken in Byford and Mundijong, including the introduction of new district centres. The presence of a number of LSPs abutting the proposed extension will increase the likelihood of residents being located in proximity to a diverse range of facilities
- Potential to integrate with existing and proposed planning undertaken by the Shire, allowing solutions to be scored based on their potential to improve the wider network

3.2.2 Key limitations

The key limitations to future connectivity above all is the Tonkin Highway Extension and Mundijong Freight Rail Realignment (now separated from the Tonkin Hwy Extension project). The following constraints have been identified:

- Given vehicle height constraints (nominally 10 m x 10 m High Wide Loads) along the majority of the extension, crossings for all modes will best be achieved through an underpass of Tonkin Highway
- Between interchanges, at-grade crossings are restricted for active transport and equine users

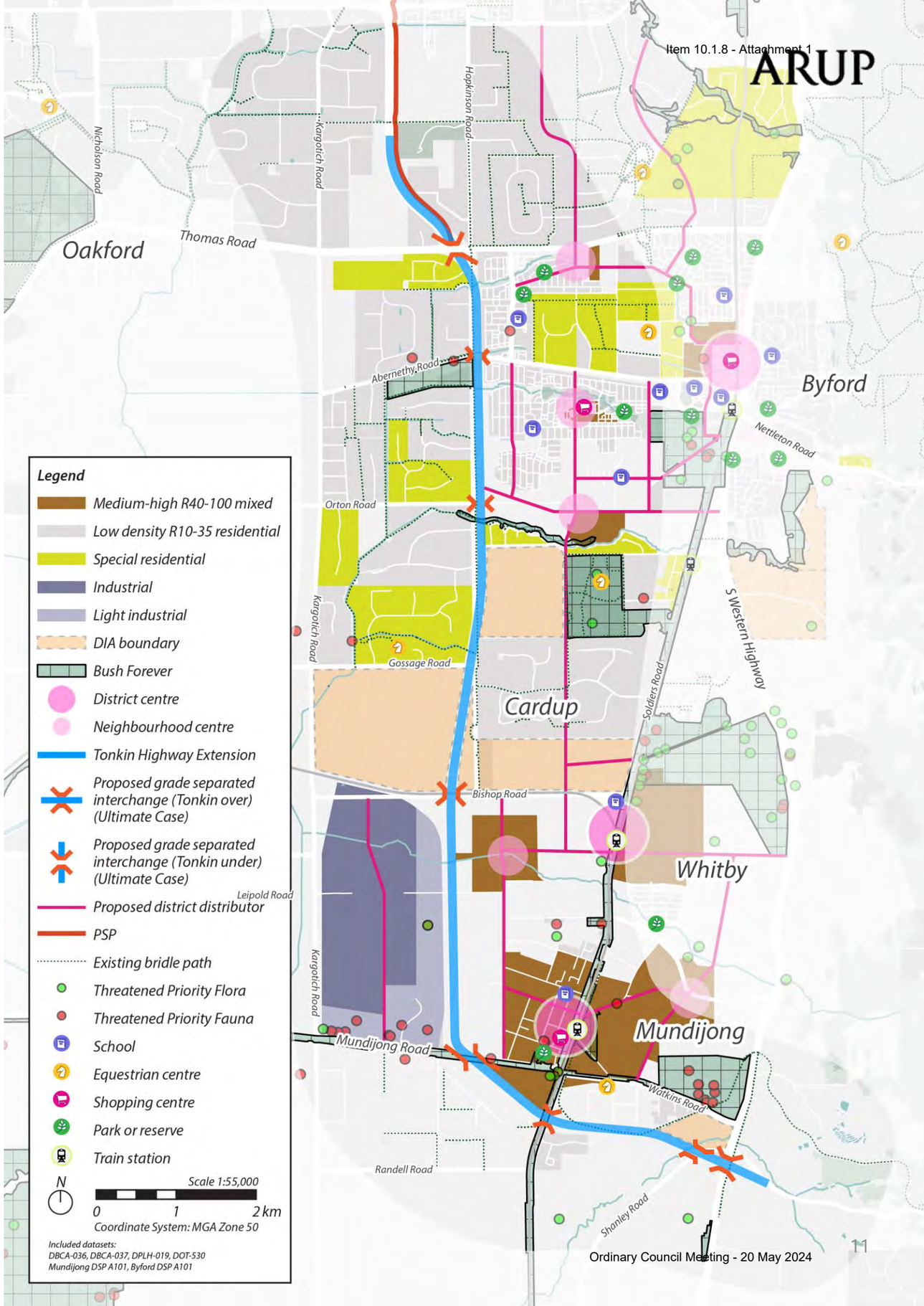


Figure 5
Project area land use trends

3.3 Community engagement

A community engagement program has been underway for the Project since 2020. The program has been well supported by engagement and communication tools and channels including, but not limited to Main Roads' digital engagement tool – MySayTransport, social media, briefing notes, newsletters, community surveys and direct mail to property owners.

In July / August 2020 a community survey was run online using Main Roads digital engagement tool MySayTransport, which indicated more than 80 percent of respondents supported the plans to extend Tonkin Highway south of Thomas Road. The survey was advertised through Main Roads' project newsletter and via social media and shared across external stakeholder digital platforms including the Shire of Serpentine-Jarrahdale. Results of this survey are attached in Appendix G.

Main Roads community engagement reporting collated Facebook comments to indicate general community sentiment which wasn't categorised (i.e. road users, cyclists, pedestrians, equine), however assumptions could be drawn based on the comments.

The MySayTransport survey asked specifically for respondents interests in the project and their areas of interest. The survey indicated that the highest proportions of respondents were road users, residents and/ or landowners. While survey respondents were generally in favour of the extension (322 in favour, 28 not in favour and 51 undecided), numerous concerns were raised about the potential impacts to accessibility and connectivity from the project, particularly local connections to residential and commercial areas.

Other priorities for respondents were in regards to the proposed intersection upgrade plans and safety. Figure 6 (adjacent) shows a heatmap of areas where comments received focused on, as well as the general trend of comments at each location. This highlights key 'focus areas' as indicated by the public and the locations earmarked to be considered as part of the accessibility study. Community focus areas are evident at evident at:

- The existing Hopkinson Road/ Abernethy Road intersection
- East west connectivity when the highway is constructed
- Hopkinson Road/ Thomas Road intersection
- Hopkinson Road/ Orton Road intersection
- East/ west links between Orton Road and Gossage Road
- Hopkinson Road/ Bishop Road intersection
- Mundijong Road in Mundijong, and
- Within the built up residential areas of Byford.

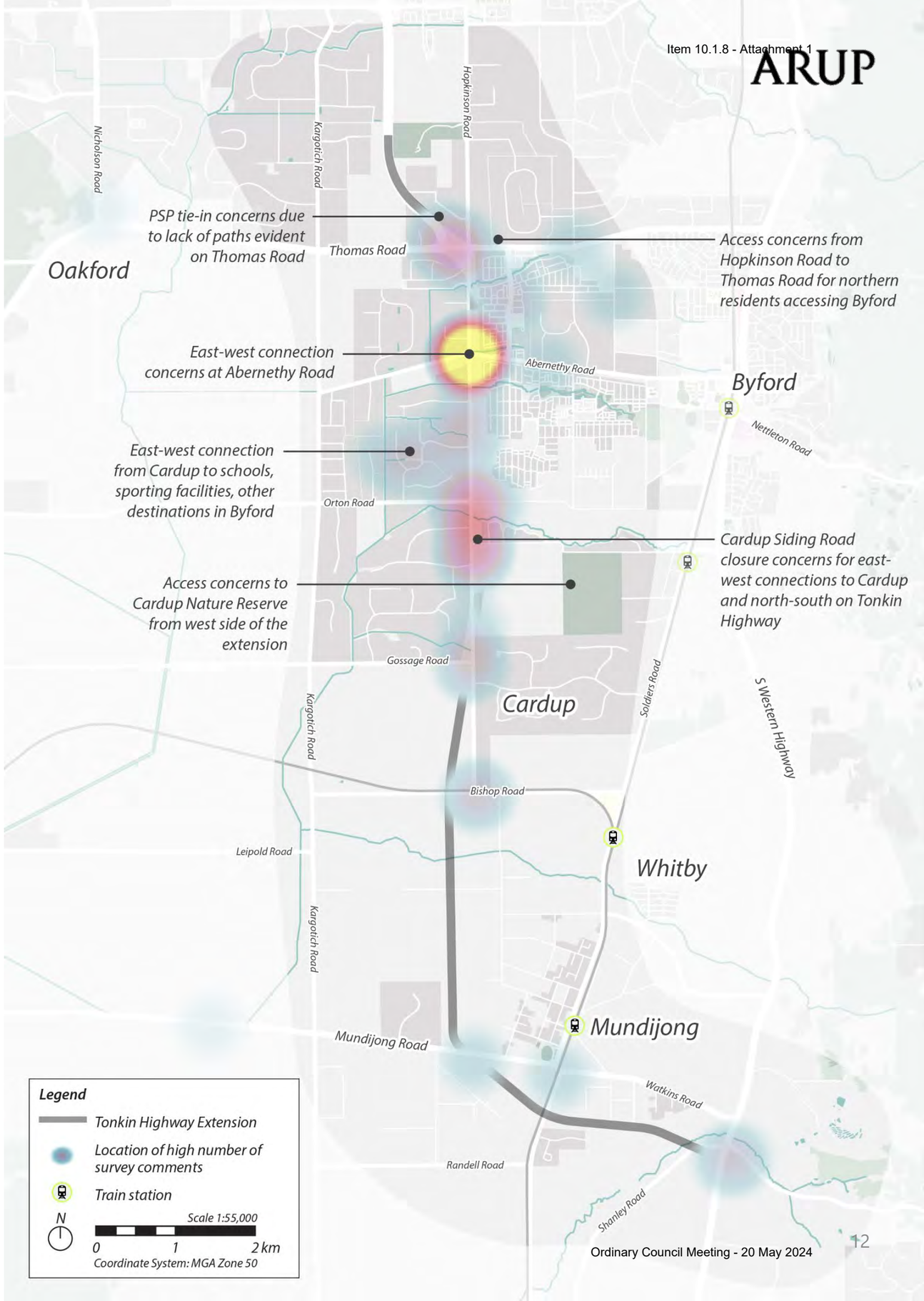
The majority of these concerns were in reference to potential severance of east-west access (creation of cul-de-sacs) for roads adjacent to the extension.

While the representation from pedestrians, cyclists and equestrian users was relatively low (53 out of 401 responses indicated active modes as an interest to their involvement in the survey) a high number of concerns were submitted, with 170 out of 401 responses with relevance to active transport. Indicating that active transport users had on average between three and four independent concerns. The majority of responses were in regard to:

- Limited east/ west connectivity between Thomas Road and Mundijong Road
- Restrictions to existing horse trail routes and popular equestrian centres
- Future connectivity to the PSP running along the east side of the extension

Additional communications within the community during 2021 and 2022 continued to generate a high level of interest from the community with strong themes regarding connectivity for active transport users, including equestrians as well as access and local road upgrades. Ongoing traffic capacity concerns have been raised across the local road network due to the existing road network being under pressure, as a result of ongoing population growth.

Figure 6
Community responses hotspot map



4 Guiding principles

Informed by the project's objectives, opportunities and constraints, a set of guiding principles were developed to assess the Long List options. The guiding principles considered all modes, split into 'aims' and 'key considerations' in order to both align options under a fatal flaw assessment but then further assess options in their ability to facilitate additional benefits. These guiding principles are focused specifically on the connectivity and accessibility items that fall within the direct scope of this study, listed previously in Section 1 of this report.

Options were first reviewed against the guiding principles in a fatal flaw assessment. Options that best aligned with the principles will be progressed through to a Short List for assessment against the agreed MCA and accessibility study.

The agreed guiding principles are shown in the adjacent table.

Table 1 ▷
Guiding principles

Mode	Aims	Key considerations
Active transport	❑ Are paths designed in accordance with accessibility standards in terms of minimum widths, maximum grades, etc. (Guide to Road Design, Austroads 2015; DDA, 1992; Australian Standard AS1428)? ❑ Do project paths follow a clear movement network along project-identified desire lines, to help discourage dangerous crossing manoeuvres in unallocated/ uncontrolled locations (in line with DoT Planning and designing for pedestrians guidelines, DoT 2016)? ❑ Does the project facilitate local connections to the PSP?	❑ Can the project provide direct routes without creating significant detours? ❑ Can project active transport routes cater for differing skill levels, ages and abilities, while avoiding challenging topography and conflicts with vehicles? ❑ Can the project corridor feel safe at all times of the day? ❑ Can the project assist to minimise conflict points at hazardous locations such as heavy vehicle routes, and roads with high traffic and speed?
Equestrian	❑ Does the project retain existing bridle paths to support regular equestrian activity? ❑ Can dedicated crossing facilities be introduced at strategic intersections/ underpasses along the corridor?	❑ Can additional kerbside protection be provided between existing bridle paths and parallel roads (Abernethy Road, Hopkinson Road North, etc.)? ❑ Can the project assist to minimise conflict points at hazardous locations such as heavy vehicle routes, and roads with high traffic and speed?
Private vehicles	❑ Does the project enable residents to have reasonable and convenient access (as much as practicable with the aim of reducing travel time impacts) to a similar level of service provided prior to the extension? ❑ Does the project retain east/ west connection to Byford Town Centre and north/ south connection to Mundijong Town Centre? ❑ Does the project provide alternative connections to higher order roads (Orton Road, Gossage Road, Abernethy Road) where connection to Hopkinson Road has been removed?	❑ Can the project provide/ unlock future access to identified urban growth areas?

5 Future connectivity impacts

Future connectivity impacts were assessed using the GIS-based Network Analyst plug-in, examining both the existing network (business-as-usual) and the modified network under the project case and ultimate case Tonkin Highway Extension designs. This section will summarise the inputs into the assessment and provide outcomes.

While origins and destinations are broader than the immediate Tonkin Highway extension corridor, this analysis is required to understand local travel time impacts to all modes as a result of the highway.

5.1 Method

To assess future connectivity impacts, first, the existing network was assessed in order to build a baseline to test potential solutions. This examined approximate travel distances (catchments) for each mode over different timeframes on the existing network, either from an agreed set of origins or, to an agreed set of destinations.

The network was then modified to create two additional scenarios:

- The Project Case; this included the Project Case Tonkin Hwy Extension design only, and
- The Ultimate Case; this included the Ultimate Case Tonkin Extension design

Both scenarios were then tested using the same origins and destinations to examine the change in travel distances and highlight instances in which accessibility was seen to be affected. These impacts have been assessed by determining the difference in catchment area between the base case, project case and ultimate scenarios.

This is illustrated in Appendix C and D.

The outcomes of this assessment informed a Long List of potential solutions to minimise the extent of adverse impacts from the Tonkin Highway Extension and potentially improve connectivity where possible.

5.1.1 Origins

Origins, as shown in Figure 7 (adjacent), have been identified using development boundaries defined by residential areas with one shared access to the wider network. The origin addresses, shown as an orange point, have been identified as approximately central points within each development boundary corresponding with an actual street address.

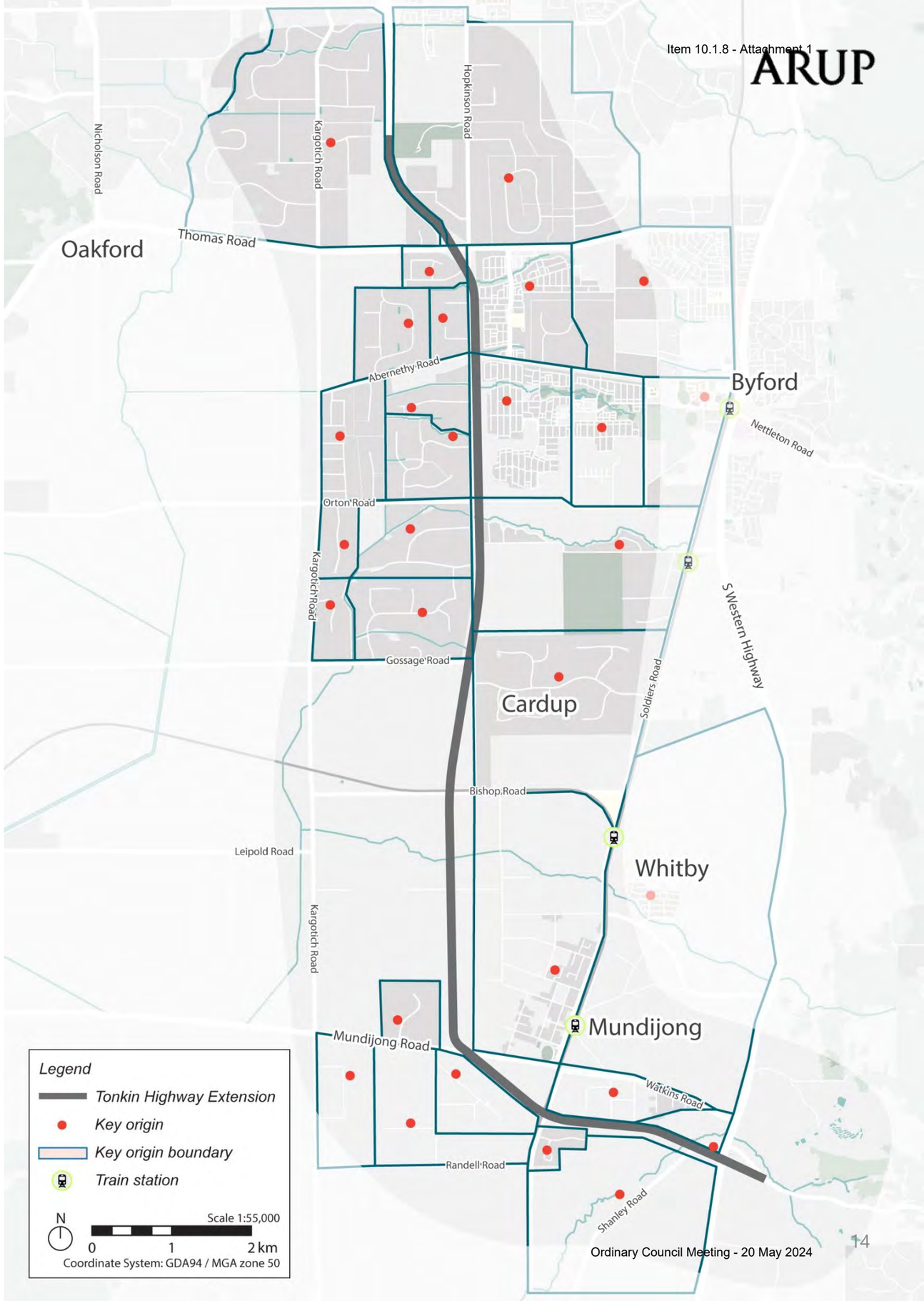


Figure 7 Origins used in the accessibility analysis

5.1.2 Destinations

Destinations, as shown in Figure 8 (adjacent), included localised centres that are expected to attract and generate various trips for a range of modes. This includes, but is not limited to, schools and other education facilities, equine centres, retail centres, parks and recreational reserves. Other destinations and points of interest that can not be represented by a point, such as popular horse trails, PSPs and primary distributor roads were also considered.

Destinations represented include both existing local centres, as well as future centres based on Shire LSPs.

5.1.3 Modes and method of use

Four modes were examined as part of the accessibility analysis: walking, cycling, equestrian and driving. Due to differing networks across modes, different approaches were undertaken for each mode as outlined in the headings below. For walking, cycling and driving this included developing isochrones – shapes representing maximum travel distances by that mode achievable in set time periods based off an assumed travel speed.

Walking (Pedestrians)

It was assumed that the majority of trips undertaken by walking occurred when residents were within appropriate walking distances to key destinations. The accessibility analysis for pedestrians was determined by travel time isochrones **to** each destination. This highlights catchments to each destination for various walking distances.

Cycling (Cyclists)

It was assumed that trips by bicycle, while consisting of a combination of trips for commute and recreational purposes, were undertaken in order to reach defined destinations (commute) and more intangible points of interest (recreational). It was therefore agreed that the accessibility analysis for cyclists was determined by travel time isochrones **from** each origin.

This would then highlight catchments from each origin for various cycling distances.

Equestrian

As discussed in Section 3.1.5, the SoSJ Equine Strategy found that the most popular form of trip for horse riders involved recreational riding and cross country riding, while a number of equestrian centres were also accessed via vehicle. It was therefore assumed that the majority of trips were not for the purpose of accessing a destination and consisted of primarily convoluted journeys along existing bridle trails and informal/ unmapped paths. Where a destination, in this case an equestrian centre, was the purpose of the journey, it was assumed this was either undertaken via horse or via vehicle. The analysis was then undertaken by examining the existing network and overlaying the key constraints to overall equestrian movement.

Driving (private vehicles)

Given the rural to semi-rural environment of the study area, it was assumed that the majority of trips were undertaken by private vehicle to reach destinations both internal and external to the study area. The accessibility analysis for private vehicles was determined by travel time isochrones **from** each origin. This highlights catchments from each origin for various driving distances.

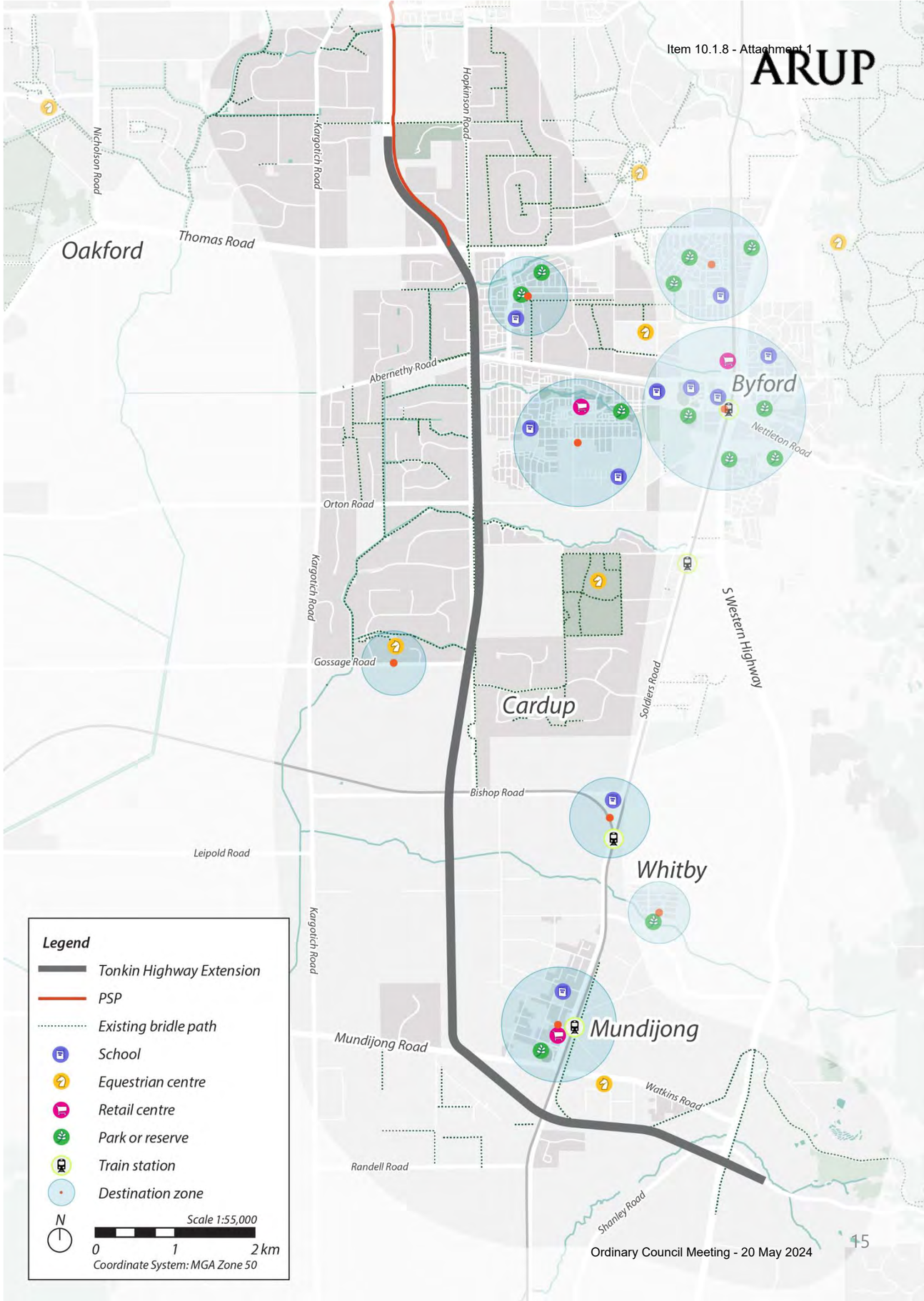


Figure 8

Destinations used in the accessibility analysis

5.2 Key assumptions

The following assumptions were utilised in development of the accessibility analysis.

Pedestrians

- Pedestrians can walk alongside any road and on any path in the existing and future network, excluding Tonkin Highway mainline. This is considering the likely provision of east-west shared paths along major side roads.
- Average travel speed of 1.2 m/s
- Pedestrians can cross Tonkin Highway at the proposed intersection/ interchange sites. At interchange sites these crossings will be grade-separated and not interface with the mainline. At intersection sites, crossings of Tonkin Highway will be at-grade.
- To assess connectivity impacts, walking times of 5-minutes, 10-minutes and 30-minutes have been investigated, considering the rural setting and the tendencies to accept longer walks to destinations
- Analysis informed by defined destinations

Cyclists

- Cyclists can ride on any road or path in the existing and future network, excluding Tonkin Highway mainline
- Average travel speed of 4.2 m/s
- Cyclists can cross Tonkin Highway at the proposed intersection/ interchange sites. At interchange sites these crossings will be grade-separated and not interface with the mainline. At intersection sites, crossings of Tonkin Highway will be at grade.
- To assess connectivity impacts, Cycling times of 5-minutes, 10-minutes and 15-minutes have been investigated, considering the rural setting and the tendencies to accept longer rides to destinations
- Analysis informed by key origins

Equestrian

- Equine riders can utilise the local road network (verge) and existing trails
- Equine riders can not cross over Tonkin Highway
- Equine underpass facilities under Tonkin Highway are available at Abernethy Road, Gossage Road and Shanley Road

Vehicles

- Tonkin Highway maximum speed limit 100 km/h, reduces to 70 km/h through at-grade intersections. Likely operating speeds through roundabouts have been assumed (30-40 km/h through circulating carriageway)
- To assess connectivity impacts, Driving times of 2-minutes, 5-minutes and 10-minutes have been investigated
- Analysis informed by key origins.

5.3 Connectivity analysis

Figure 9 to Figure 13 in this section provide an example of outputs from the accessibility analysis, showing the impacts to travel time across each mode.

The following provides a summary of the key issues and trends highlighted by the analysis.

5.3.1 Impacts to pedestrian connectivity

An example of the pedestrian connectivity analysis is provided on Figure 9, showing pedestrian connectivity for 30-minute walking catchments from **Schools** within the study area (origins for this study). Further analysis for 5-minute, 10-minute and 30-minute walking catchments for all destinations has been provided in Appendix C and D.

A 30-minute walking catchment, which is typically high for an exclusively urban environment, has been utilised to account for maximum walking times in the mix of urban and rural environments. It is understood that due to the characteristics of this environment consisting of larger blocks, relatively low vehicle volumes and limited potential delays at road crossing points, people in rural areas are more likely to walk longer distances to reach specific destinations.

The analysis shows that the impacts to school catchments as a result of the project works is relatively minor. Minimal difference is noted in the 30-minute walking distance for the existing, project case and ultimate case scenarios. This is due to all schools within the study area being located to the east of Tonkin Highway Extension corridor.

The origins that feature in Figure 9 are limited to school locations only. Further analysis has been undertaken for all 18 destinations to understand connectivity impacts as a result of the project case and ultimate case scenarios. Impacts to catchment size on average is found to be negligible, with the total area reachable by walking in 30-minutes from each destination remaining relatively unchanged between scenarios.

A full breakdown of pedestrian connectivity for all eighteen destinations tested as part of the pedestrian connectivity analysis has been provided in Appendix C and D.

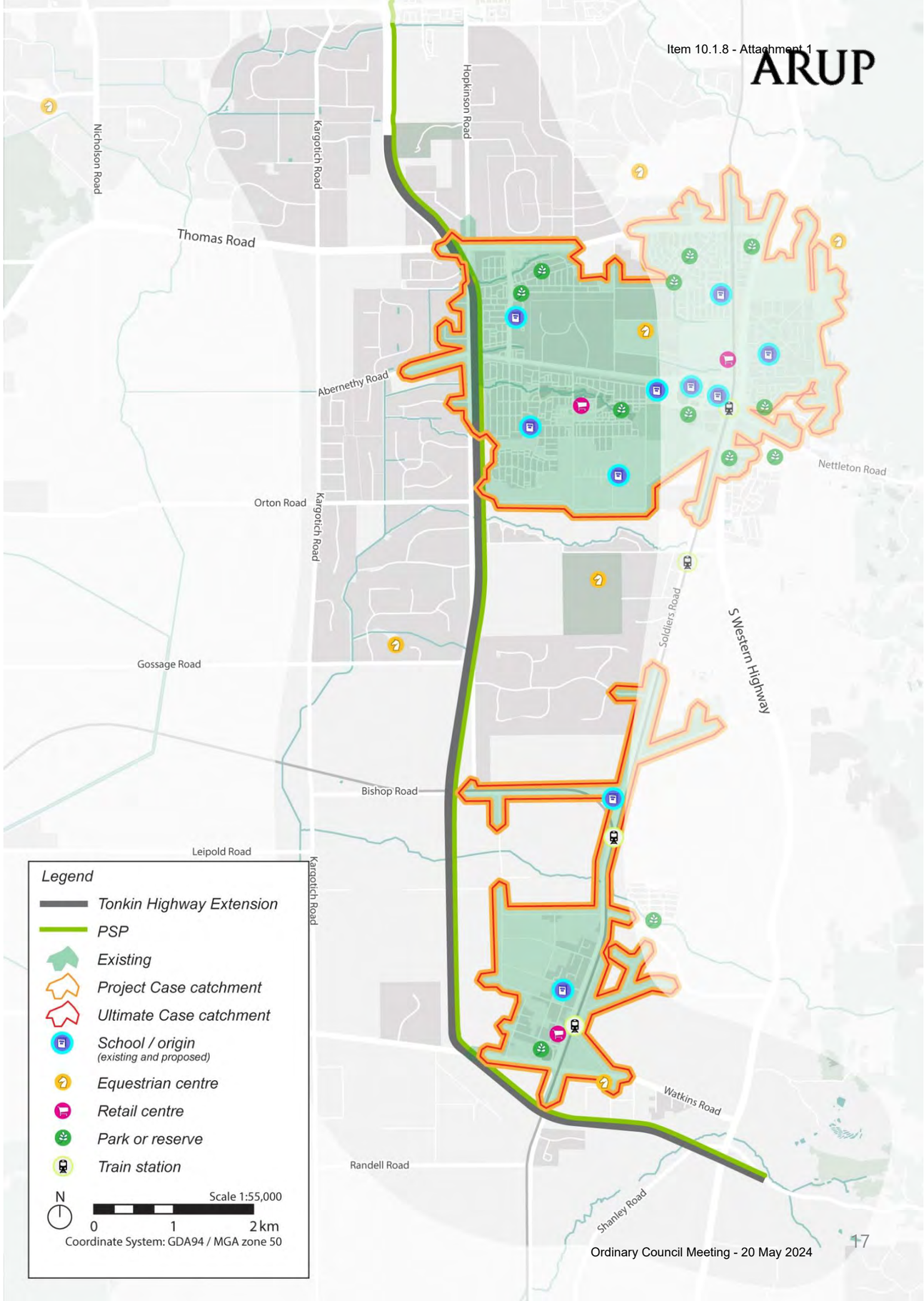


Figure 9

Example demonstration of impact to pedestrian connectivity (30-minute walking catchment) for school origins only

5.3.2 Impacts to cyclist connectivity

An example of the cyclist connectivity analysis is provided in Figure 10, showing cyclist connectivity for 15-minute cycling catchments. Further analysis for 5-minute, 10-minute and 15-minute cycling catchments for each origin has been provided in Appendix C and D.

It noted that across the existing study area, there are no formal cycling facilities. It is assumed that cycling is currently facilitated informally on-road.

The impact to cyclist catchments in comparison with the Base Case as a whole in the Project Case is negligible, with a recorded improvement of 0.1% to catchment size. In contrast, the Ultimate Case design records a 12.5% reduction in average catchment size across the origins as a whole, representing a clear decrease in cycling connectivity across the board.

In the Project Case, around a third of the origins' catchments (10/29) are negatively impacted by the Tonkin Highway Extension design, with an average decrease in 25% for those impacted. This increases to 14/29 origins in the Ultimate Case, with an average decrease in 34.7%.

As shown in Figure 10, it can be seen that properties to the north and east of the Tonkin Highway Extension are likely to have minimal impacts to their accessibility. This is due to limited modifications to the surrounding network, and most destinations being located on the eastern side of the Tonkin Highway corridor.

Properties to the south and west of Tonkin Highway Extension, namely in West Cardup and south of Mundijong Road, are likely to have accessibility impacts as Tonkin Highway will modify routes to key destinations to the east and north. These locations are subject to a 23% average reduction in catchment size and up to 94% in locations closer to the Tonkin Highway Extension where subject to a severed network.

Key points of interest that the catchment analysis has highlighted are:

- Jersey Road connectivity to the broader transport network is severed in the Project/Ultimate Case scenarios
- East-west connectivity at Karbro Drive, Gossage Road and Cardup Siding Road is reduced in the Project/Ultimate Case scenarios. North-south connectivity will however increase in these areas as a result of the PSP.
- Lampiter Drive connectivity to the broader transport network is severed in the Ultimate Case scenario. This is caused by a combination of the Tonkin Highway and the Freight Rail Realignment (now separated from project)
- Hopkinson Road north-south connectivity is severed (at Thomas Road) in the Project/Ultimate Case scenarios.
- East-west active transport crossings are provided at each key intersection/ interchange location.

The origins that feature in Figure 10 are limited to three sample locations. A full breakdown of cyclist connectivity for all 29 origins tested as part of the cyclist connectivity analysis has been provided in Appendix C and D.

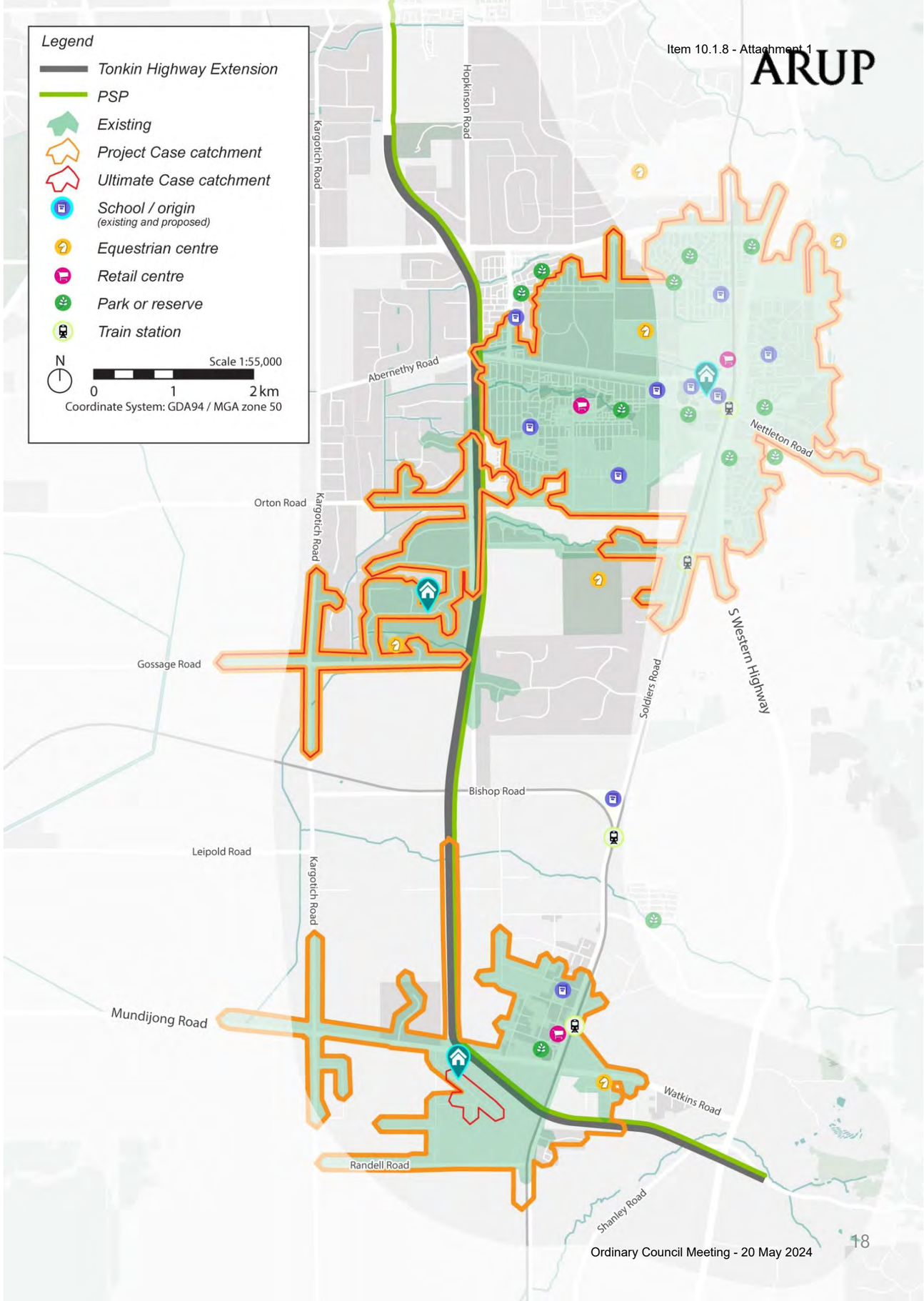


Figure 10

Example demonstration of impact to cyclist connectivity (15-minute cycling catchment) for three selected origins along the alignment

5.3.3 Impacts to equestrian connectivity

The equestrian connectivity analysis is provided in Figure 11, showing the key barrier to overall equestrian movement following the implementation of the Project Case.

As shown, the existing bridle paths provide formal equestrian links to equestrian centres from the majority of properties, with an existing equestrian underpass provided north of Thomas Road facilitating east-west connections under the Tonkin Highway. It is understood that horse riders are currently provided the freedom to move east-west across major roads while also using the Tonkin Highway road reserve to move uninterrupted for the majority of its length. Based on community feedback, it is understood that the network shown does not reflect the entire movement network offered to horse riders, given that they are able to follow informal and unmapped tracks through properties, grasslands and along waterways in the current network.

Following the construction of Tonkin Highway, the equestrian network will be impacted. As shown, connectivity across the Tonkin Highway corridor (currently Hopkinson Road) will be impacted from Thomas Road to South Western Highway without any treatments.

If there were no proposed equestrian underpasses as part of the design, horse riders will be forced to go around the full length of the highway, to access areas on the other side of the highway.

This is a similar conclusion for the Ultimate Case. It was for this reason that equine underpasses have been pursued along the alignment to provide east-west connectivity at strategic points along the alignment and has been addressed further within Section 8.

Figure 11
Equestrian connectivity barriers, with locations where access is being modified shown as a black dot

^ Existing bridle paths are per the Shire Equine Trail masterplan. It is understood these are a mixture of formal and informal trails, currently used by Shire equine users.

5.3.4 Impacts to vehicle connectivity

An example of the vehicle connectivity analysis is provided in Figure 12, showing vehicle connectivity for 5-minute driving catchments. Further analysis for 2-minute, 5-minute and 10-minute vehicular catchments from each origin has been provided in Appendix C and D.

Driving catchments of 5-minutes have been used in this sample to highlight potential impacts to exclusively local trips within the study area.

The analysis has recorded a decline in average vehicle connectivity in comparison with the Base Case for both the Project Case (-10.1%) and Ultimate Case (-14.5%). Broken down by origins, the analysis has shown 17/29 catchments are negatively impacted by the Project Case and Ultimate Case, with an average decrease in catchment size of 17.6% and 25% respectively. Given the importance of driving in this region, these impacts could lead to significant impacts in travel time and accessibility. Impacts on a case-by-case basis are more troublesome, with 5 origins in the ultimate case with over a 28% loss in catchment size. These locations are typical of properties to the south and west of Tonkin Highway Extension, as Tonkin Highway will cause severance to the key destinations to the east, while also limiting opportunities to access north-south routes.

Properties to the north and east of the Tonkin Highway Extension are likely to have minimal impacts to their accessibility to the existing destinations within the study area. This is due to most destinations being located on the eastern side of the Tonkin Highway corridor and limited impacts proposed to east-west connections on Abernethy Road.

The key points of interest that the catchment analysis has highlighted are:

- East-west connectivity at Karbro Drive, Gossage Road and Cardup Siding Road is reduced at the Project Case and Ultimate Case
- Lampiter Drive connectivity to the broader transport network is reduced at the Ultimate Case which is caused by the combination of Tonkin Highway and the Freight Rail Realignment (now separated from project)
- Hopkinson Road north of Thomas Road connectivity to the south is severed in the Project Case and Ultimate Case
- Shanley Road south of Tonkin Highway Extension is reduced resulting in reduced connectivity in the Project Case and Ultimate Case
- In general, the adverse impacts to the broader road network are relatively minor.

Although not explicitly represented within Figure 12, Jersey Road connectivity to the broader transport network is also reduced at Project Case and Ultimate Case. This is illustrated in greater detail within Figure 12a and Figure 12b overleaf. The Jersey Road Local Structure Plan providing access and based on Figure 12a and Figure 12b is depicted within Figure 20.

The origin that features in Figure 12 is limited to one sample location. A full breakdown of vehicle connectivity for all 29 origins tested as part of the vehicle connectivity analysis has been provided in Appendix C and D.

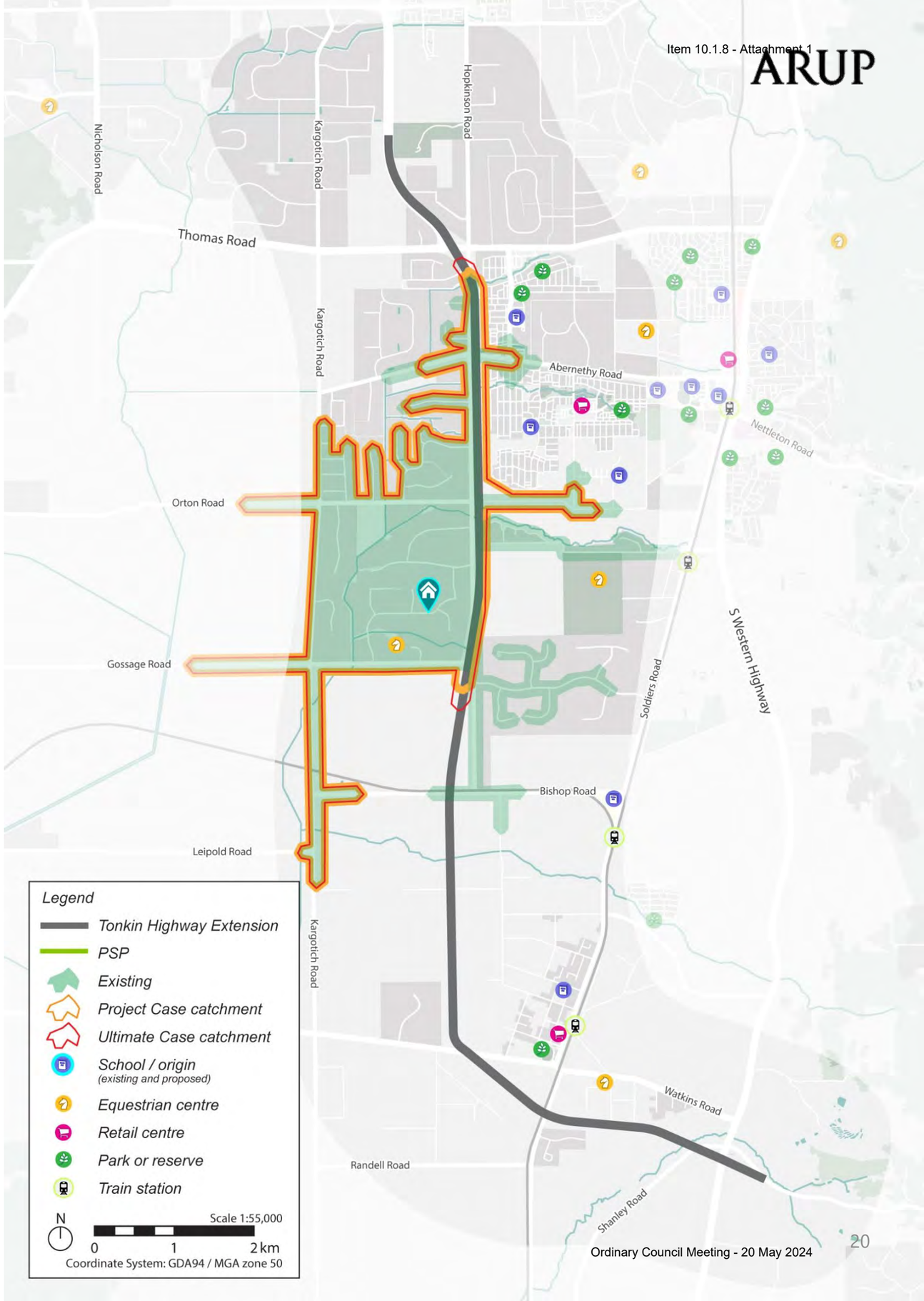


Figure 12 Example demonstration of impact to vehicle connectivity for a sample origin west of Tonkin Highway (5-minute driving catchment) ^

^ A 5-minute driving catchment from the indicative origin (Bournbrook Ave) is intended to represent a short vehicle trip and as a means of direct comparison between the do-nothing, project case and ultimate-case catchments.

5.3.4 Impacts to vehicle connectivity (continued)

Figure 12a

Jersey Road catchment subdivision construction progress as of early-2023

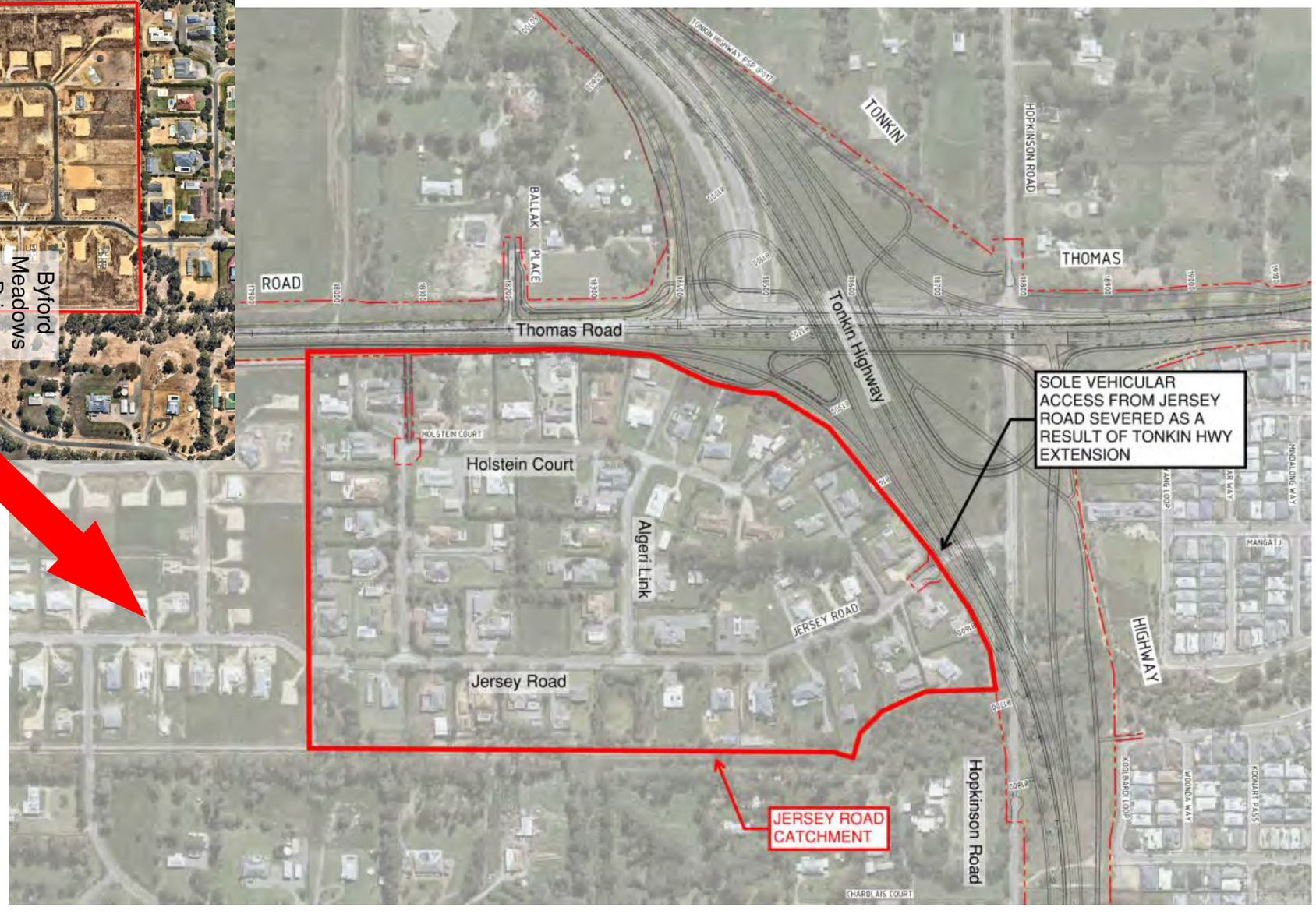


Figure 12b

Do-nothing scenario 'landlocking' of Jersey Road catchment

5.4 Key focus areas for further investigation

The catchment analysis has identified the following key focus areas for further investigation (shown on Figure 13).

Focus area	Accessibility impacts
1. Hopkinson Road north of Thomas Road	❑ Modification of Hopkinson Road/ Thomas Road intersection to potentially isolate access to Thomas Road from the north, forcing residents to use Rowley Road.
2. Ballak Place	❑ Modification of Ballak Place/ Thomas Road intersection to impact access to properties on Ballak Place
3. Thomas Road (A), Orton Road (B), Bishop Road (C), Mundijong Road (D) and South Western Highway (E) intersections/ interchanges	❑ Active travel and equine connectivity to be investigated at intersections/ interchanges for both the interim and ultimate treatments.
4. Jersey Road residential catchment	❑ Access to/ from the residential catchment isolated by closure of Jersey Road without any treatment. Closure of access to Hopkinson Road impacts the Bushfire Management Plan.
5. Underpasses at midblock locations along Tonkin Highway Extension	❑ East-west active transport connectivity impacted at midblock locations between Thomas Road and Mundijong Road.
6. Cardup Siding Road residential catchment	❑ Potential evacuation risk with closure of Cardup Siding Road/ Hopkinson Road intersection removing alternative access out of catchment. Closure of access to Hopkinson Road impacts the Bushfire Management Plan.
7. Lampiter Drive residential catchment	❑ Access to/ from Lots 1-6 Lampiter Drive isolated by the closure of Lampiter Drive following the Freight Rail Realignment (now separated from project)
8. Shanley Road north of Tonkin Highway Extension	❑ Access modification of Shanley Road/ South Western Highway intersection potentially isolates property between Tonkin Highway Extension, South Western Hwy and Shanley Road.
9. Shanley Road south of Tonkin Highway Extension	❑ Access to South Western Highway from Shanley Road potentially isolated west of Property 11, significantly impacting current and future Stanley Road residents from accessing Byford and other regional centres without any treatments.

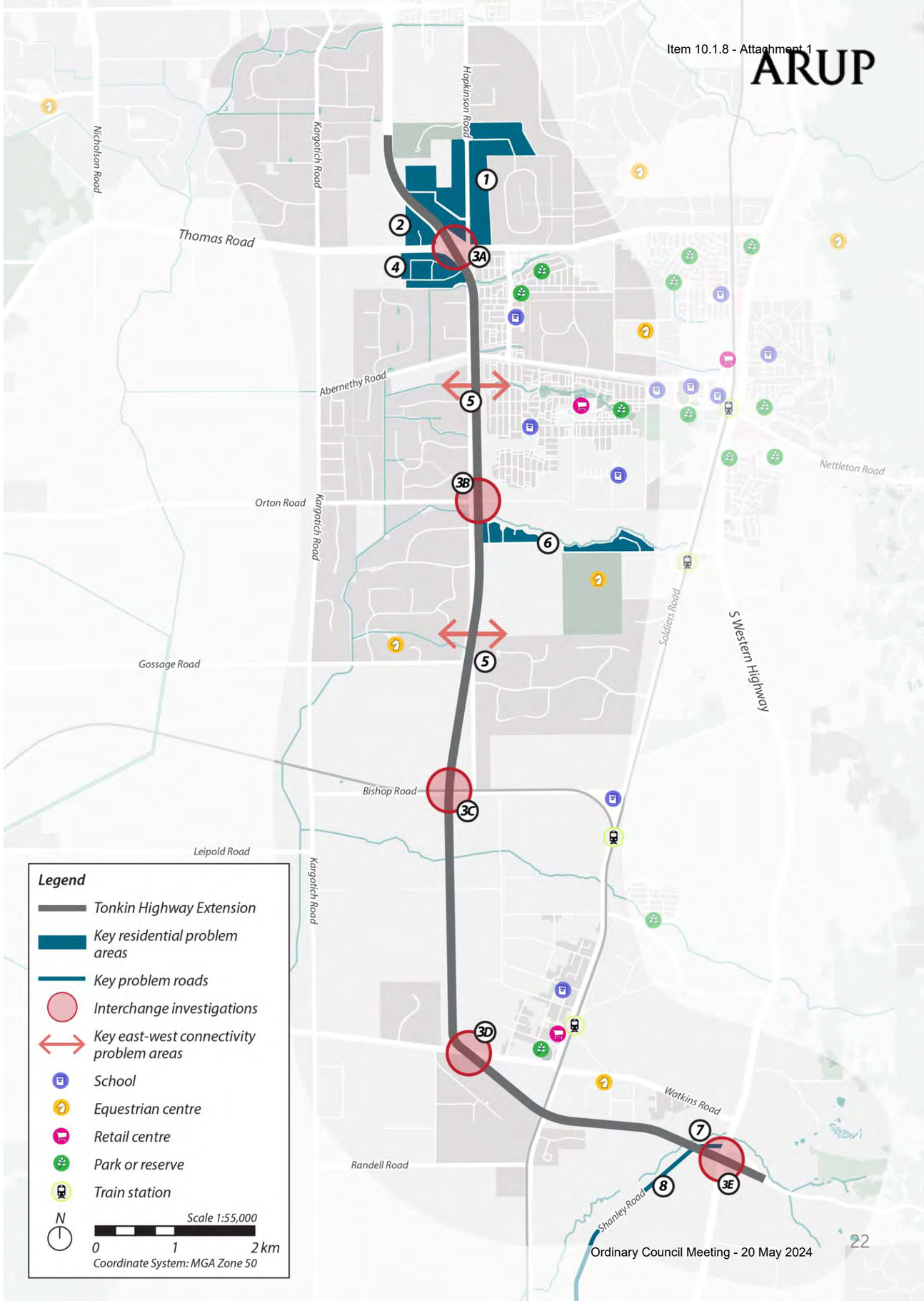


Figure 13 ▷
Key accessibility focus areas

6 Long list process and fatal flaw analysis

6.1 Development of fatal flaw analysis criteria

In developing a Fatal Flaw Analysis (FFA) criteria to be used for evaluating the Long List options, the project team considered that the criteria should be developed in line with the guiding principles of the project, assessing each option on a pass/ fail rating scoring system.

The seven pass/ fail criteria utilised were:

- Network Connectivity
- Safety
- Constructability
- Alignment with ultimate planning
- Impact to the Environment
- Impact to Heritage
- Impact to zoning/ land impact/ MRS boundary.

Each criteria were made up of 1-4 queries that the Long List option had to satisfy in order to pass the FFA. If an option failed against one of the criteria, it was not progressed through to the Short List stage.

A breakdown on the fatally flawed options, as well as rationale of the pass/ fail decisions made, is included in Appendix E.

To focus the Long List options considered, a first sieve of criteria was developed which deemed options unviable from the offset, prior to the long list stage. This criteria included:

- No options can include a bridge over Tonkin Highway unless at an interchange where a bridge structure is already provided
- No at-grade crossings can be provided over Tonkin Highway at midblock locations.

To further streamline the Long List process, the study area was divided into four sectors:

- **Sector 1:** Thomas Road to south of Orton Road
- **Sector 2:** Orton Road to Bishop Road
- **Sector 3:** Bishop Road to Wright Road
- **Sector 4:** Wright Road to South Western Highway.

While considered throughout the study, it should be noted that detailed analysis into Locations 12, 15 and 16 have since been excluded from the scope of this project Access & Connectivity Study, following the omission of Mundijong Freight Rail from the Tonkin Highway Extension project scope.

Each sector contained a number of locations representing each focus area as shown in Figure 14.

The project team then developed an initial Long List of potential solutions and FFA to be workshopped with stakeholders.

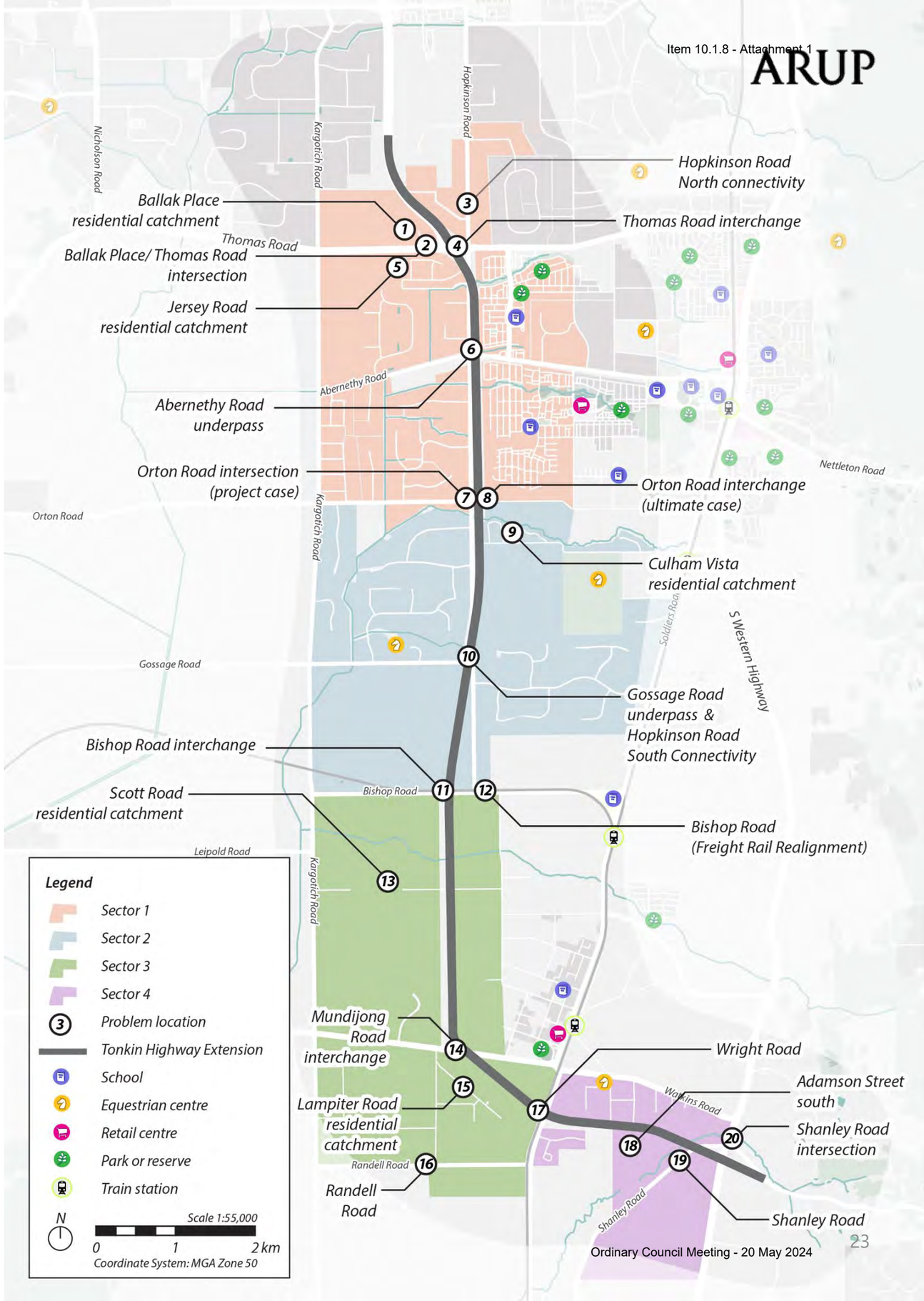


Figure 14

Long List
Sectors and locations

6.2 Long list stakeholder workshop

The preliminary outcomes of the initial Long List FFA were presented and workshopped with Main Roads WA and relevant stakeholders on 12 March 2021. In the workshop, the project team went through each Sector and described each Long List option to attendees, and a brief summary of the initial Long List FFA.

Following the presentation of each Sector, attendees were given the opportunity to discuss, amend and offer additional options relevant to the project for assessment, particularly for any options where pass/ fail criteria isn't clear or obvious. This included any long list options not identified earlier in the treatment selection process.

Provisional outcomes decided within the workshop session were captured on sticky notes on printed aerial plans of the Tonkin Extension design plots. An illustration of process is shown in Figure 15. The detailed outcomes are shown further within Appendix A and Appendix E.

The Long List and FFA was then agreed by stakeholders in this session, arriving at a final Long List.

A total number of 85 Long List options across all locations were assessed against the defined Fatal Flaw Analysis (FFA) criteria, with the remaining options progressing through to the Short List options stage.

A summary of the FFA of each of the Long List options is provided in Appendix A. It should be noted that following project development on the Tonkin Highway Extension, some options which were previously fatally flawed were deemed to be acceptable and brought into the project as post-workshop developments.

Figure 15

Long List workshop outcomes – illustration of process only

7 Short list options

Following completion of the FFA of the Long List options summarised in Section 6 and Appendix A, a total of 58 Short List options were confirmed for scoring through the MCA process, with detailed results and breakdown included in Appendix E. The subsequent assessment of these options was undertaken by the internal project team, workshopped and endorsed by Main Roads WA on 22nd April 2021.

A summary of the options is shown in Figure 16 and provided in Appendix B.

The detailed scoring matrix for the shortlisted options is provided in Appendix E.

On completion of the first draft reporting a Main Roads stakeholder meeting, with a broader group of stakeholders, was held on 6 August 2021 to review the preferred options put forward in the initial draft of this Connectivity and Accessibility Report. In this meeting several options were removed, reworded or revised to meet stakeholder requirements or suggestions. These changes have been captured in this version of the report, with the reworded or revised options noted with an asterisk (*).

Final options were subsequently refined and updated following further design development of the Tonkin Highway Extension project – the final options being incorporated into the design are reflected in Section 8.

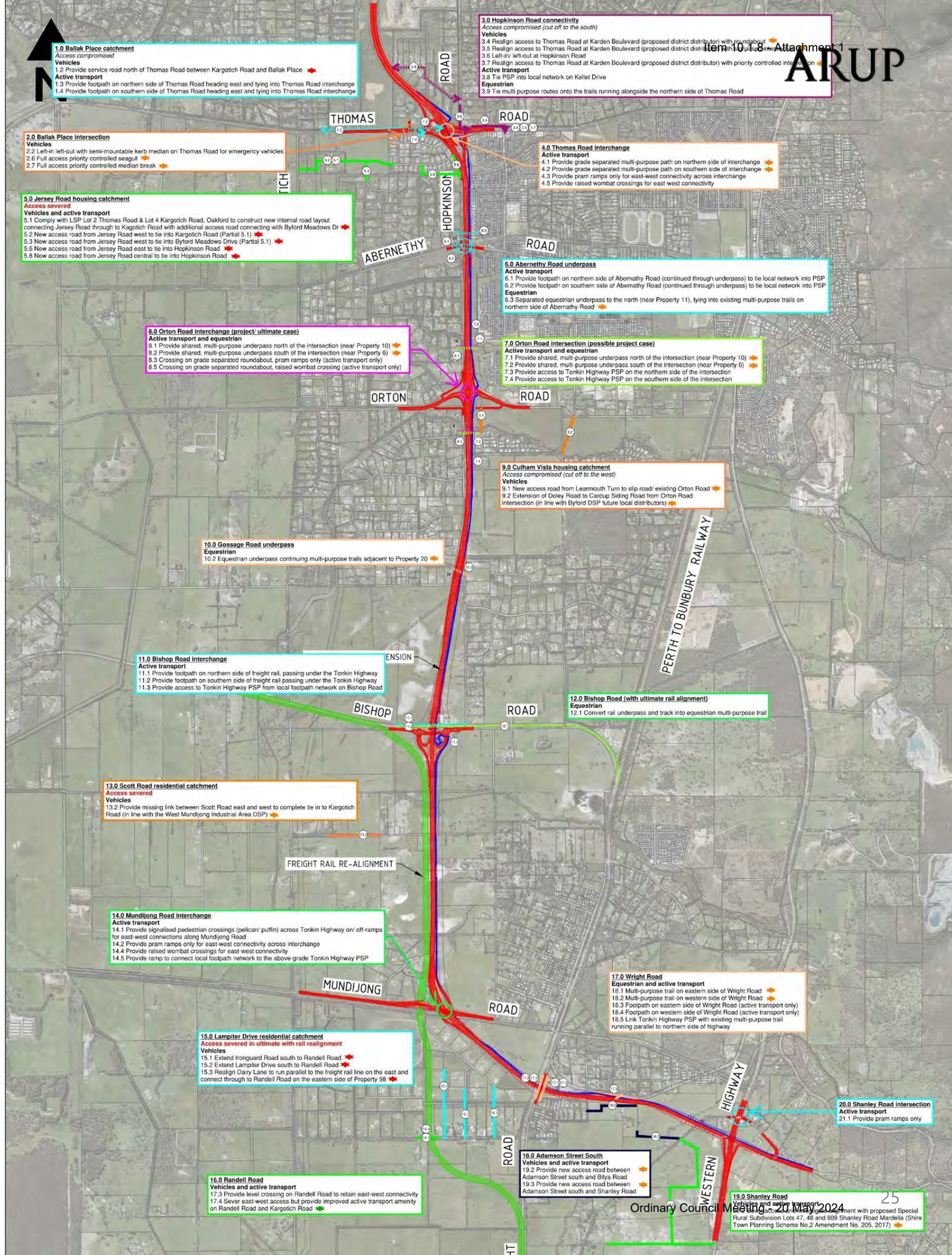


Figure 16 ▷
Short List workshop outcomes

8 Preferred options

8.1 Location 1 – Ballak Place residential catchment

The proximity of the Ballak Place residential catchment to the Tonkin Highway/ Thomas Road intersection means that access will likely be impacted due to intersection spacing requirements.

To allow for pedestrian and cyclist connectivity to the PSP running on the eastern side of Tonkin Highway, it is advised that a footpath is provided on the southern side of Thomas Road, in keeping with long term Thomas Road corridor planning by the Shire. The proposed footpath is shown in Figure 17a.

Separate to this study, optioneering is ongoing to establish how to cross Thomas Road east-west, which is preferred on the southern side. The pedestrian crossings and configuration at the interchange is detailed in Section 8.4.

Active transport options for the Ballak Place residential catchment are discussed in further detail overleaf and within Figure 17b.

Preferred option
1.4** Provide footpath on southern side of Thomas Road heading east, tying into Thomas Road interchange and Thomas Road/ Kargotich Road roundabout (to be constructed 2022/23)

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

8.2 Location 2 – Ballak Place/ Thomas Road intersection

Ballak Place currently has full priority controlled access onto Thomas Road. The Tonkin Highway Extension project case intersection and ultimate case interchange footprints are proximate to the existing intersection. Such, the interchange footprint will likely impact the feasibility of design options in and out of the residential catchment.

The duplication of Thomas Road is also a key consideration that will likely impact the intersection configuration options.

The preferred option is to provide a left-in left-out treatment. A semi-mountable kerbed median will allow for informal emergency vehicle access to mount the median.

Preferred option
2.2 Left-in left-out treatment on Thomas Road

Figure 17a
Ballak Place preferred options

Ballak Place residential catchment active transport options

Following the formal long list FFA and short listing of preferred options, active transport access options to the Ballak Place residential catchment were further assessed, considering that Ballak Place contains five residential dwellings.

The provision of a standard midblock crossing linking Ballak Place to a Thomas Road east-west shared path along the southern verge is not easily suited, due to (a) the interchange form at the Tonkin Highway & Thomas Road site, and (b) design objectives to cross no more than two lanes unprotected, and to not cross within a merge.

The costs of a dedicated active user crossing grade-separation for a catchment containing five properties, and the lack of existing active user infrastructure at Ballak Place, has additionally been considered.

No requirement has been identified to deliver active user connectivity infrastructure for Ballak Place as part of the project case as part of the workshopping process, however three connectivity options have been identified should this change, shown in Figure 17b below.

Option A: Route footpath along northern verge from Ballak Place to interchange western signal site and cross using existing phasing arrangements.

Option B: Route footpath along northern verge westward to Kargotich Road roundabout and cross at roundabout, or where median increases in width.

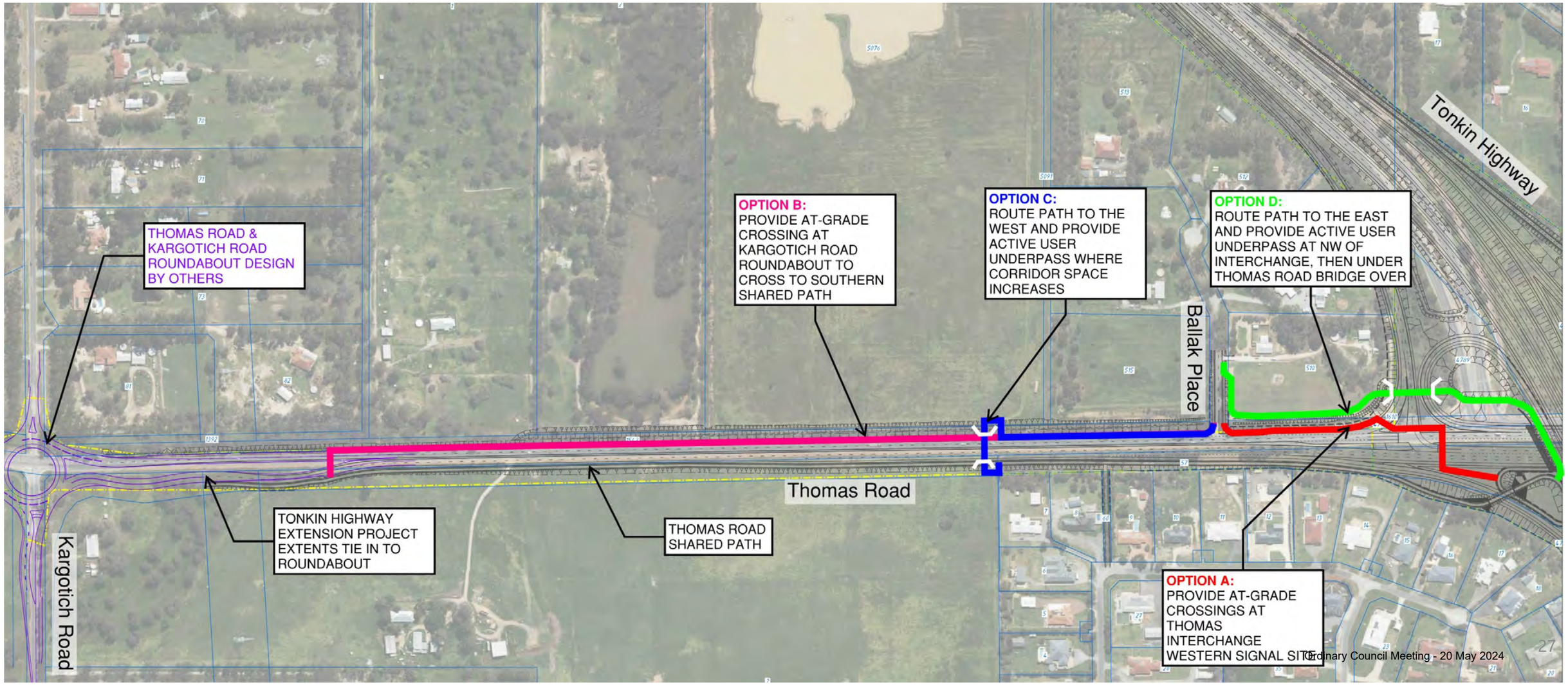
Option C: Route footpath along northern verge westward and cross underneath Kargotich Road as underpass. Due to road reserve width constraints, this will need to occur to the west of the Jersey Road residential catchment.

Option D: Route footpath eastwards as underpass at north-western quadrant of interchange, connecting into Thomas Road shared path loop section. This option is considered to be preferred, however investigations are ongoing to establish best outcomes for this catchment.

Active user routing northward along Tonkin Highway to cross at the existing equine underpass was considered, but seen to be unpreferred, due to the extensive detour lengths and mixing active user infrastructure with dedicated equine infrastructure.

Figure 17b

Ballak Place residential catchment potential treatments for active users



8.3 Location 3 – Hopkinson Road north connectivity

The proximity of Hopkinson Road to the Tonkin Highway/ Thomas Road interchange means that existing vehicle access to the north is impacted. Further to this, concerns over bushfire egress from the Shire were raised should a direct connection to Thomas Road be severed.

In response, several options to maintain connectivity between Hopkinson Road and Thomas Road were investigated and assessed from a traffic, bushfire egress and adjacent land impact perspective. This included a connection between Hopkinson Road and the proposed Thomas Road/ Kardan Boulevard intersection, using a portion of four private lots with relatively significant land take north of Thomas Road (refer to Figure 18). However, these options have not been supported due to the imbalance between the high amount of land acquisition required to construct this connection, alternative emergency egress options (refer to Section 9) and the limited travel time improvements for impacted land parcels.

Given a connection is not proposed to be provided, alternative roads such as Rowley Road and Masters Road may be used to maintain connectivity.

To support cyclist and pedestrian connectivity for the local catchment, connections to the Tonkin Highway PSP are advised at Kellet Drive and from the southern end of Hopkinson Road (see also Location 4).

The multi purpose equine trails on the northern side of Thomas Road are advised to be retained for equine users, maintaining the Thomas Road linkage to Hopkinson Road north.

Preferred option

3.8 Tie PSP into local network on Kellet Drive and end of Hopkinson

3.9 Tie multi purpose routes onto the trails running alongside the northern side of Thomas Road

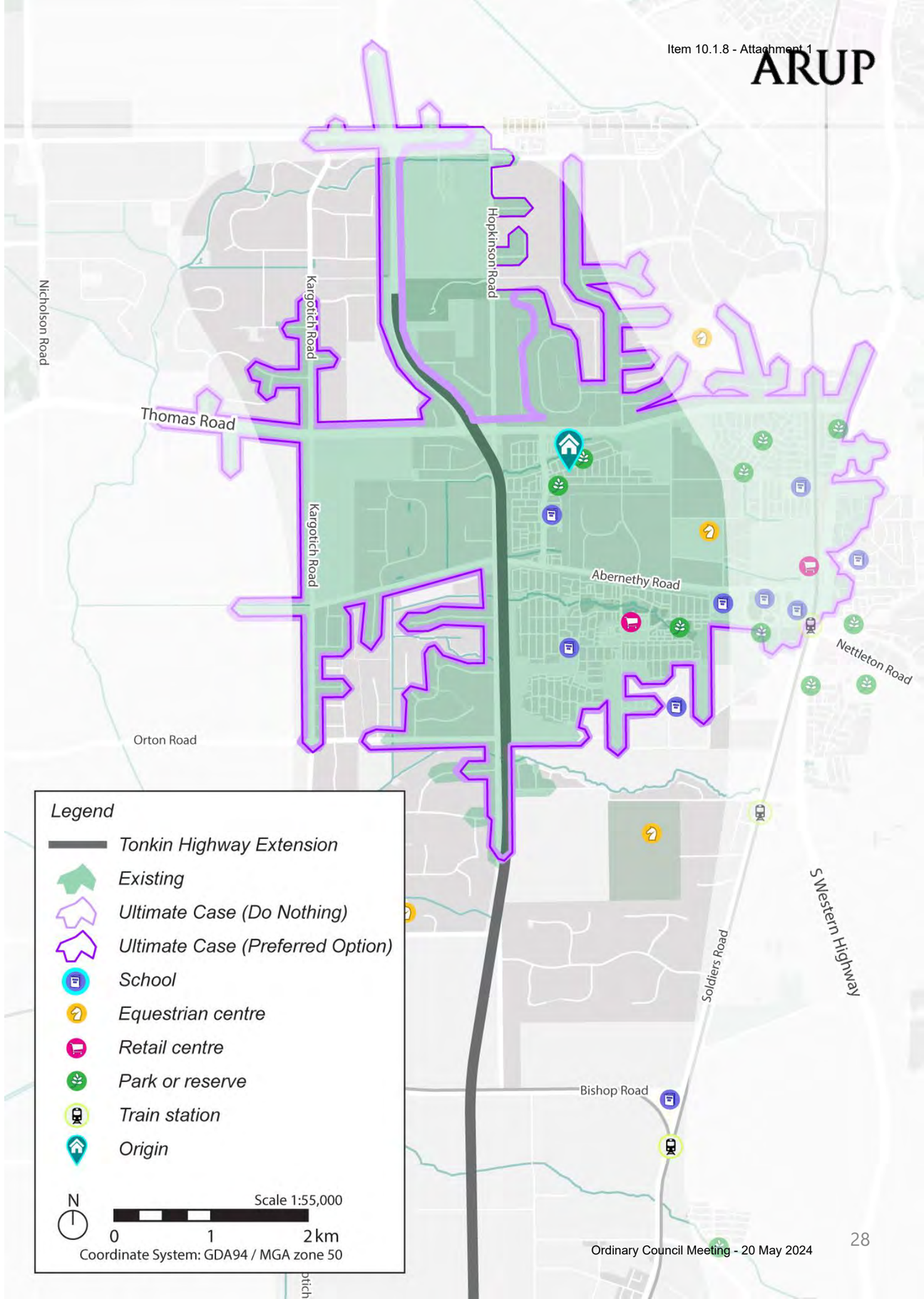


Figure 18

Hopkinson Road vehicle accessibility diagram

8.4 Location 4 – Thomas Road interchange

The preferred option for Thomas Road interchange is a diamond interchange with two loop ramps. This configuration is shown in Figure 19, along with the connecting footpath and shared path networks.

To facilitate east-west connectivity for pedestrians and cyclists, a shared path on the southern side of Thomas Road is advised, with a grade separated underpass provided on the westbound left slip lane. The path will follow the alignment of Thomas Road and tie into the north-south PSP on the eastern side of Tonkin Highway. This arrangement (yellow) is grade separated and therefore there are no interfaces between vehicles, and pedestrians and cyclists.

It should be noted the pink alignment is the preferred treatment to provide active user access to the Ballak Place catchment however this treatment and access provisions remain under investigation.

To the northeast of the interchange, connection to the existing Tonkin Highway PSP occurs from the southern end of Hopkinson Road (dark red), as well as a further recommendation for a connection to the existing equine trail (Option 3.9) to maintain connectivity from Hopkinson Road (blue).

Preferred option
4.7* Provide grade separated active transport crossings for east-west connectivity

*Option developed/ revised at Main Roads Stakeholder Meeting 6th August 2021

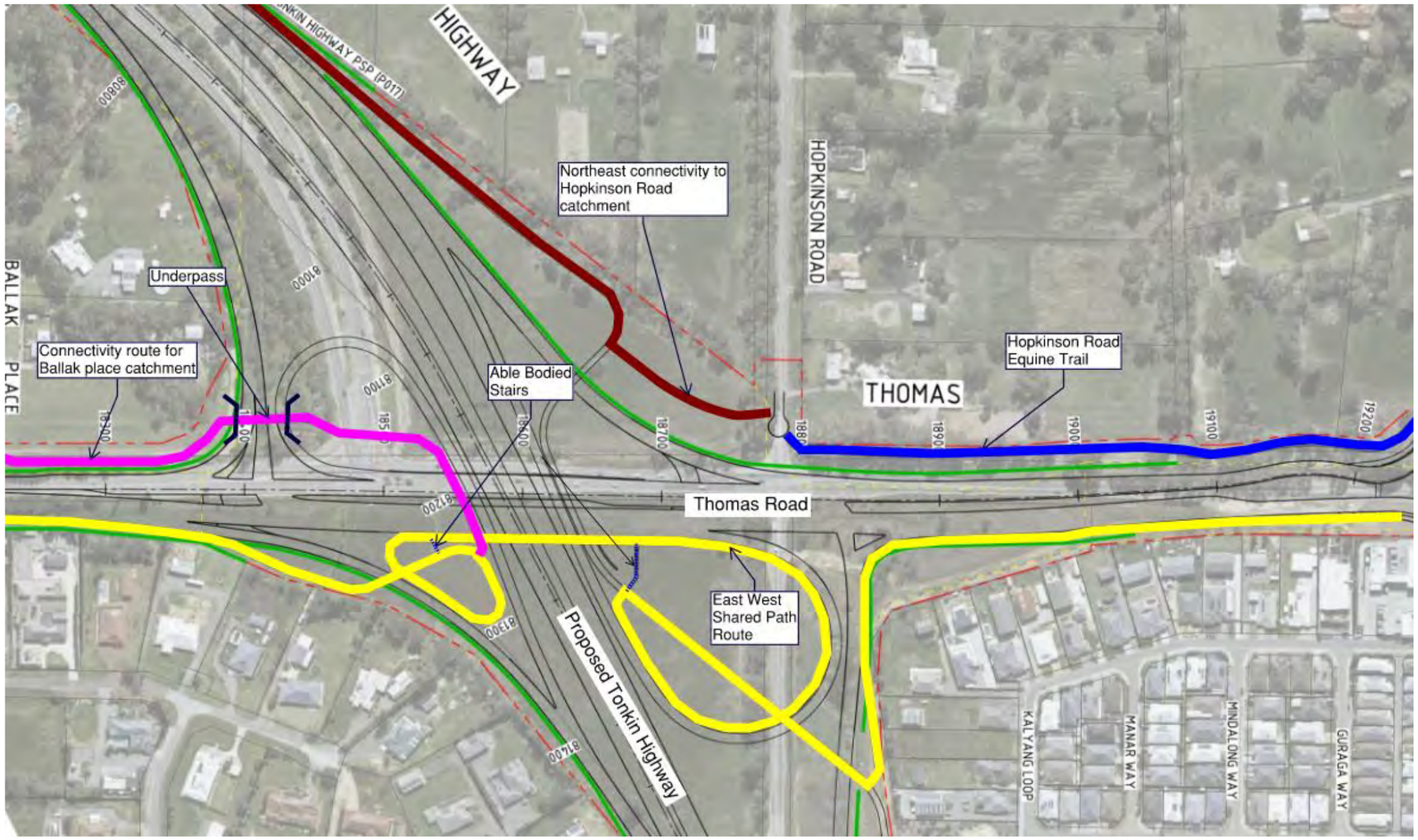


Figure 19
Thomas Road interchange configuration

Figure 21

Jersey Road residential area vehicle accessibility diagram

8.5 Location 5 – Jersey Road residential catchment

The Jersey Road residential catchment currently has vehicle access to the east onto Hopkinson Road. The Tonkin Highway Extension isolates this access and removes access for residents to the broader road network.

To provide vehicle connectivity, access roads extending Jersey Road to the west tying into Kargotich Road and Byford Meadows Drive are advised in line with the Local Structure Plan as shown in Figure 20. It is understood that this subdivision, inclusive of road infrastructure, is currently under construction by the developer as of early-2023, shown previously in Figure 12a.

It has been assumed for this analysis that all subdivision roads are completed by opening year. This delivery is not being conducted by Main Roads, however this preferred option has been captured in this report to demonstrate the impacts of the connecting roads on Jersey Road accessibility/ connectivity.

To show the accessibility impacts, the 5 minute vehicle accessibility catchments for the existing, ultimate do nothing and ultimate preferred option is shown in Figure 21.

It highlights how the access modifications to Hopkinson Road reduces access to the north, east and south relative to the existing conditions, as access out of the Jersey Road residential catchment is redistributed to Kargotich Road and Byford Meadows Drive.

Preferred option

5.1** Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to enable construction of the access on to Kargotich Road, enabling secondary access through the new subdivision roads for the Jersey Road catchment

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

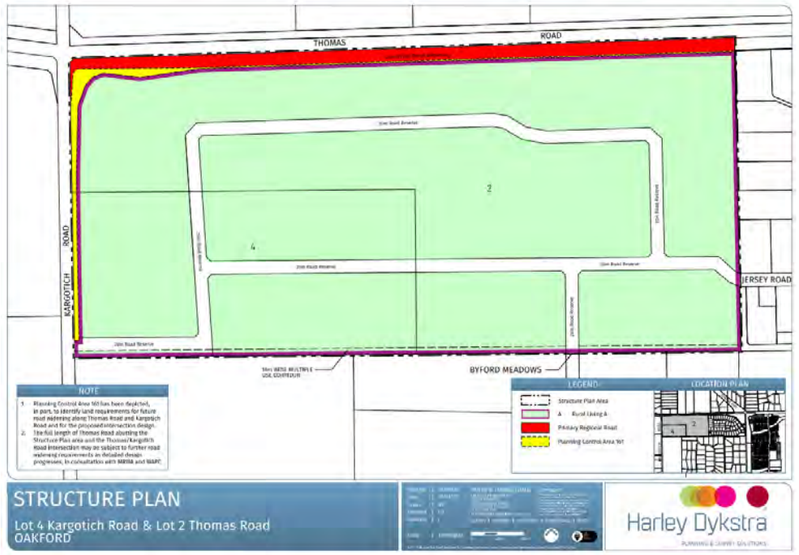
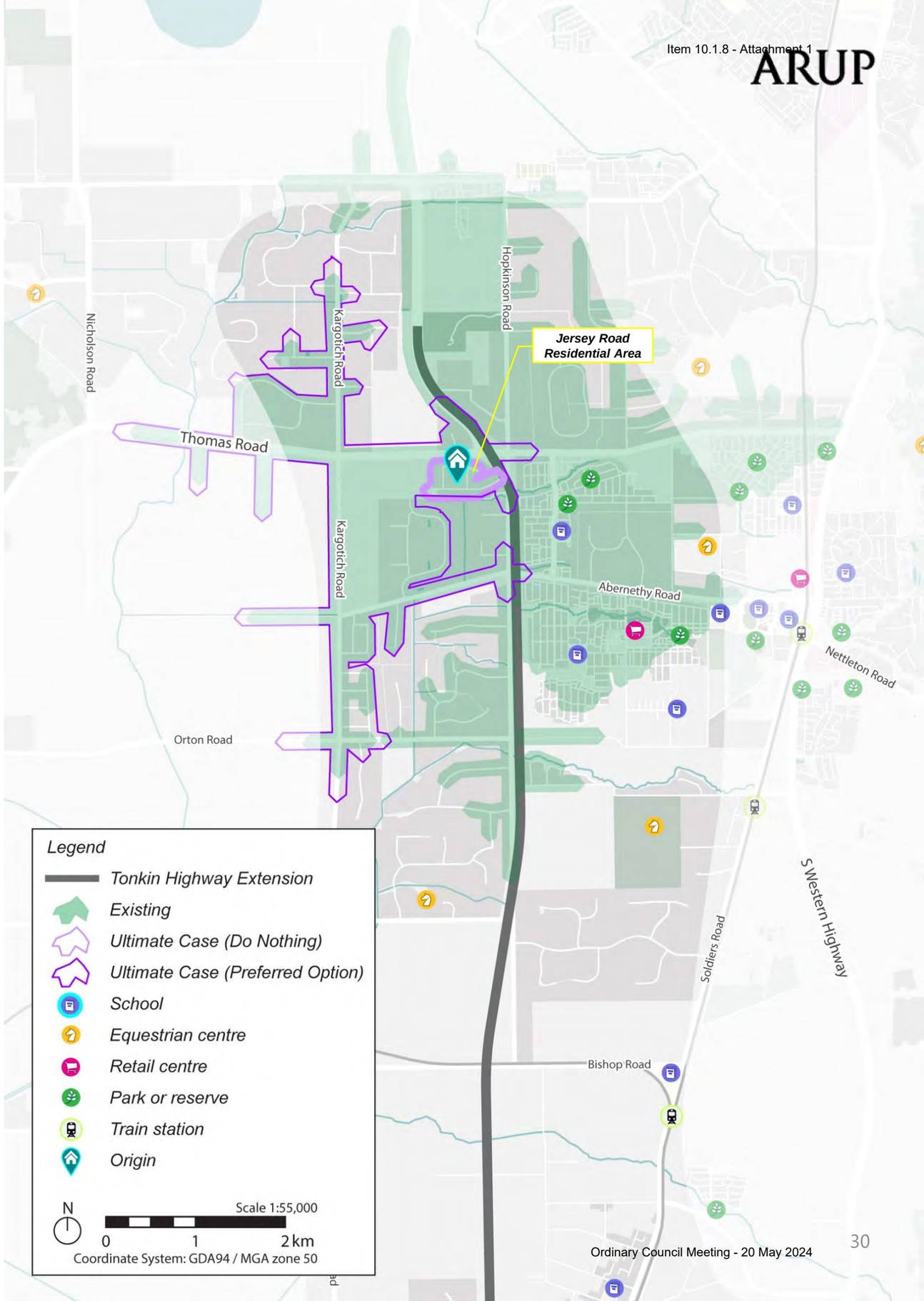


Figure 20

Jersey Road subdivision (*Source: Local Structure Plan Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford*)



8.6 Location 6 – Abernethy Road underpass

Abernethy Road currently intersects Hopkinson Road as a four-way at-grade priority-controlled intersection, proposed to be upgraded as part of the Tonkin Highway Extension project.

The Tonkin Highway Extension will concentrate the east-west connectivity, however the design accommodates a vehicle underpass of Tonkin Highway at Abernethy Road as part of the project case.

To leverage off the height clearance provided for the vehicle underpass, provision for active transport and equestrian access has been considered at this location.

A shared path on the southern side of Abernethy Road is advised to allow for pedestrian and cyclist connectivity between the residents to the west of Hopkinson Road and Byford.

To support the east-west connectivity for equestrian users, it is recommended a dedicated equine path is provided on the northern side of Abernethy Road, to utilise the clearance height provided for the vehicle underpass.

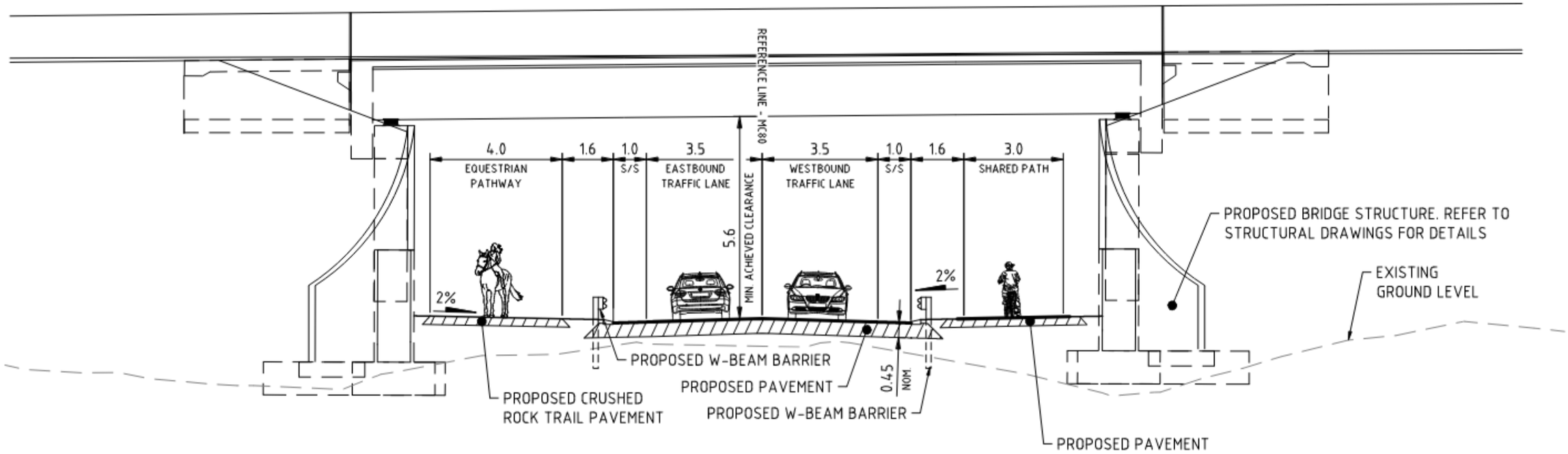
A draft of the Abernethy Road underpass design is shown in Figure 22, showing how the equestrian and shared path can be accommodated in the underpass.

Preferred option

6.2 Provide footpath on southern side of Abernethy Road (continued through underpass) to tie local network into PSP

6.3 Separated equestrian underpass to the north (near Property 11), tying into existing informal trails on northern side of Abernethy Road

Figure 22 Abernethy Road underpass draft design



8.7 Location 7 – Orton Road intersection (project case)

At opening year, the Orton Road intersection is proposed to be an at-grade dual lane roundabout.

At Project Case, a grade-separated PSP footbridge has been recommended over the eastern leg to allow for continuous PSP connectivity. *(Note: project case scope subject to finalisation concerning grade-separated footbridge).*

To facilitate east-west connectivity, a footpath with pram ramp crossings on the northern leg is advised tying into the Tonkin Highway PSP on the eastern side.

A footpath to the east at Copper Road is recommended to tie into the Tonkin Highway PSP, providing access into Byford.

Preferred option

7.3 Provide access to Tonkin Highway PSP north of the intersection

7.5* Crossing on northern side of roundabout, pram ramps (active transport only)

*Option developed/ revised at Main Roads Stakeholder Meeting 6th August 2021

8.8 Location 8 – Orton Road interchange (ultimate case)

At Ultimate Case, Orton Road intersection is anticipated to be a grade-separated roundabout treatment. The pram ramps and footpaths from the Project Case are recommended to be maintained in the Ultimate Case.

A multi-purpose underpass to the south of Orton Road is recommended to be constructed in line with the Ultimate Case grade separation. The vertical alignment of Tonkin Highway will increase due to the grade separation over Orton Road and will increase the feasibility of constructing an east-west equestrian underpass of Tonkin Highway south of Orton Road, see Figure 25.

Preferred option

8.2 Provide shared, multi-purpose underpass south of the intersection (near Property 6)

8.7* Crossing on northern side of grade separated roundabout, pram ramps (active transport only)

*Option developed/ revised at Main Roads Stakeholder Meeting 6th August 2021

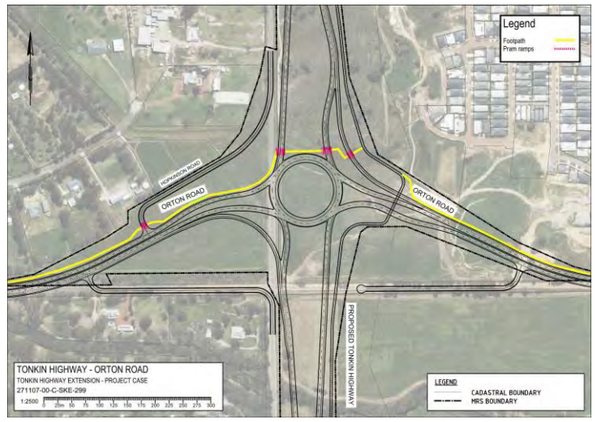


Figure 23

Orton Road Project Case

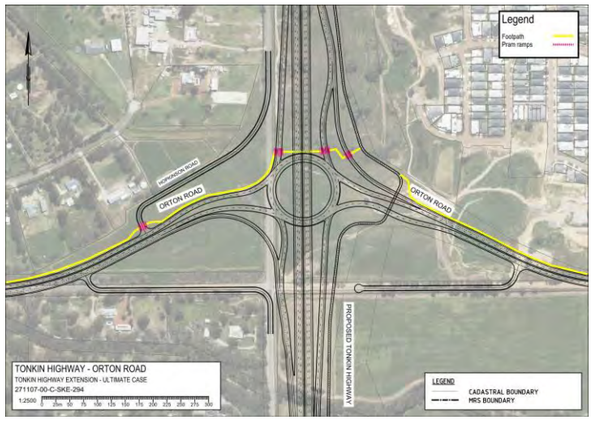
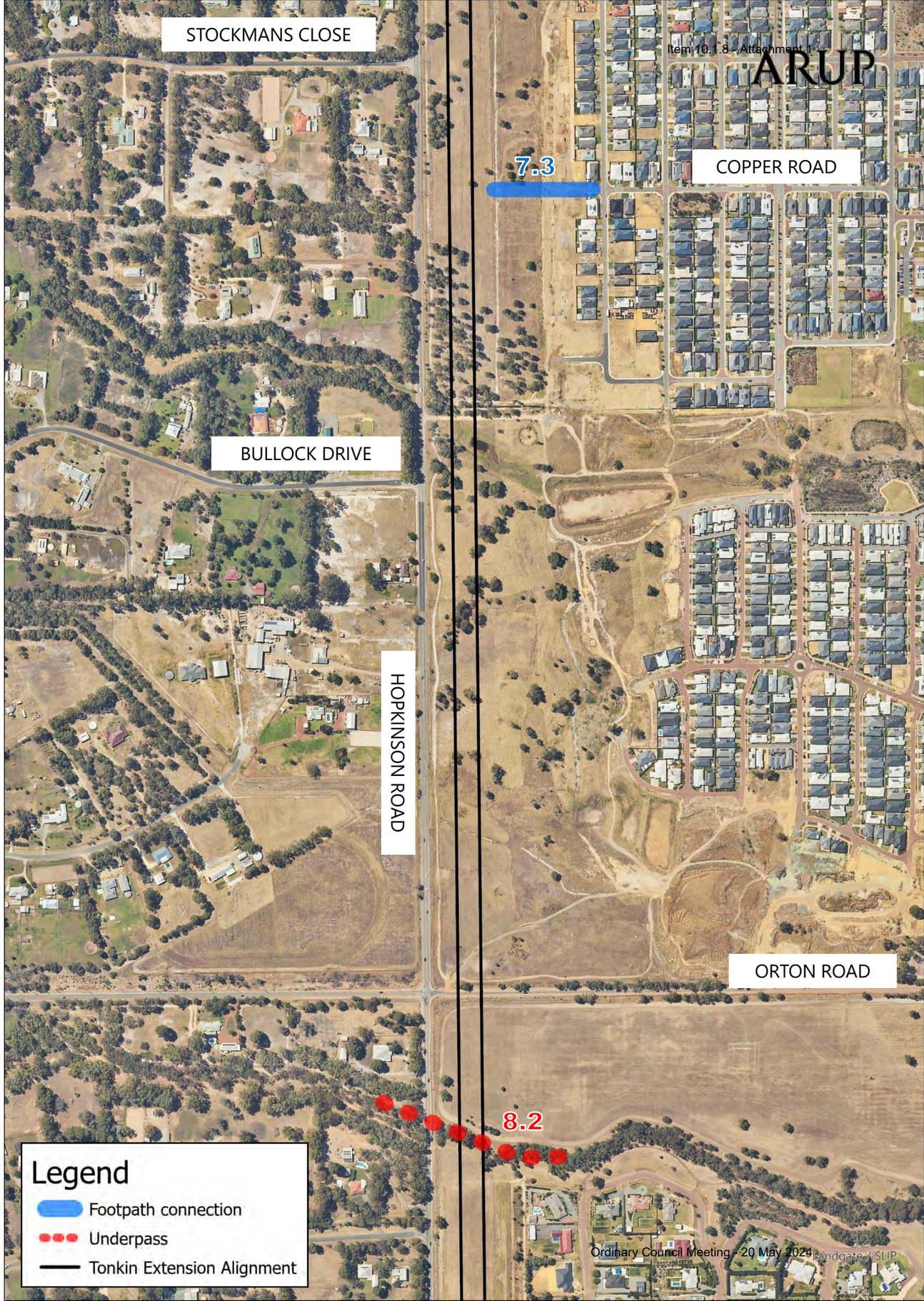


Figure 24

Orton Road Ultimate Case

Figure 25

Orton Road intersection treatments



8.9 Location 9 – Culham Vista residential catchment

Cardup Siding Road is currently an east-west corridor between Hopkinson Road and Soldiers Road. Tonkin Highway Extension modifies vehicle access to the west of Cardup Siding Road onto Hopkinson Road, creating a cul-de-sac.

To minimise the impact of the modified access, a north-south connection between Cardup Siding Road and Orton Road has been proposed within the Byford DSP, as an extension of Doley Road.

The Tonkin Highway Extension design has been updated to include this connection, which is illustrated in Figure 26, see right.

To show the accessibility impacts, the 5 minute vehicle accessibility catchments for the existing, ultimate do nothing and ultimate preferred option is shown in Figure 27.

With the proposed upgrades, the analysis shows:

- Increased access to the north
- Comparable access to the east and west
- Reduced access to the south

Preferred option
9.2 Extension of Doley Road to Cardup Siding Road from Orton Road (following Byford DSP alignment)

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

Figure 26
Proposed Doley Road extension

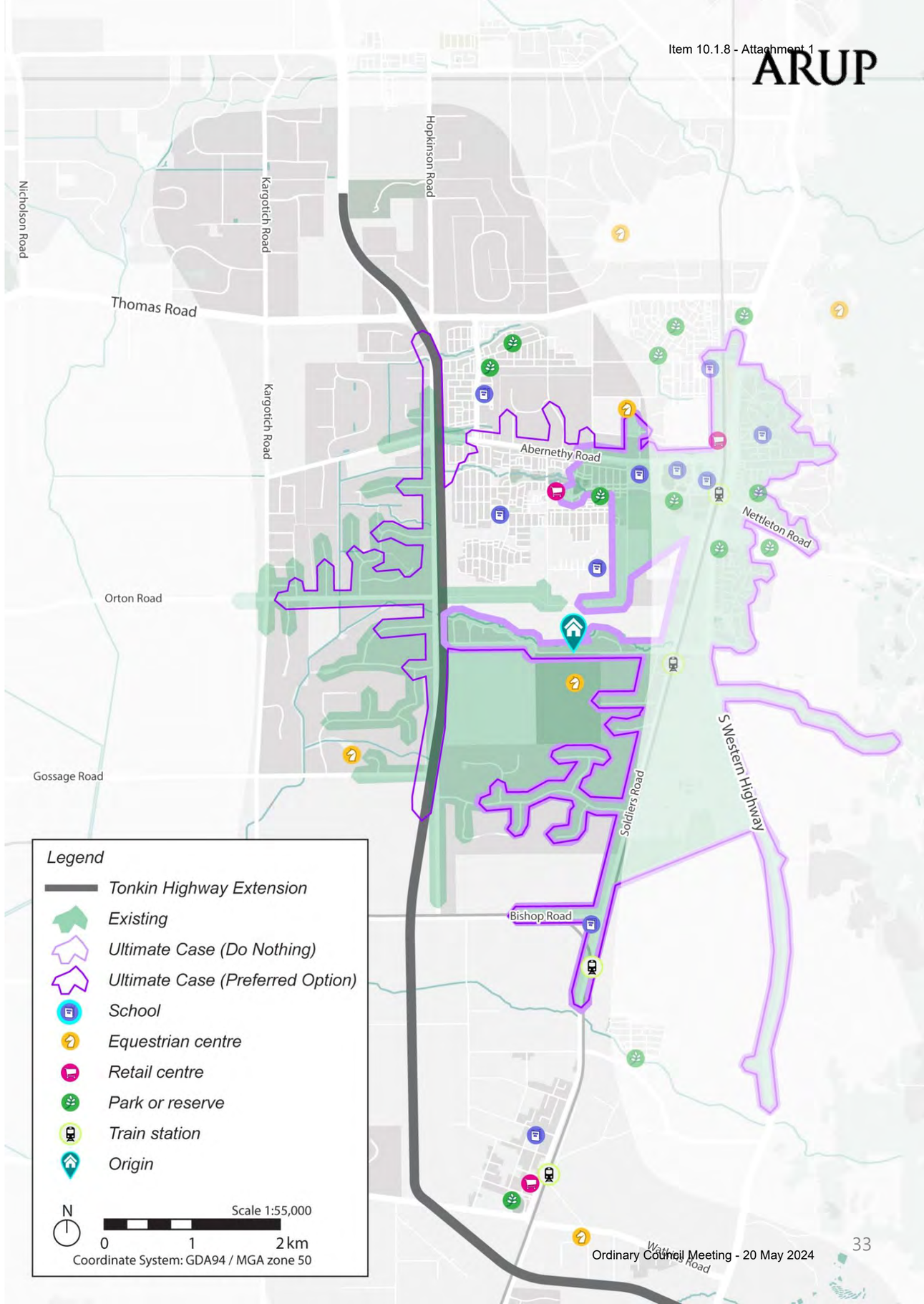


Figure 27
Culham Vista residential catchment accessibility

8.10 Location 10 – Gossage Road underpass

The informal equestrian trail adjacent to Property 20 on Gossage Road (running parallel to existing waterways) has been identified as a frequented equine route, with equine users currently crossing Hopkinson Road at this location. At this location, crossing provides access between the residents that live in the residential area to the west of Hopkinson Road, and the Cardup Nature Reserve to the east of Hopkinson Road, used for recreational equine activity.

Without treatment, the Tonkin Highway Extension alignment modifies this trail access, causing re-routing for equine users and increasing travel times to the Cardup Nature Reserve.

An equestrian underpass, similar to what is provided north of Thomas Road (see Figure 28), is recommended to facilitate the east-west connectivity under Tonkin Highway. The underpass location is shown on Figure 29.

Emergency vehicle access to Lot 33 Hopkinson Road east of the underpass (where Hopkinson Road south is proposed to be cul-de-sac) will also be facilitated at the project case. This is discussed further within Figure 43.

Preferred option
10.2 Equestrian underpass continuing multi-purpose trails adjacent to Property 20

Figure 28
Existing Tonkin Highway equestrian underpass north of Thomas Road

Figure 29
Gossage Road underpass location

8.11 Location 11 – Bishop Road interchange

The project case treatment of the Bishop Road interchange is consistent with the ultimate design. The grade separation of Tonkin Highway over Bishop Road allows for the provision of a shared path on the northern side of Bishop Road, south of the existing freight rail.

A shared path will facilitate pedestrian and cyclist connectivity along Bishop Road, facilitating safe access to Court Grammar School to the east.

To connect the PSP into the local path network, a connection east of Tonkin Highway is advised, as shown on Figure 30. To cross Bishop Road north-south, it is recommended that a staged crossing with pram ramps is provided.

Preferred option

11.2 Provide footpath on southern side of freight rail passing under the Tonkin Highway

11.3 Provide access to Tonkin Highway PSP from local footpath network on Bishop Road

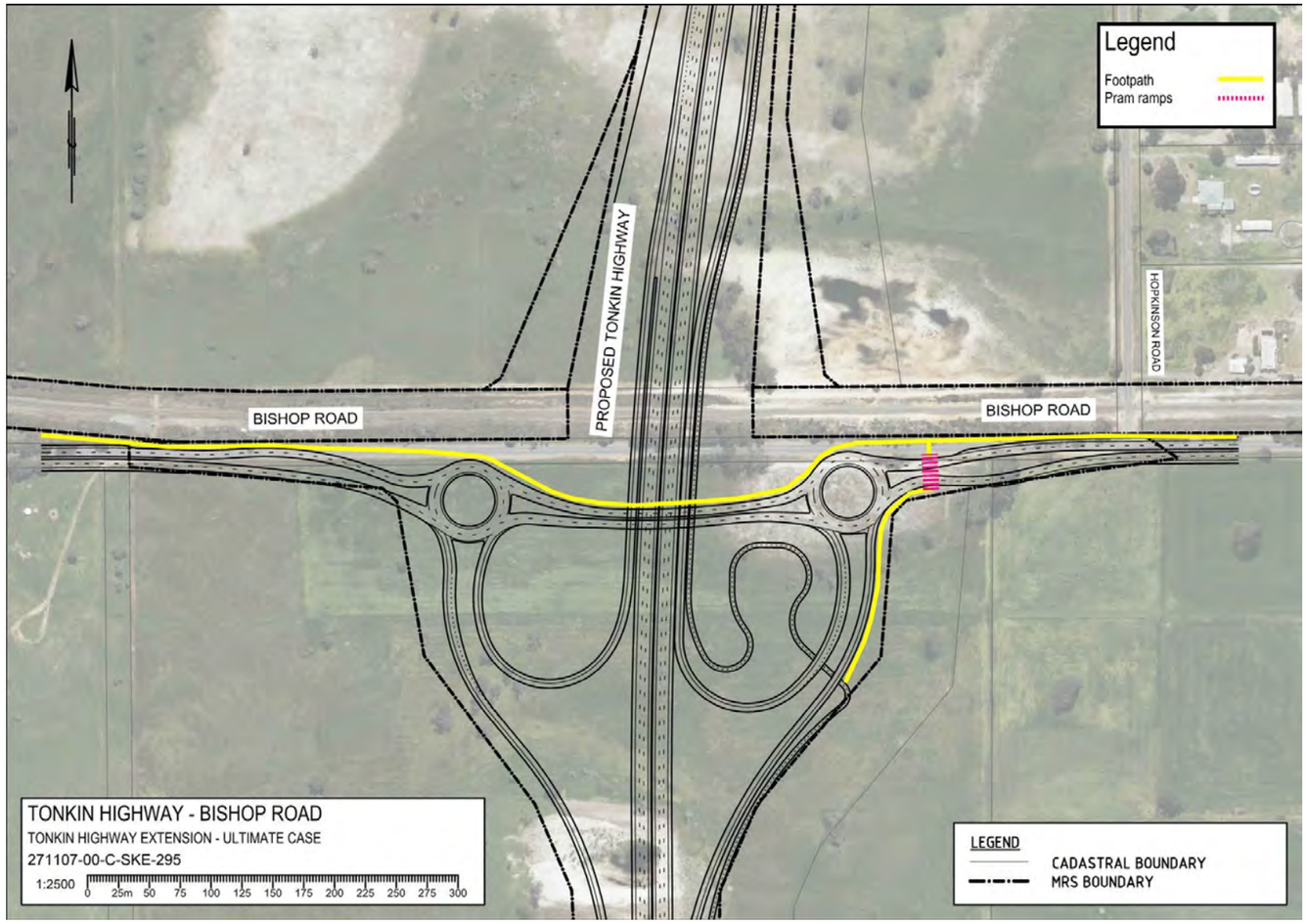


Figure 30
Bishop Road Interchange

8.13 Location 13 – Scott Road residential catchment

Scott Road currently has two access points, Kargotich Road to the west and Taylor Road to the east. There is a segment in the centre of the corridor that is not connected.

When the Tonkin Highway Extension is constructed, the access to the east onto Taylor Road will be isolated, with properties to the east losing local access to the broader road network.

As a recommended treatment, construction of the central section of Scott Road is advised to tie into the western section. This will provide access to the broader road network via Kargotich Road. The surface of the road is proposed to be built consistent with the existing gravel sections on Scott Road.

Preferred option

13.2 Provide missing road section between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP). The road will be built to the existing standard of Scott Road

Figure 31

Scott Road catchment upgrades

8.14 Location 14 – Mundijong Road intersection/ interchange

The Mundijong Road intersection is designed to be a dual lane roundabout at Project Case. At the Ultimate Case, this is proposed as a diamond interchange, however the form of this interchange is to be confirmed subject to the Mundijong Freight Rail Realignment project.

To facilitate east-west pedestrian and cyclist access, in the Project Case pram ramp crossings are recommended to be provided across the northern legs of the intersection, as shown in Figure 32.

At the Ultimate Case, the major east-west crossings are recommended to be protected, in the form of signalised crossings, with zebra crossings across left-turn slip lanes, as shown in Figure 33.

At the Ultimate Case, the east-west footpath is recommended to tie into the PSP on the eastern side of Tonkin Highway adjacent to the off ramp.

Preferred option

14.4* Provide pram ramps for east-west connectivity

14.5 Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP

*Option developed/ revised at Main Roads Stakeholder Meeting 6 August 2021

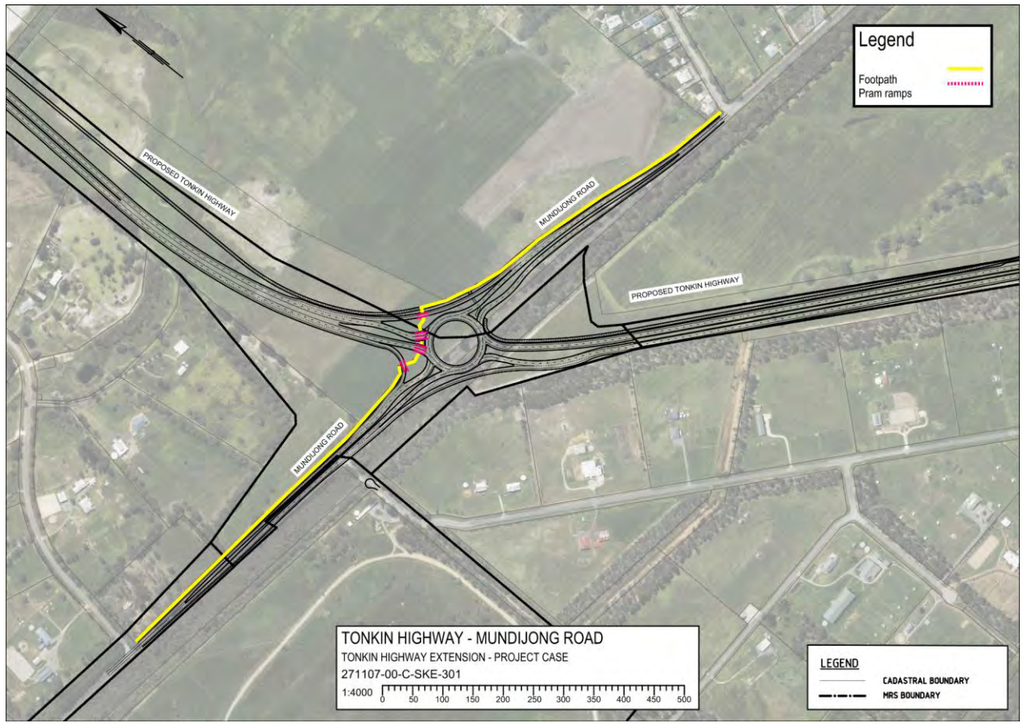


Figure 32

Mundijong Road Project Case east-west connectivity

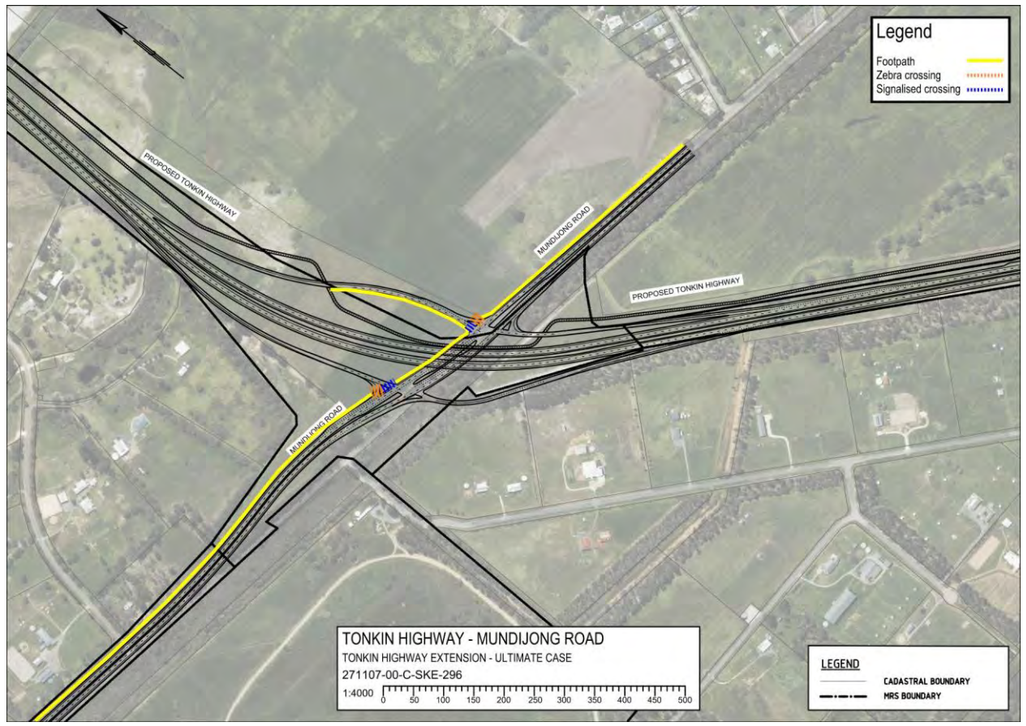


Figure 33

Mundijong Road Ultimate Case east-west connectivity

8.17 Location 17 – Wright Road

The Wright Road corridor runs parallel to the existing freight rail corridor south of Watkins Road. The Tonkin Highway Extension overpasses the freight rail and Wright Road corridor maintaining vehicle access north-south.

To support connectivity to the PSP from the housing catchment to the north of Tonkin Highway, a connection to the PSP extending from the south of Adamson Street is recommended.

Preferred option
17.5 Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway

Figure 34
Wright Road upgrades

8.18 Location 18 – Adamson Street south

The Tonkin Highway Extension alignment isolates the driveway access of Lot 200 Adamson Street. The existing driveway currently extends north over the proposed Tonkin Highway alignment through to Adamson Street, discussed in Figure 34.

This access modification has been known to the landowner since the early concept stage of the Tonkin Highway Extension Project and the realignment of the driveway to the west has been approved prior. The realignment of the driveway as agreed by the landowner is shown in Figure 35, tracking along the north of the property.

Preferred option
18.2 Provide new access to Lot 200 Adamson Street from Bilya Avenue

Figure 35
Adamson Street driveway realignment

8.19 Location 19 – Shanley Road

The Tonkin Highway Extension modifies access to Shanley Road to the north. Without treatment, access is provided only to South Western Highway for land owners and tenants.

To improve the level of access and provide greater bushfire immunity, an underpass accommodating vehicles, equine users, pedestrians and cyclists has been recommended as part of the project scope. This will also provide a greater level of accessibility for the approved LSP for Lot 47, 808 and 809 Shanley Road (Gangemi-owned properties east of Shanley Road).

This underpass is anticipated be similar to the grade-separation provided at Abernethy Road.

A sketch of the proposed underpass is shown below in Figure 36.

Preferred option
19.1 Provide underpass to retain access from Shanley Road to South Western Highway

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

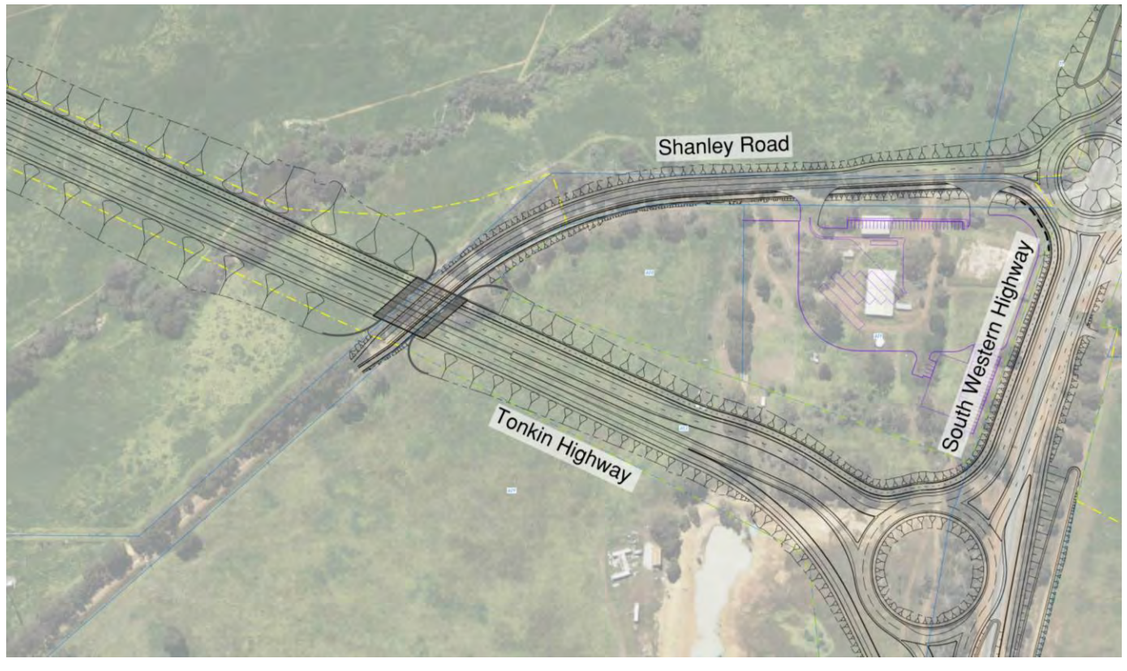


Figure 36 △
Proposed Shanley Road Underpass

8.20 Location 20 – Shanley Road intersection

To address east-west connectivity of pedestrians and cyclists on South Western Highway, several options were investigated for assessment.

With the PSP is proposed for the western side of South Western Highway and residential properties largely situated to the west of South Western Highway, pram ramp crossings have been recommended to service the east-west pedestrian and cyclist connectivity. This will cater for routes to/from Jarrahdale town centre, noting no existing path infrastructure is provided along this section of South Western Highway, Shanley Road or Jarrahdale Road.

This is shown on Figure 37 below for the Project Case design.

Preferred option
20.1 Provide pram ramps only

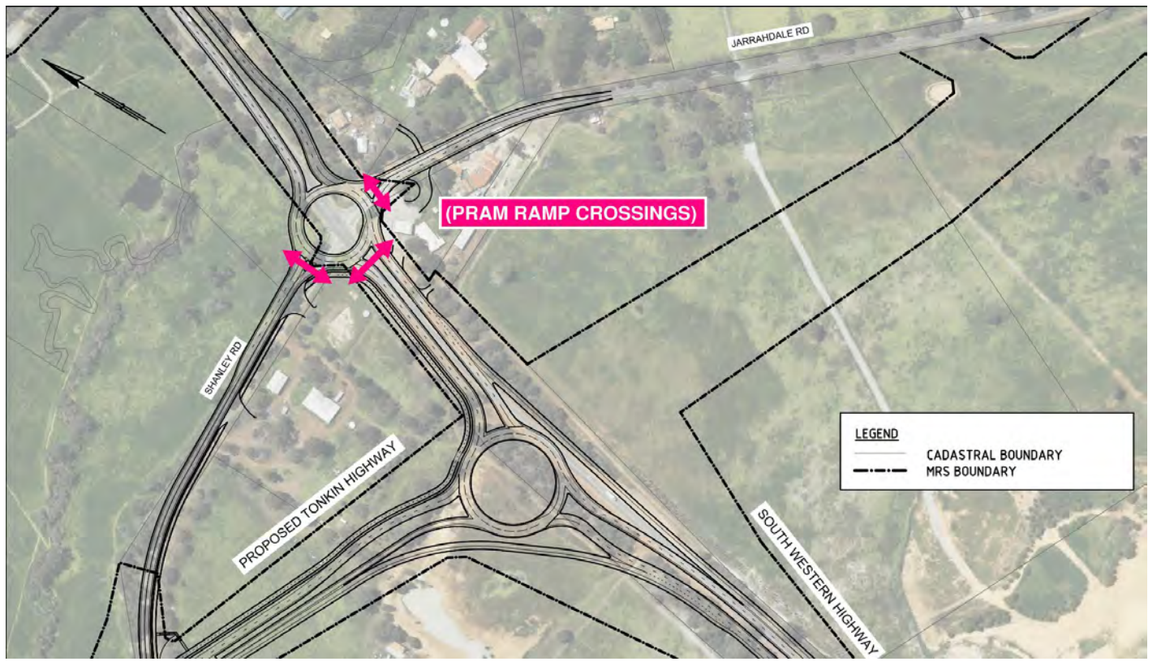


Figure 37 △
Shanley Road Project Case east-west connectivity

8.21 Withdrawn preferred options

Due to separation of projects during the develop phase, preferred options associated with the Mundijong Freight Rail Realignment have since been withdrawn following the formal long list and short list process for the analysis, documented in Appendix A and E.

These options are: 12.1, 15.1 and 16.4. The three preferred options will be addressed separately from this analysis.

9 Bushfire management plan considerations

Arup met with fire management representatives from SoSJ on 14 May 2021 to understand the revised accessibility requirements for evacuation as a result of the Tonkin Highway Extension alignment.

The impacted catchments that were identified for consideration are the Jersey Road Residential Catchment, Cardup Siding Road cul-de-sac and Lampiter Road Residential Catchment.

Emergency access/egress has been provisioned in accordance with *State Planning Policy 3.7 - Planning in bushfire prone areas* and the DPLH/WAPC's *Guidelines for Planning in Bushfire Prone Areas. (Note: document currently under review – access/egress during project delivery may require revisiting against updated guideline)*.

This includes the provision of gated emergency accessways, which are permitted where secondary public road access cannot be provisioned (see *Guidelines for Planning in Bushfire Prone Areas*, section A3.2b, page 74).

The *Tonkin Extension Emergency Bushfire Egress strategy* and *Tonkin Extension Emergency Bushfire Egress – Addendum* is attached as Appendix F.

Further updates were included to reflect the Emergency Egress Review – Addendum dated 1st February 2024.

9.1 Hopkinson Road north of Thomas Road

As discussed in Section 8.3, the proximity of Hopkinson Road (north of Thomas Road) to the Tonkin Highway Extension means access directly to Thomas Road is severed and replaced by a cul-de-sac. As identified by the Emergency Egress Review – Addendum (1st February 2024), the existing emergency access/egress route for properties on this segment of Hopkinson Road is via a convoluted pathway through adjacent rural residential areas approximately 1.5km north of the modified intersection. This road system only provides a single egress route, meaning any vehicle break down or crash could block any further egress for evacuating vehicles and firefighting vehicles. Therefore, additional options are proposed that provide connections to the south as shown in Figure 38 and covered in the Tonkin Extension Emergency Bushfire Egress Strategy. Both options can be considered in detailed design with sufficient land for either option.

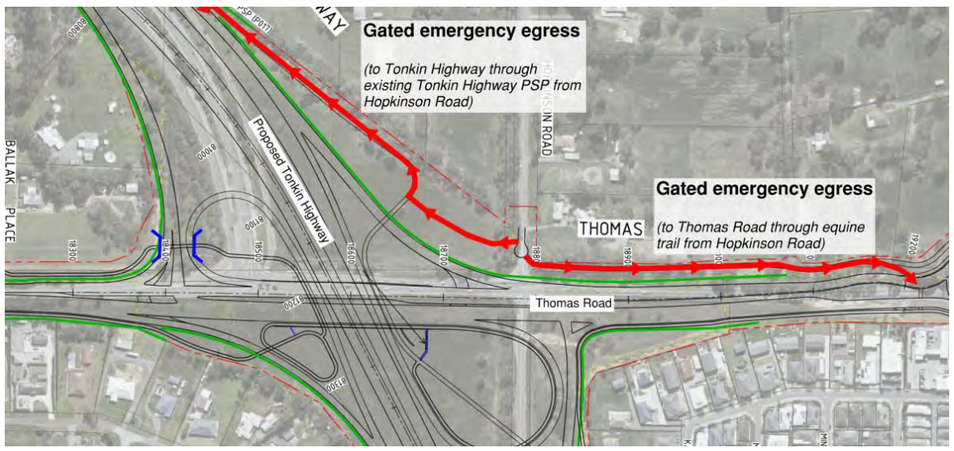
Preferred option

21.1**** Provide gated access from Hopkinson Road cul-de-sac to existing Tonkin Highway PSP or to Thomas Road via the equine trail

**** Option preferred following Emergency Egress – Addendum 1st February 2024

Figure 38

Emergency egress points for Hopkinson Road (north of Thomas Road)



9.2 Jersey Road Residential Catchment

In order to provide alternate emergency bushfire egress to the Jersey Road residential catchment, three gated emergency egress points are recommended in addition to the primary access/egress to Kargotich Road and Byford Meadows Drive – these are shown in Figure 39 below.

The emergency access points to be constructed are:

- Gated access from the north-west of Holstein Court – this is an existing gated access to be reinstated.
- A new gated access from the eastern end of Jersey Road.
- A new gated access from the severed southern section of Abernethy Road.

Preferred option

5.9** Provide gated access points to Tonkin Highway and Thomas Road to allow for emergency evacuation for vehicles

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

Figure 39

Emergency egress points for Jersey Road

9.3 Cardup Siding Road cul-de-sac

The cul-de-sac created at Cardup Siding Road was identified as a potential bushfire risk area. The risk area was flagged at the meeting with SoSJ fire management representatives on 14 May 2021 with the proposed option presented in Section 8.9 found to provide suitable access for bushfire management purposes.

This access arrangement is in line with the proposed extension of Doley Road in line with the DSP – see Figure 27.

In addition to the extension of Doley Road, it was raised in a meeting with Main Roads on 6th August 2021 that an additional emergency route should be provisioned for. Further options were investigated as part of the Emergency Egress Review – Addendum (1st February 2024), with the preferred option to provide gated access to the PSP on the eastern side of Tonkin Highway which can allow for vehicle evacuation, with the future design allowing direct access to the southbound lanes of Tonkin Highway.

The current proposed access locations out of Cardup Siding Road in line with section 8.9 is shown in Figure 40.

Preferred option
9.4* Provide emergency access to Tonkin Highway from Cardup Siding Road to allow for emergency evacuation for vehicles

*Option developed/ revised at Main Roads Stakeholder Meeting 6 August 2021

9.4 Lot 33 Hopkinson Road

As part of design development of the Tonkin Highway Extension project, and through review of the bushfire management elements, a requirement was highlighted to provide access to/from Lot 33 Hopkinson Road, subject to future planning as a residential subdivision.

Primary access to this development will be to Cardup Siding Road, at locations to be determined through the Local Structure Planning process. Secondary emergency egress is provisioned in the south-west corner onto the Hopkinson Road cul-de-sac as shown in Figure 41 below.

It should be noted that this development will also be able to utilise the emergency egress point provided on the western end of Cardup Siding road, as outlined in Section 9.2.

Preferred option
10.3** Provide gated access from Lot 33 Hopkinson Road to Hopkinson Road

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

Figure 40
Emergency egress points for Cardup Siding

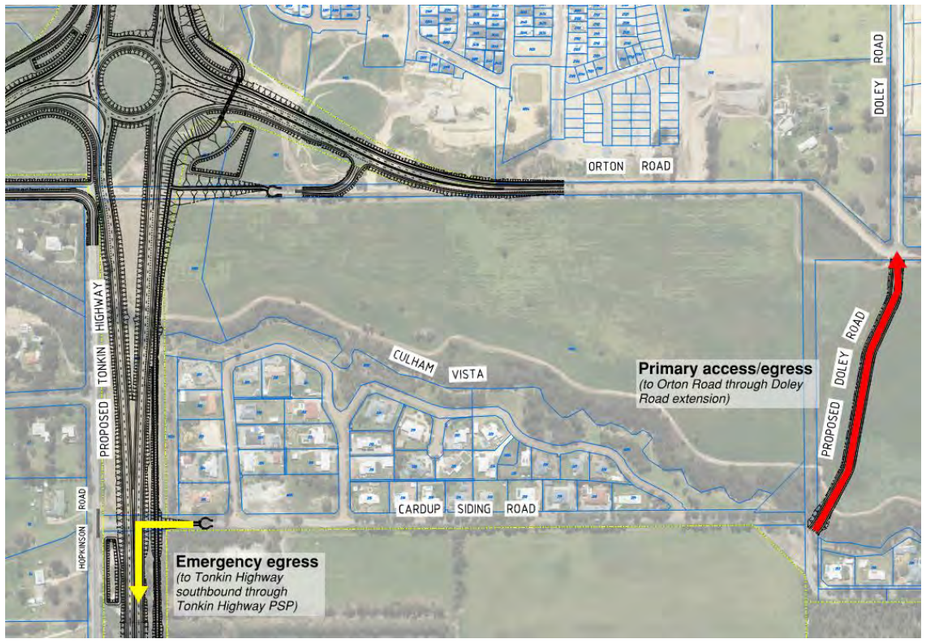
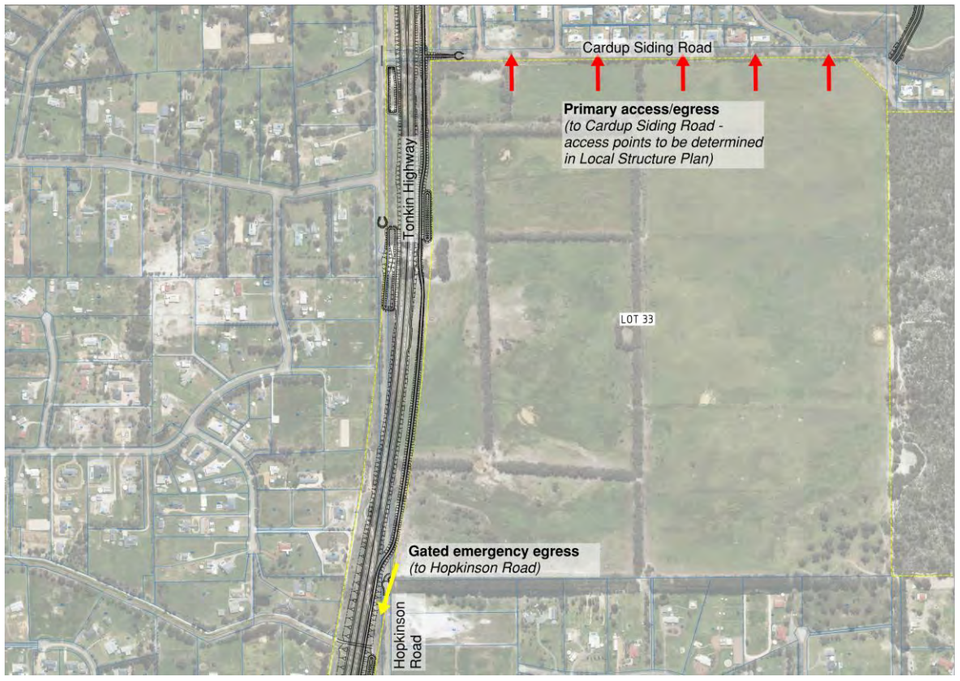


Figure 41
Emergency egress points Lot 33 Hopkinson Road



9.5 Lampiter Road residential catchment

On 6 August 2021, Arup met with Main Roads to confirm the outcomes of the accessibility strategy. At the meeting, it was identified that the proposed solution for the Lampiter Road residential catchment at the ultimate may not meet minimum fire and emergency evacuation requirements. It was deemed that an additional emergency egress location should be provided for the catchment.

The proposed recommendations for the catchment were further investigated, and an additional option was developed.

There currently exists a drainage easement to the north-east of Lampiter Road, and it is recommended that a gated emergency accessway is provided using the redundant widths of the corridor directly onto Tonkin Highway, see Figure 42.

This type of treatment has been implemented as part of the NorthLink WA Stage 3 Project, where gated access directly onto Tonkin Highway is provided in case of an emergency.

An additional emergency access is also recommended to be provided on to Mundijong Road from the northern extent of Lampiter Road. These emergency egress points supplement the planned primary access/egress through Dairy Link and Ironguard Road, required as part of the Mundijong Freight Rail Realignment.

Preferred option

15.4** Provide gated access roads between Lampiter Road and Tonkin Highway Extension/Mundijong Road for emergency evacuation

** Option further modified/refined following Tonkin Highway Extension design development in November 2022

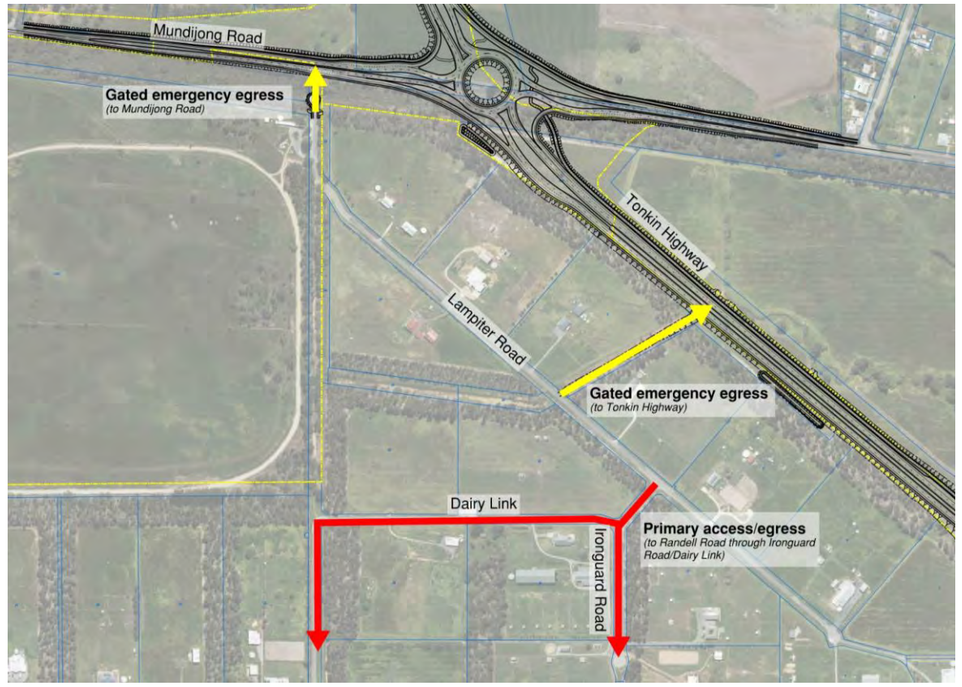


Figure 42

Emergency egress points Lampiter Road

10 Conclusion

The accessibility study has provided a strategy for implementation to limit the extent the Tonkin Highway Extension primary works modifies existing accesses for the immediate vehicle, pedestrian, cyclist and equestrian networks.

The preferred options represent the treatment option at each location that most aligns with the project objectives and supporting accessibility outcomes discussed earlier within this report.

Next steps

The strategy has been developed in line with the preferred intersection treatments at Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway, the Thomas Road Duplication Project, and the Mundijong Freight Rail Realignment Project. If the preferred options are subject to change, this strategy should be revisited to assess the suitability of the preferred options.

Table 2 provides summary of the preferred options and whether these should be delivered as part of the project case, ultimate case, or as part of an interfacing project (i.e. Thomas Road Duplication).

Table 2
Next steps for preferred options

Option	Incorporate into Tonkin Extension Project Case design	Incorporate into Tonkin Extension Ultimate Case design	Incorporate into Thomas Road Duplication design
1.4** Ballak Place residential catchment: Provide footpath on southern side of Thomas Road heading east, tying into Thomas Road interchange and Thomas Road/Kargotich Road roundabout (to be constructed 2022/23)	✓	✓	✓
2.2 Ballak Place/Thomas Road intersection: Left-in left-out treatment on Thomas Road *(with semi-mountable kerb median)*	✓	✓	
3.8 Hopkinson Road north connectivity: Tie PSP into local network on Kellet Drive and end of Hopkinson	✓	✓	
3.9 Hopkinson Road north connectivity: Tie multi purpose routes onto the trails running alongside the northern side of Thomas Road	✓	✓	✓
4.7* Thomas Road interchange: Provide grade separated active transport crossings for east-west connectivity	✓	✓	
5.1** Jersey Road residential catchment: Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to enable construction of the access on to Kargotich Road, enabling secondary access through the new subdivision roads for the Jersey Road catchment	✓	✓	
5.9** Jersey Road residential catchment: Provide gated access points to Tonkin Highway and Thomas Road to allow for emergency evacuation for vehicles	✓	✓	
6.2 Abernethy Road underpass: Provide footpath on southern side of Abernethy Road (continued through underpass) to tie local network into PSP	✓	✓	
6.3 Abernethy Road underpass: Separated equestrian underpass to the north (near Prop11), tying into existing informal trails on northern side of Abernethy Road	✓	✓	
7.3 Orton Road intersection (project case): Provide access to Tonkin Highway PSP on the northern side of the intersection	✓	✓	
7.5* Orton Road intersection (project case): Crossing on northern side of roundabout, pram ramps (active transport only). *Note: 7.5 and 8.7 options are mutual.*	✓	✓	
8.2 Orton Road intersection (ultimate case): Provide shared, multi-purpose underpass south of the intersection (near Property 6)		✓	
8.7* Orton Road intersection (ultimate case): Crossing on northern side of grade separated roundabout, pram ramps (active transport only)		✓	
9.2** Culham Vista residential catchment: Extension of Doley Road to Cardup Siding Road from Orton Road (following Byford DSP alignment)	✓	✓	
9.4* Culham Vista residential catchment: Provide emergency access to Tonkin Highway from Cardup Siding Road to allow for emergency evacuation for vehicles	✓	✓	
10.2 Gossage Road underpass: Equestrian underpass continuing multi-purpose trails adjacent to Property 20	✓	✓	
10.3** Gossage Road underpass: Provide gated access from Lot 33 Hopkinson Road to Hopkinson Road	✓	✓	
11.2 Bishop Road interchange: Provide footpath on southern side of freight rail passing under the Tonkin Highway	✓	✓	
11.3 Bishop Road interchange: Provide access to Tonkin Highway PSP from local footpath network on Bishop Road	✓	✓	
13.2 Scott Road residential catchment: Provide missing road section between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP). The road will be built to the existing standard of Scott Road	✓	✓	
14.4 Mundijong Road intersection: Provide pram ramps for east-west connectivity	✓	✓	
14.5 Mundijong Road intersection: Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP		✓	
15.4** Lampiter Road residential catchment: Provide gated access roads between Lampiter Road and Tonkin Highway Extension/Mundijong Road for emergency evacuation	✓	✓	
17.5 Wright Road: Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway	✓	✓	
18.2 Adamson Street South: Provide new access to Lot 200 Adamson Street from Bilya Avenue	✓	✓	
19.1** Shanley Road: Provide underpass to retain access from Shanley Road to South Western Highway	✓	✓	
20.1 Shanley Road intersection: Provide pram ramps only	✓	✓	
21.1**** Hopkinson Road intersection: Provide gated access from Hopkinson Road cul-de-sac to existing Tonkin Highway PSP or to Thomas Road via the equine trail	✓	✓	

* Options developed/ revised at Main Roads Stakeholder Meeting 6 August 2021
** Option further modified/refined following Tonkin Highway Extension design development in November 2022
**** Option preferred following Emergency Egress – Addendum 1st February 2024

Appendix A

Long list options and fatal flaw analysis

Note: Further commentary on rationale for fatally flawing options is presented in Appendix E.

Long list options and fatal flaw analysis

Mode	#	Shortlisted (Y/N)	Option description
Sector 1 – Thomas Road to south of Orton Road			
Location 1 – Ballak Place residential catchment			
🚶 🚲 🚗 🐎	1.1	N	Purchase properties and remove access
🚗	1.2	Y	Provide service road north of Thomas Road between Kargotich Road and Ballak Place
🚶 🚲	1.3	Y	Provide footpath on northern side of Thomas Road heading east and tying into Thomas Road interchange
🚶 🚲	1.4	Y	Provide footpath on southern side of Thomas Road heading east and tying into Thomas Road interchange
Location 2 – Ballak Place/ Thomas Road intersection			
🚗	2.1	N	Left-in left-out only on Thomas Road *(with barrier kerb median)*
🚗	2.2	Y	Left-in left-out only on Thomas Road *(with semi-mountable kerb median)*
🚗	2.3	N	Left-in left-out only on Thomas Road *(with painted median)*
🚗	2.4	N	Full access roundabout
🚗	2.5	N	Full access signalised
🚗	2.6	Y	Full access priority-controlled seagull
🚗	2.7	Y	Full access priority-controlled median break
🚗	2.8	N	Realign Ballak Place to Holstein Court and provide a 4-way intersection
Location 3 – Hopkinson Road north connectivity			
🚗	3.1	N	Realign access to Thomas Road at a new roundabout
🚗	3.2	N	Realign access to Thomas Road at a new signalised intersection
🚗	3.3	N	Realign access to Thomas Road at a new priority-controlled intersection
🚗	3.4	Y	Realign access to Thomas Road at Kardan Boulevard (proposed District Distributor) with roundabout
🚗	3.5	Y	Realign access to Thomas Road at Kardan Boulevard (proposed District Distributor) with signalised intersection
🚗	3.6	Y	Left-in/ left-out at Hopkinson Road
🚗	3.7	Y	Realign access to Thomas Road at Kardan Boulevard (proposed District Distributor) with priority controlled intersection
🚶 🚲	3.8	Y	Tie PSP into local network on Kellet Drive
🐎	3.9	Y	Tie multi-purpose routes onto the trails running alongside the northern side of Thomas Road

Mode	#	Shortlisted (Y/N)	Option description
Sector 1 – Thomas Road to south of Orton Road			
Location 4 – Thomas Road interchange			
🚶 🚲	4.1	Y	Provide grade separated multi-purpose path on northern side of interchange
🚶 🚲	4.2	Y	Provide grade separated multi-purpose path on southern side of interchange
🚶 🚲	4.3	Y	Provide pram ramps only for east-west connectivity across interchange
🚶 🚲	4.4	N	Provide zebra crossings for east-west connectivity across interchange
🚶 🚲	4.5	Y	Provide raised wombat crossings for east-west connectivity
🚶 🚲	4.6	N	Provide signalised pedestrian crossings (pelican/ puffin) for east-west connectivity across interchange
Location 5 – Jersey Road residential catchment			
🚶 🚲 🚗 🐎	5.1	Y	Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to construct new internal road layout connecting Jersey Road through to Kargotich Road with additional access road connecting with Byford Meadows Drive
🚶 🚲 🚗	5.2	Y	New access road from Jersey Road west to tie into Kargotich Road (partial 5.1)
🚶 🚲 🚗	5.3	Y	New access road from Jersey Road west to tie into Byford Meadows Drive (partial 5.1)
🚶 🚲 🚗	5.4	N	New access road from Jersey Road west to tie into Thomas Road
🚶 🚲 🚗	5.5	N	New access road from Jersey Road central to tie into Abernethy Road
🚶 🚲 🚗	5.6	Y	New access road from Jersey Road east to tie into Hopkinson Road
🚶 🚲 🚗	5.7	N	New access road from Holstein Court north west to tie into Thomas Road
🚶 🚲 🚗	5.8	Y	New access road from Jersey Road central to tie into Hopkinson Road
Location 6 – Abernethy Road underpass			
🚶 🚲	6.1	Y	Provide footpath on northern side of Abernethy Road (continued through underpass) to tie local network into PSP on northern side of Abernethy Road
🚶 🚲	6.2	Y	Provide footpath on southern side of Abernethy Road (continued through underpass) to tie local network into PSP on southern side of Abernethy Road
🐎	6.3	Y	Separated equestrian underpass to the north (near Property 11), tying into existing multi-purpose trails on northern side of Abernethy Road
Location 7 – Orton Road intersection (project case)			
🚶 🚲 🐎	7.1	Y	Provide shared, multi-purpose underpass north of the intersection (near Property 10)
🚶 🚲 🐎	7.2	Y	Provide shared, multi-purpose underpass south of the intersection (near Property 6)
🚶 🚲	7.3	Y	Provide access to Tonkin Highway PSP on the northern side of the intersection
🚶 🚲	7.4	Y	Provide access to Tonkin Highway PSP on the southern side of the intersection

Mode	#	Shortlisted (Y/N)	Option description
Sector 1 – Thomas Road to south of Orton Road			
Location 8 – Orton Road interchange (ultimate case)			
🚶 🚲 🐎	8.1	Y	Provide shared, multi-purpose underpass north of the intersection (near Property 10)
🚶 🚲 🐎	8.2	Y	Provide shared, multi-purpose underpass south of the intersection (near Property 6)
🚶 🚲	8.3	Y	Crossing on grade separated roundabout, pram ramps only
🚶 🚲	8.4	N	Crossing on grade separated roundabout, zebra crossings
🚶 🚲	8.5	Y	Crossing on grade separated roundabout, raised wombat crossing
🚶 🚲	8.6	N	Crossing on grade separated roundabout, signals
Sector 2 – Orton Road to Bishop Road			
Location 9 – Culham Vista residential catchment			
🚗	9.1	Y	New access road from Learmouth Turn to slip road/ existing Orton Road
🚗	9.2	Y	Extension of Doley Road to Cardup Siding Road from Orton Road intersection (in line with Byford DSP future local distributors)
🚗	9.3	N	Underpass on Cardup Siding Road
Location 10 – Gossage Road underpass			
🚗	10.1	N	Vehicle underpass retaining connection between Gossage Road and Hopkinson Road
🚶 🚲 🐎	10.2	Y	Multi-purpose underpass continuing multi-purpose trails adjacent to Property 20
Location 11 – Bishop Road interchange			
🚶 🚲	11.1	Y	Provide footpath on northern side of freight rail, passing under the Tonkin Highway
🚶 🚲	11.2	Y	Provide footpath on southern side of freight rail, passing under the Tonkin Highway
🚶 🚲	11.3	Y	Provide access to Tonkin Highway PSP from local footpath network on Bishop Road
Location 12 – Bishop Road (with Freight Rail Realignment)			
🐎	12.1	Y	Convert rail underpass and track into equestrian (multi-purpose) trail

Mode	#	Shortlisted (Y/N)	Option description
Sector 3 – Bishop Road to Wright Road			
Location 13 – Scott Road residential catchment			
🚗	13.1	N	Retain access on Scott Road by providing underpass under Tonkin Highway in the project case and under freight rail in the ultimate case
🚗	13.2	Y	Provide missing link between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP)
🚗	13.3	N	Purchase property and remove access
Location 14 – Mundijong Road interchange			
🚶 🚲	14.1	Y	Provide signalised pedestrian crossings (pelican/ puffin) across Tonkin Highway on/ off-ramps for east-west connections along Mundijong Road
🚶 🚲	14.2	Y	Provide pram ramps only for east-west connectivity across interchange
🚶 🚲	14.3	N	Provide zebra crossings for east-west connectivity across interchange
🚶 🚲	14.4	Y	Provide raised wombat crossings for east-west connectivity
🚶 🚲	14.5	Y	Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP
Location 15 – Lampiter Road residential catchment			
🚗	15.1	Y	Extend Ironguard Road south to Randell Road
🚗	15.2	Y	Extend Lampiter Drive south to Randell Road
🚗	15.3	Y	Realign Dairy Lane to run parallel to the freight rail line on the east and connect through to Randell Road on the eastern side of Property 98
Location 16 – Randell Road			
🚶 🚲 🚗	16.1	N	Provide underpass under freight rail line
🚶 🚲 🚗	16.2	N	Provide overpass over freight rail line
🚶 🚲 🚗	16.3	Y	Provide level crossing on Randell Road to retain east-west connectivity.
🚶 🚲 🚗	16.4	Y	Sever east-west access but provide improved active transport amenity on Randell Road and Kargotich Road

Mode	#	Shortlisted (Y/N)	Option description
Sector 4 – Wright Road to South Western Highway			
Location 17 – Wright Road			
	17.1	Y	Multi-purpose trail on eastern side of Wright Road
	17.2	Y	Multi-purpose trail on western side of Wright Road
	17.3	Y	Footpath on eastern side of Wright Road
	17.4	Y	Footpath on western side of Wright Road
	17.5	Y	Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway
Location 18 – Adamson Street South			
	18.1	N	Provide underpass connecting Adamson Street south with Adamson Street north to provide north-south connectivity across Tonkin Highway
	18.2	Y	Provide new access road between Adamson Street south and Bilya Road
	18.3	Y	Provide new access road between Adamson Street south and Shanley Road
	18.4	N	Purchase property and remove access
Location 19 – Shanley Road			
	19.1	N*	Provide underpass to retain access from Shanley Road to South Western Highway (note: this was later reinstated as a preferred option in line with project case scope)
	19.2	Y	Sever access and investigate alignment with proposed Special Rural Subdivision Lots 47, 48 and 809 Shanley Road Mardella (Shire Town Planning Scheme No.2 Amendment No. 205, 2017)
Location 20 – Shanley Road intersection			
	20.1	Y	Provide pram ramps only
	20.2	N	Provide signalised active transport crossing (pelican/ puffin)

Appendix B

Short list and multi criteria analysis

Note: Derivation of scores is provided in Appendix E.

Short list options and multi criteria analysis

Mode	#	MCA score	Option description
Sector 1 – Thomas Road to south of Orton Road			
Location 1 – Ballak Place residential catchment			
🚗	1.2	4	Provide service road north of Thomas Road between Kargotich Road and Ballak Place
🚶 🚲	1.3	7	Provide footpath on northern side of Thomas Road heading east and tying into Thomas Road interchange
🚶 🚲	1.4	8	Provide footpath on southern side of Thomas Road heading east and tying into Thomas Road interchange
Location 2 – Ballak Place/ Thomas Road intersection			
🚗	2.2	8	Left-in left-out on Thomas Road *(with semi-mountable kerb median)*
🚗	2.6	4	Full access priority-controlled seagull
🚗	2.7	7	Full access priority-controlled median break
Location 3 – Hopkinson Road north connectivity			
🚗	3.4	8	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with roundabout
🚗	3.5	4	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with signalised intersection
🚗	3.6	-2	Left-in/ left-out at Hopkinson Road
🚗	3.7	2	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with priority controlled intersection
🚶 🚲	3.8	10	Tie PSP into local network on Kellet Drive
🐎	3.9	7	Tie multi-purpose routes onto the trails running alongside the northern side of Thomas Road
Location 4 – Thomas Road interchange			
🚶 🚲	4.1	1	Provide grade separated multi-purpose path on northern side of interchange
🚶 🚲	4.2	3	Provide grade separated multi-purpose path on southern side of interchange
🚶 🚲	4.3	4	Provide pram ramps only for east-west connectivity across interchange
🚶 🚲	4.5	6	Provide raised wombat crossings for east-west connectivity
Location 5 – Jersey Road residential catchment			
🚶 🚲 🚗 🐎	5.1	6	Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to construct new internal road layout connecting Jersey Road through to Kargotich Road with additional access road connecting with Byford Meadows Drive
🚶 🚲 🚗	5.2	5	New access road from Jersey Road west to tie into Kargotich Road (partial 5.1)
🚶 🚲 🚗	5.3	5	New access road from Jersey Road west to tie into Byford Meadows Drive (partial 5.1)
🚶 🚲 🚗	5.6	-2	New access road from Jersey Road east to tie into Hopkinson Road
🚶 🚲 🚗	5.8	-1	New access road from Jersey Road central to tie into Hopkinson Road

Mode	#	MCA score	Option description
Sector 1 – Thomas Road to south of Orton Road			
Location 6 – Abernethy Road underpass			
🚶 🚲	6.1	8	Provide footpath on northern side of Abernethy Road (continued through underpass) to tie local network into PSP on northern side of Abernethy Road
🚶 🚲	6.2	11	Provide footpath on southern side of Abernethy Road (continued through underpass) to tie local network into PSP on southern side of Abernethy Road
🐎	6.3	4	Separated equestrian underpass to the north (near Property 11), tying into existing multi-purpose trails on northern side of Abernethy Road
Location 7 – Orton Road intersection (project case)			
🚶 🚲 🐎	7.1	1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)
🚶 🚲 🐎	7.2	2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)
🚶 🚲	7.3	12	Provide access to Tonkin Highway PSP on the northern side of the intersection
🚶 🚲	7.4	9	Provide access to Tonkin Highway PSP on the southern side of the intersection
Location 8 – Orton Road interchange (ultimate case)			
🚶 🚲 🐎	8.1	1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)
🚶 🚲 🐎	8.2	2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)
🚶 🚲	8.3	5	Crossing on grade separated roundabout, pram ramps only
🚶 🚲	8.5	6	Crossing on grade separated roundabout, raised wombat crossing
Sector 2 – Orton Road to Bishop Road			
Location 9 – Culham Vista residential catchment			
🚗	9.1	-1	New access road from Learmouth Turn to slip road/ existing Orton Road
🚗	9.2	4	Extension of Doley Road to Cardup Siding Road from Orton Road intersection (in line with Byford DSP future local distributors)
Location 10 – Gossage Road underpass			
🚶 🚲 🐎	10.2	2	Multi-purpose underpass continuing multi-purpose trails adjacent to Property 20
Location 11 – Bishop Road interchange			
🚶 🚲	11.1	8	Provide footpath on northern side of freight rail, passing under the Tonkin Highway
🚶 🚲	11.2	12	Provide footpath on southern side of freight rail, passing under the Tonkin Highway
🚶 🚲	11.3	9	Provide access to Tonkin Highway PSP from local footpath network on Bishop Road
Location 12 – Bishop Road (with Freight Rail Realignment)			
🐎	12.1	10	Convert rail underpass and track into equestrian (multi-purpose) trail

Mode	#	MCA score	Option description
Sector 3 – Bishop Road to Wright Road			
Location 13 – Scott Road residential catchment			
🚗	13.2	10	Provide missing link between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP)
Location 14 – Mundijong Road interchange			
🚶 🚲	14.1	2	Provide signalised pedestrian crossings (pelican/ puffin) across Tonkin Highway on/ off-ramps for east-west connections along Mundijong Road
🚶 🚲	14.2	5	Provide pram ramps only for east-west connectivity across interchange
🚶 🚲	14.4	8	Provide raised wombat crossings for east-west connectivity
🚶 🚲	14.5	9	Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP
Location 15 – Lampiter Road residential catchment			
🚗	15.1	6	Extend Ironguard Road south to Randell Road
🚗	15.2	2	Extend Lampiter Drive south to Randell Road
🚗	15.3	1	Realign Dairy Lane to run parallel to the freight rail line on the east and connect through to Randell Road on the eastern side of Property 98
Location 16 – Randell Road			
🚶 🚲 🚗	16.3	5	Provide level crossing on Randell Road to retain east-west connectivity.
🚶 🚲 🚗	16.4	6	Sever east-west access but provide improved active transport amenity on Randell Road and Kargotich Road

Mode	#	MCA score	Option description
Sector 4 – Wright Road to South Western Highway			
Location 17 – Wright Road			
	17.1	5	Multi-purpose trail on eastern side of Wright Road
	17.2	8	Multi-purpose trail on western side of Wright Road
	17.3	6	Footpath on eastern side of Wright Road
	17.4	6	Footpath on western side of Wright Road
	17.5	10	Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway
Location 18 – Adamson Street South			
	18.2	8	Provide new access road between Adamson Street south and Bilya Road
	18.3	3	Provide new access road between Adamson Street south and Shanley Road
Location 19 – Shanley Road			
	19.2	3	Sever access and investigate alignment with proposed Special Rural Subdivision Lots 47, 48 and 809 Shanley Road Mardella (Shire Town Planning Scheme No.2 Amendment No. 205, 2017)
Location 20 – Shanley Road intersection			
	20.1	5	Provide pram ramps only

Appendix C

Do nothing layered PDFs

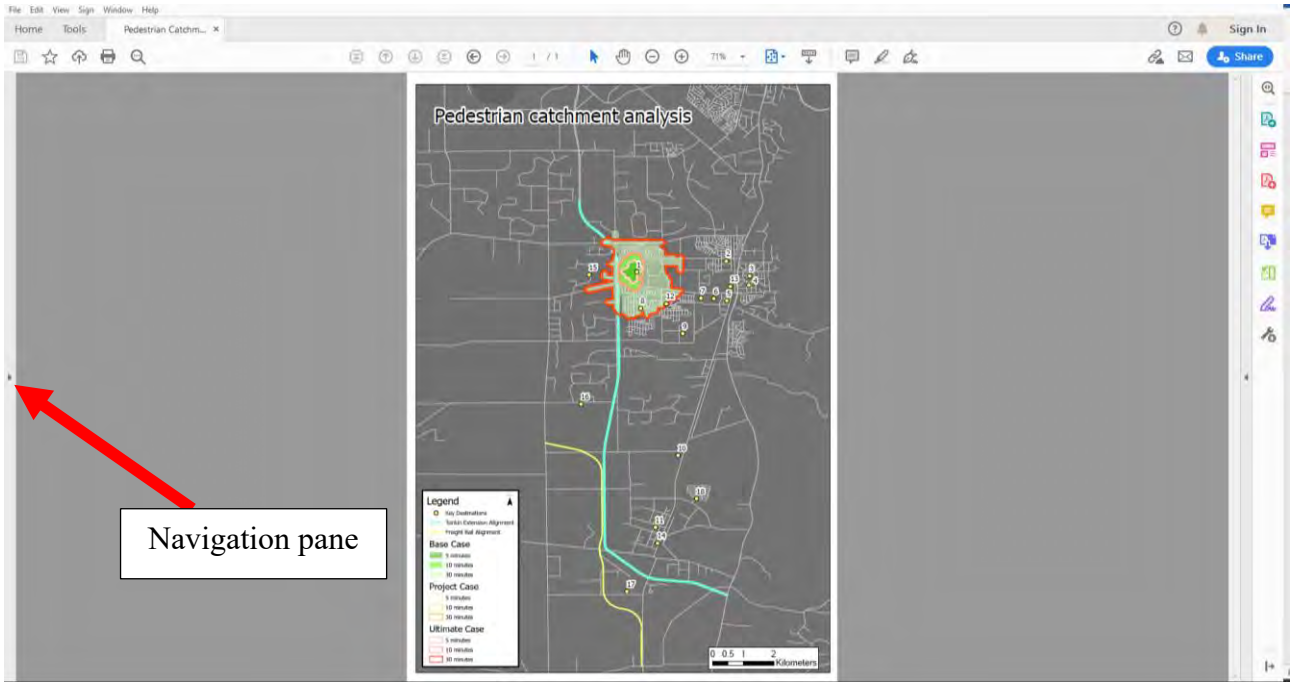
ARUP

Subject Interactive PDF Instructions

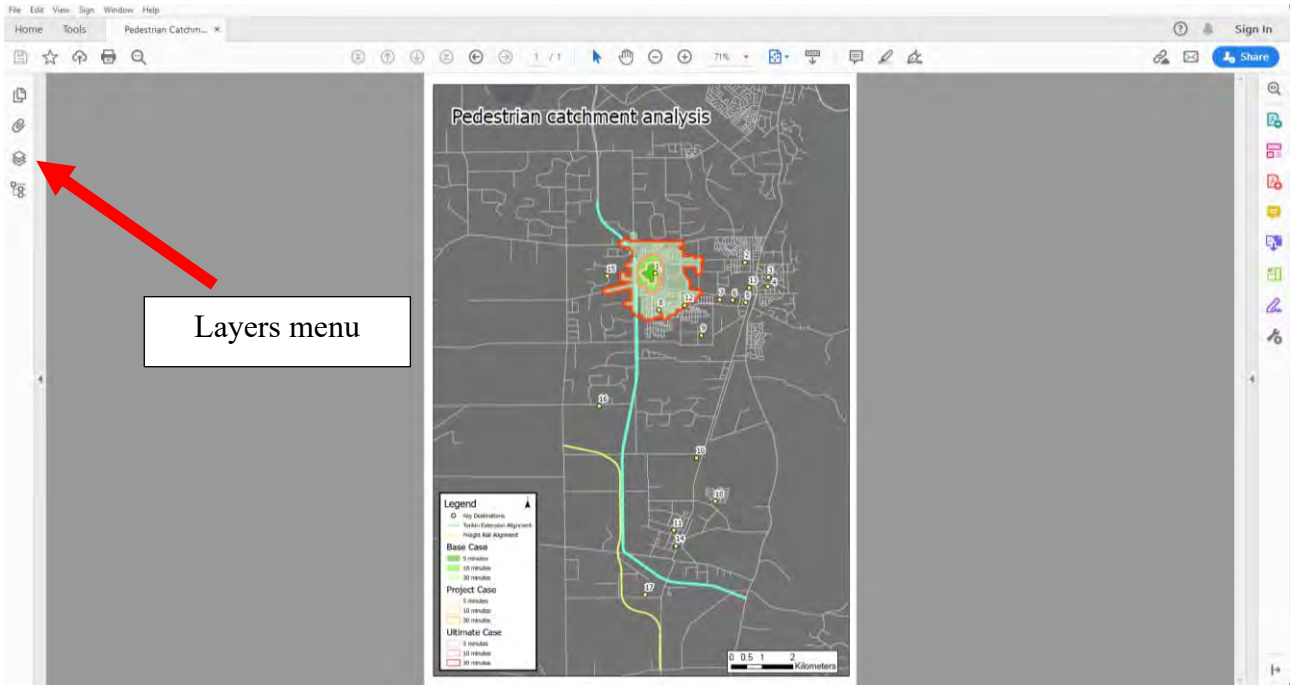
Date 4 March 2021 **Job No/Ref** 271107-19

Instructions on how to operate interactive PDF in Adobe

Step 1: Open the PDF in Adobe
Step 2: Open the navigation pane to the left of the page



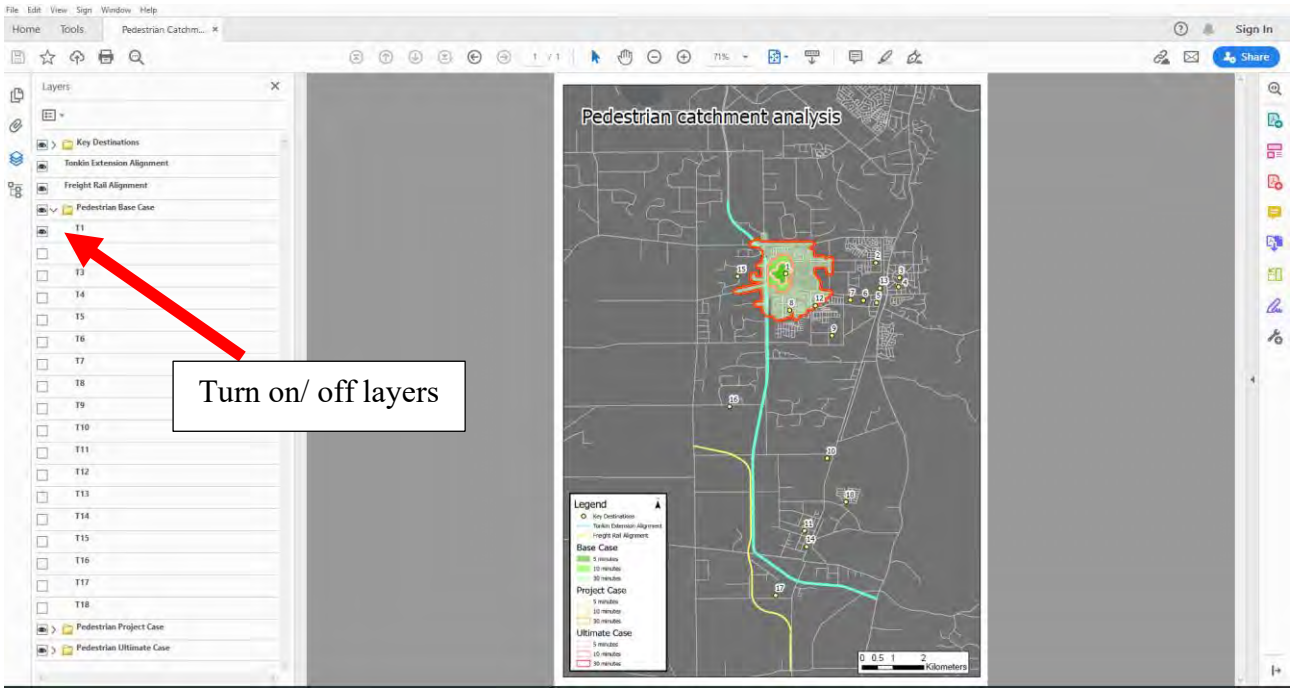
Step 3: Select the layers menu



Subject Interactive PDF Instructions

Date 4 March 2021 **Job No/Ref** 271107-19

Step 4: Use the layers menu to turn on/ off specific layers within the spreadsheet

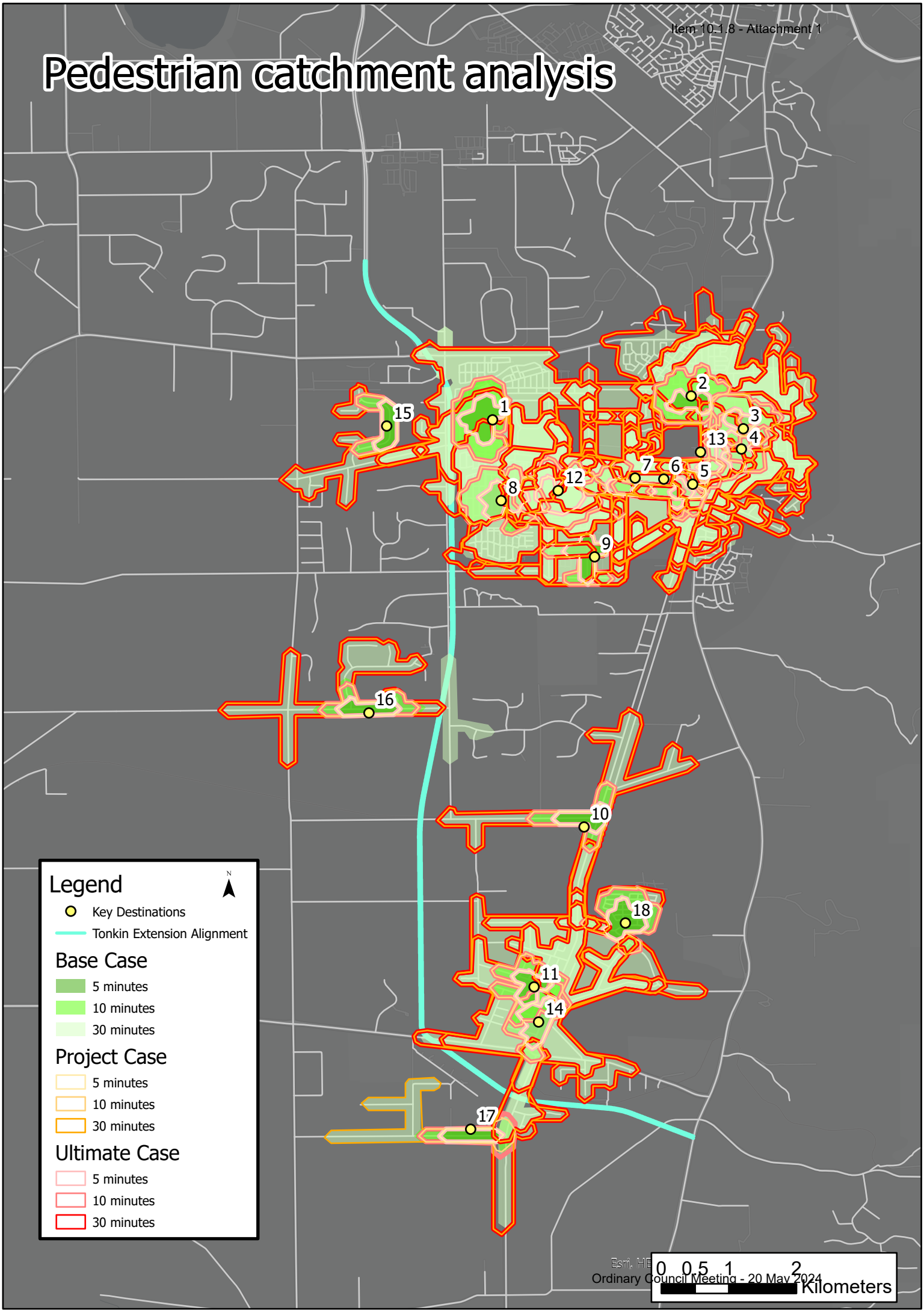


Data layers:

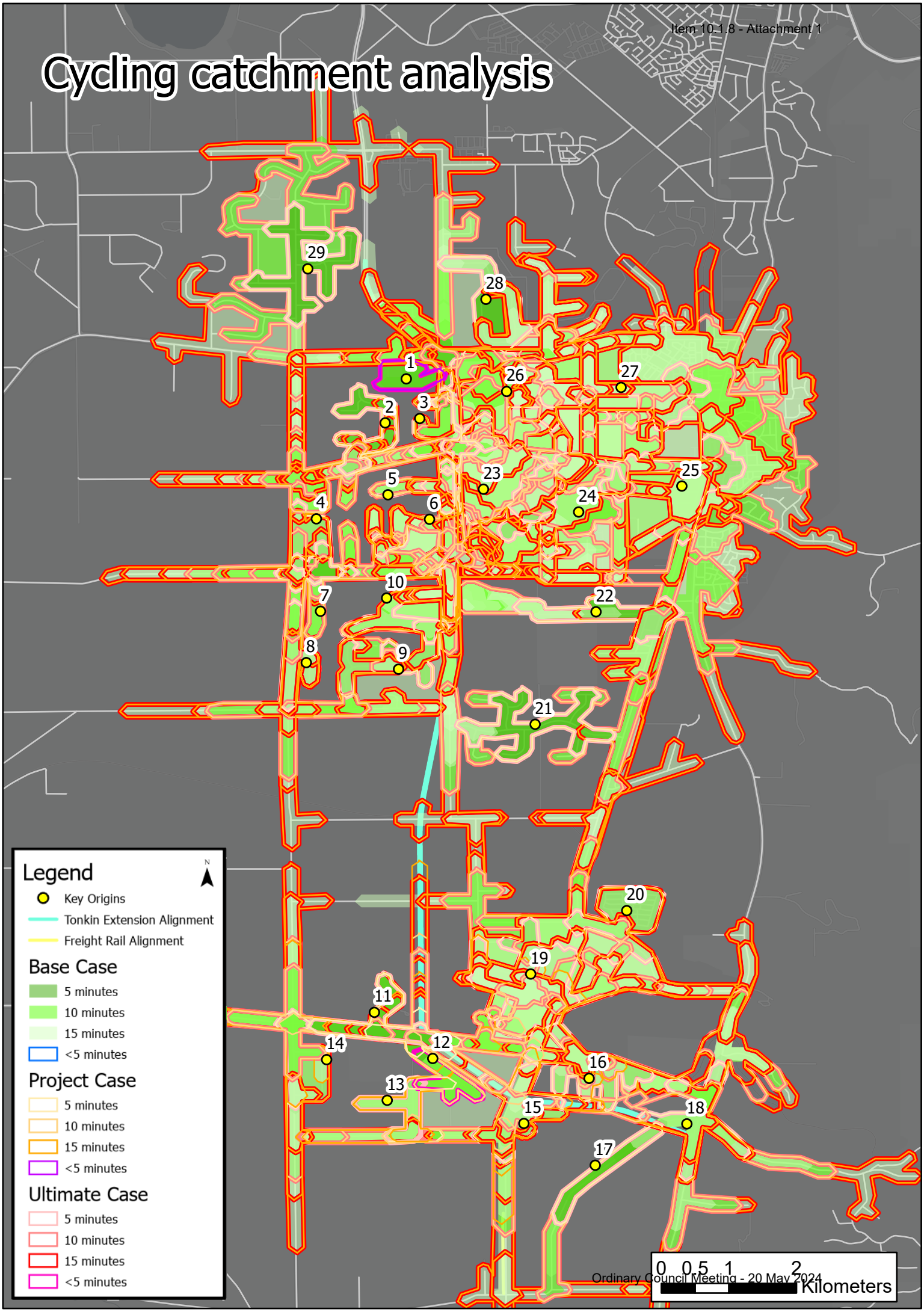
- **Key origins/ destinations:** Turns on/off the key origins/ destinations and their labels
- **Tonkin Extension alignment:** Turns on/off the Tonkin Extension Alignment
- **Freight Rail alignment:** Turns on/off the Freight Rail Alignment
- **Base case:** Turns on/off the base case catchment isochrones. Expand the menu to turn on/off individual catchments based off the respective key origin/ destination location
- **Project case:** Turns on/off the project case catchment isochrones. Expand the menu to turn on/off individual catchments based off the respective key origin/ destination location
- **Ultimate case:** Turns on/off the ultimate case catchment isochrones. Expand the menu to turn on/off individual catchments based off the respective key origin/ destination location

<u>Note:</u> Key origin/ destination point 1 has been turned on as the default starting point, as seen in the example diagrams.

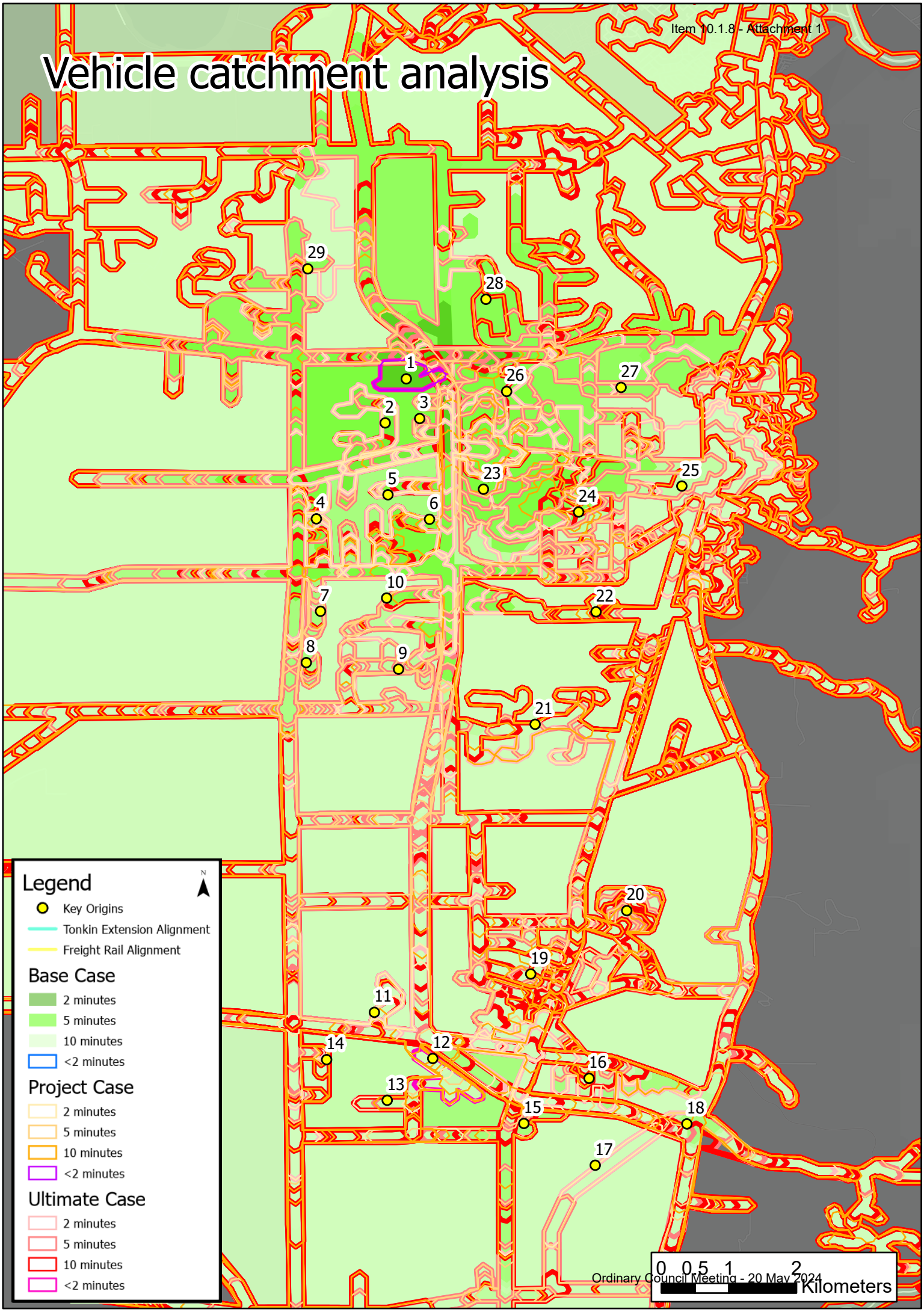
Pedestrian catchment analysis



Cycling catchment analysis



Vehicle catchment analysis



ARUP

File Note

Project title	Tonkin Highway Extension Stage 3 - Connectivity and Accessibility Study
Job number	271107-00
File reference	
cc	Bill Adams Max Bouga Flynn Watervoort
Prepared by	Jason Hoad
Date	21 July 2023
Subject	Appendix C – Connectivity Analysis

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1. Introduction

Main Roads WA is planning to extend Tonkin Highway (H017) from Thomas Road (H038) in Oakford to South Western Highway (H009) in Mundijong. The extension of the highway includes 5 major intersections at Thomas Road, Orton Road, Bishop Road, Mundijong Road and South Western Highway along with modifications to the transport network adjacent to the corridor. The project area is entirely located within the Shire of Serpentine Jarrahdale (SoSJ) LGA.

Arup have been engaged to undertake a Connectivity and Accessibility Study to analyse impacts caused by the Project Case and Ultimate Case Tonkin Highway Extension. This study aims to identify and propose solutions where connectivity and access adjacent to the project area are impacted.

As part of the study, future connectivity impacts were assessed using the GIS-based Network Analyst plug-in, examining both the existing network (business-as-usual) and the modified network under the project case and ultimate case Tonkin Highway Extension designs. This Technical Note documents the methodology adopted during this process, provides a guide for reading the outputs, and supplies an in-depth appraisal of the results.

2. Purpose of Technical Note

The purpose of this Technical Note is to summarise the methodology of the connectivity analysis in collecting spatial and quantitative results. More specifically, this note:

- Documents the process for reading the interactive PDFs.
- Summarises a worked example to assist in interpreting the results.
- Provides the methodology in undertaking a quantitative analysis.
- Summarises the quantitative results of the connectivity analysis.

ARUP

Job number	271107-00
Date	10 July 2023

3. Methodology

To determine future connectivity impacts, first, the existing network was assessed and a baseline was established to test potential solutions. This examined approximate travel distances (catchments) for each transport mode over varying timeframes on the existing network. This was completed either from an agreed set of origins or, to an agreed set of destinations.

The network was then modified to create two additional scenarios:

- The Project Case Scenario; which included the 2022 Project Case Tonkin Hwy Extension design only, and
- The Ultimate Case Scenario; which included the 2021 Ultimate Case Tonkin Extension design, and the 2021 Mundijong Freight Rail Realignment Design.

Both scenarios were then tested using the same baseline origins and destinations to examine the change in travel distances and highlight instances in which accessibility was affected. These impacts were then quantified by determining the difference in catchment area between the Base Case, Project Case and Ultimate scenarios.

The outcomes of this assessment informed a Long List of potential solutions to minimise the extent of adverse connectivity impacts in the project area, and potentially improve connectivity where possible.

It's noted that both the 2022 Project Case Tonkin Hwy Extension design, as well as the 2021 Mundijong Freight Rail Realignment design have been updated since preparation of this study. This is further discussed in the Assumptions and Limitations section below.

3.1.1 Assumptions and limitations

The assumptions and limitations of this analysis are listed below:

- Given the sensitivities of the geospatial averaging algorithm, a negligible impact to connectivity was assumed where Base Case vs Project/Ultimate Case difference was less than 5%.
- The connectivity analysis was undertaken prior to the proposed inclusion of a vehicular underpass and shared path at Shanley Road. It should be noted that outcomes of this analysis assumed the severing of Shanley Road and a resultant decline in connectivity for Origin 17. The reader should therefore recognise that with the inclusion of the underpass at Shanley Road, connectivity impacts to Origin 17 for cyclists and vehicles will be improved rather than worsened as shown in the analysis, particularly for north-south connectivity.
- The connectivity analysis was undertaken prior to 2023 Mundijong Freight Rail realignment design amendments. The rail alignment adopted by this study is documented within the overall *Tonkin Highway Extension Stage 3 – Thomas Road to South Western Highway Connectivity and Accessibility Study* Report (2023).

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4. Results

The results of this analysis have been produced in both spatial and quantitative datasets for each mode: walking (Pedestrian Catchment), cycling (Cyclist Catchment) and driving (Vehicle Catchment), as documented below.

4.1 Spatial analysis (interactive PDFs)

To show results of the connectivity impacts, three separate interactive PDFs were produced, each showing travel distances possible for each mode from either origins or destinations.

For each PDF, four key datasets are shown:

- **Key Origins/Destinations** –
  - Shows the points from which travel distance catchments were developed.
  - Origins have been identified using development boundaries defined by residential areas with one shared access to the wider network. The origin addresses have been identified as approximately central points within each development boundary corresponding with an actual street address.
  - Destinations include localised centres that are expected to attract and generate various trips for a range of modes. This includes, but is not limited to, schools and other education facilities, equine centres, retail centres, parks and recreational reserves.
- **Base Case** –
  - Shows the travel distances possible from each origin/destination on the existing network, i.e. how far can someone travel from an origin/destination within a given time on the existing network.
- **Project Case** –
  - Shows the travel distances possible from each origin/destination on the Project Case network, i.e. how far can someone travel from an origin/destination within a given time if the Project Case Tonkin Hwy Extension design was implemented (without additional access and connectivity solutions).
- **Ultimate Case** –
  - Shows the travel distances possible from each origin/destination on the Ultimate Case network, i.e. how far can someone travel from an origin/destination within a given time if the Ultimate Case Tonkin Extension design was implemented (without additional access and connectivity solutions).

4.1.1 Interpreting the spatial results

The purpose of displaying data in this way is to spatially recognise where catchments are impacted, and which areas are accessible under the base case scenario, but less accessible under the design scenarios. A worked example is provided below.

Step 1: Show Base Case catchments for a particular origin/destination

By turning on the Base Case layer for a particular origin/destination (in this case the Origin 12 - T12 Vehicle Catchment), the 2, 5, and 10 minute catchments will be shown.

This shows, theoretically, how far an individual could drive from Origin 12 within 2, 5, and 10 minute durations. Outputs for this step are shown below in Figure 1.

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From this, we can see that in 20minutes (dark green fill), an individual from Origin 12 could theoretically drive to the Cockram Street/Paterson Street in the Mundijong Town Centre, as well as west to Kargotich Road.

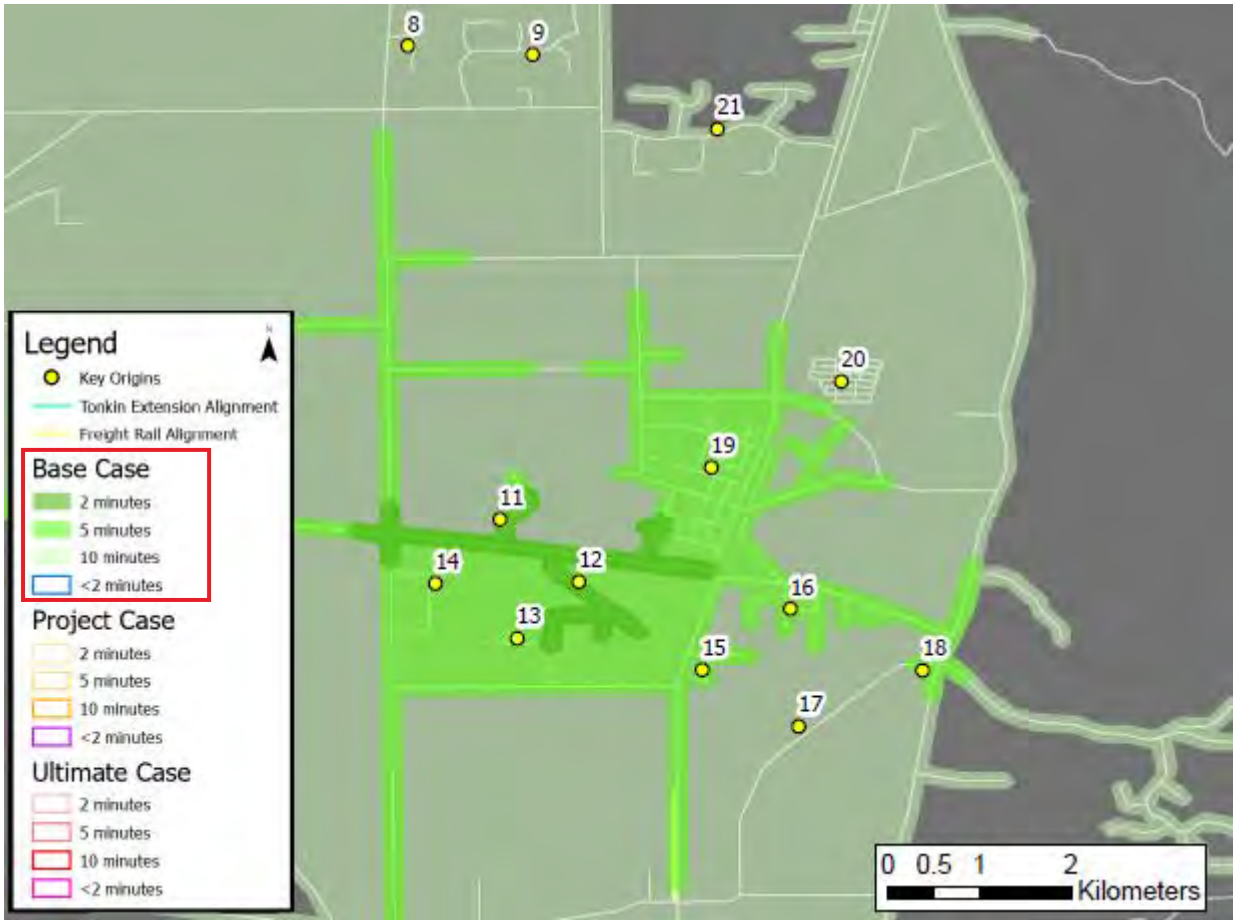

Figure 1 – Step 1: Base Case driving catchments from Origin 12

Step 2: Show Project Case vs. Base Case catchments for same origin/destination

By turning on the Project Case layer for Origin 12, while keeping the Base Case layer active, an overlay of the 2 , 5, and 10 minute catchments under the Project Case design conditions will be shown.

This shows, theoretically, how far someone could drive from Origin 12 within 2, 5, and 10 minutes if the Project Case Tonkin Hwy Extension design was implemented without any additional connectivity solutions.

As an overlay, we can start to see how the Project Case and Base Case catchments differ in distance and overall area. Outputs for this step are shown below in Figure 2. Looking at the 2-minute catchment (light orange outline), the outputs show that the Project Case design improves north-south driving connectivity from Origin 12 due to the introduction of the Tonkin Highway Extension. East-west connectivity is however reduced slightly, with the likely cause being delays at Mundijong Road/ Tonkin Highway intersection.

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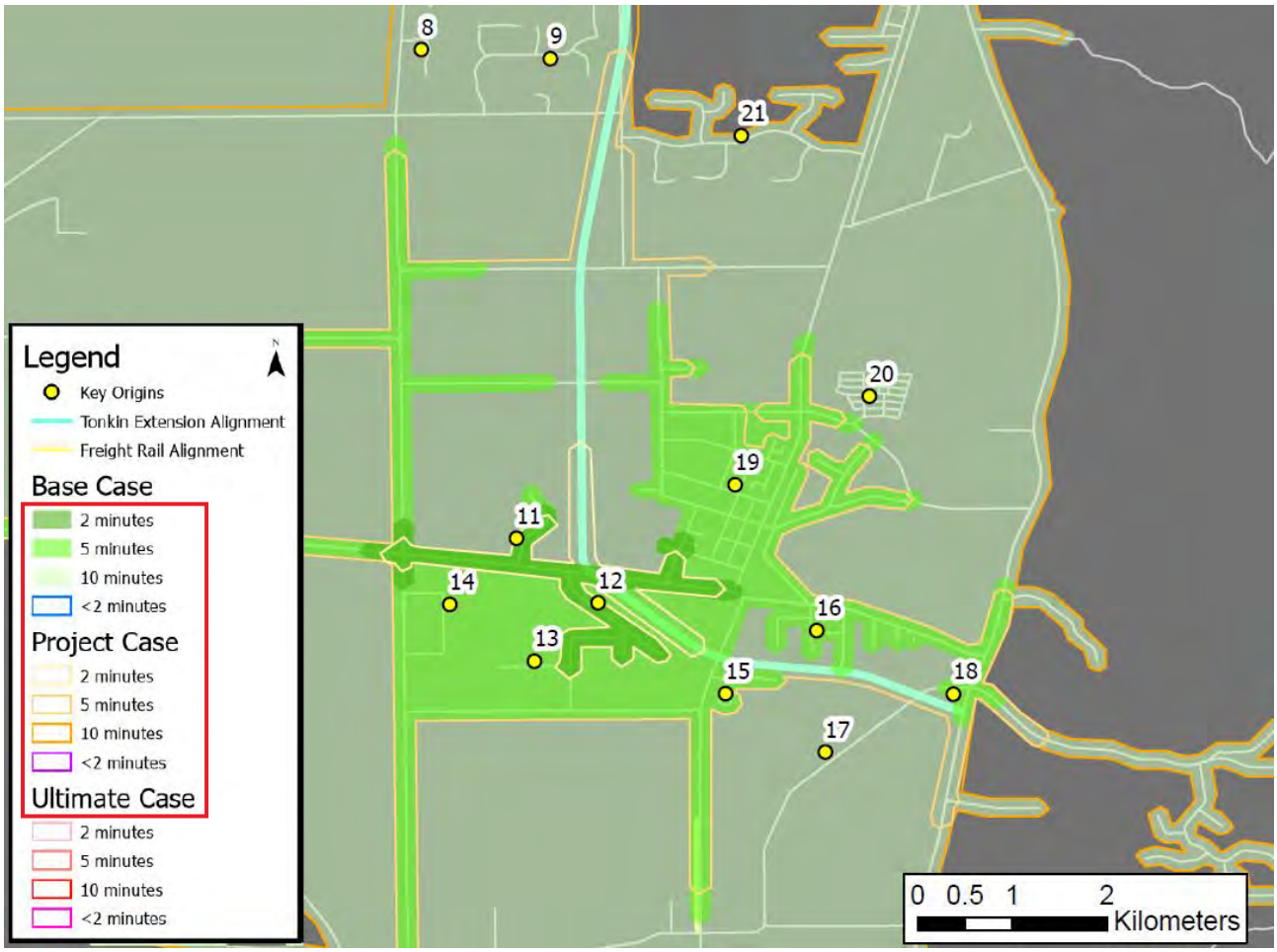

Figure 2 – Step 2: Project Case vs. Base Case driving catchments from Origin 12

Step 3: Show Ultimate Case vs Base Case catchments for same origin/destination

By turning off the Project Case layer and turning on the Ultimate Case layer for Origin 12, an overlay of the 2, 5, and 10-minute catchments under the Ultimate Case design conditions will be shown.

This shows, theoretically, how far someone could drive from the origin point within 2, 5 and 10 minutes if the Ultimate Case Tonkin Extension design was implemented without any additional connectivity solutions.

As an overlay, we can start to see how the Ultimate Case and Base Case catchments differ in distance and overall area. Outputs for this step are shown below in Figure 3.

As shown, following the implementation of the Ultimate Case design, the catchment size is reduced significantly to a point where the maximum distance someone could drive from that origin is <2 minutes in duration. This is caused by the severing of Lampiter Drive as a result of the Tonkin Highway Extension and Freight Rail Realignment design (now separated from project). Without connectivity solutions, properties within the boundary of Origin 12 will effectively be landlocked, bounded by a <2 minute driving catchment.

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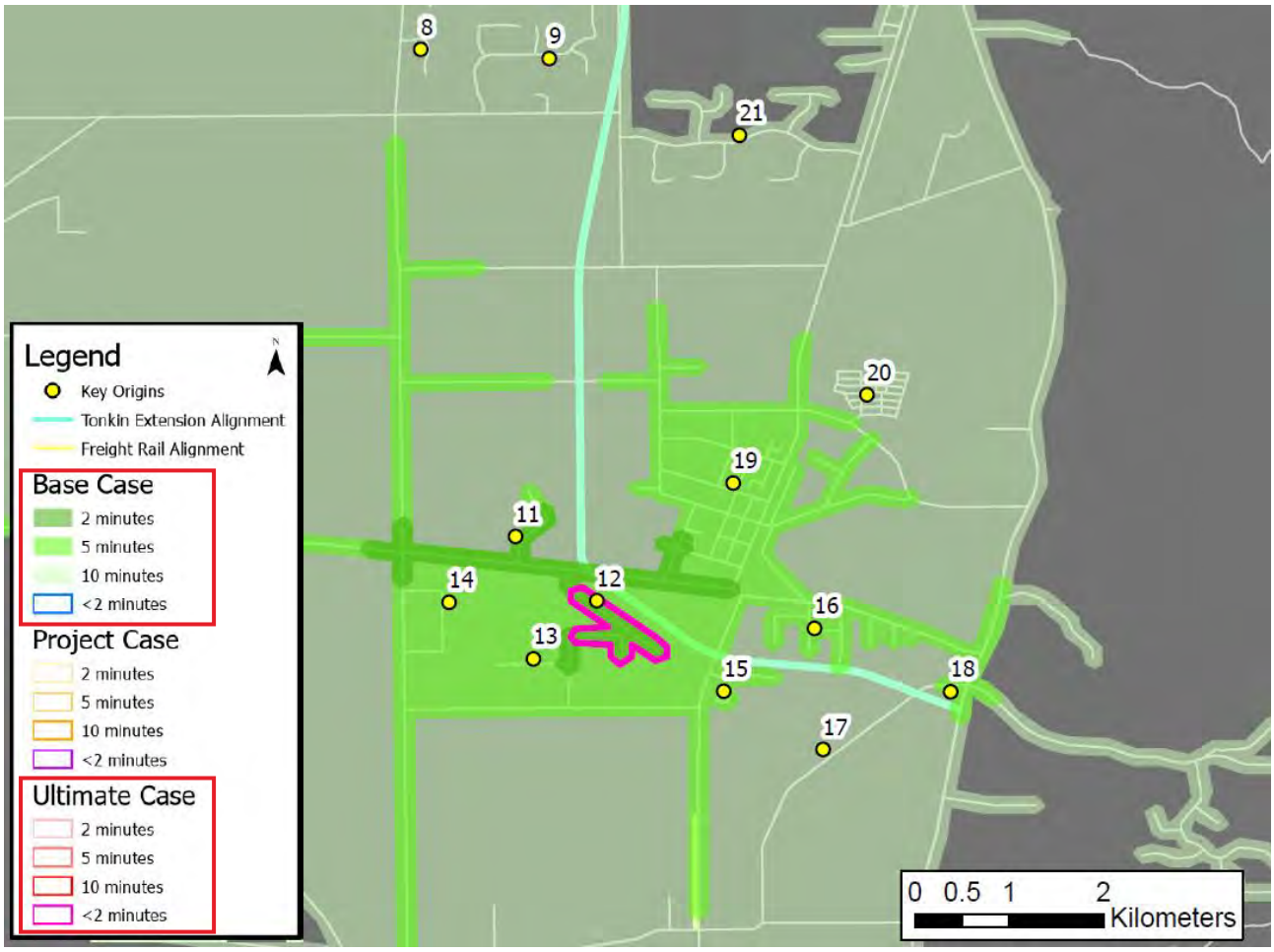

Figure 3 – Step 3: Ultimate Case vs. Base Case driving catchments from Origin 12

4.2 Quantitative analysis

In analysing the quantitative impacts to the Pedestrian, Cyclist and Vehicle Catchments, the areas (m^2) of each catchment were extracted from the GIS-based Network Analyst plug-in and compared between scenarios. This produced a statistical evidence for assessing the extent that catchments are positively or negatively impacted by the Tonkin Highway Extension designs (without additional connectivity solutions). In interpreting results, three output metrics for each mode were produced:

- Per cent (%) change in individual catchment areas between Base Case and Project/Ultimate Case scenarios.
- Average % change in catchment areas (total) between Base Case and Project/Ultimate Case scenarios.
- Total number of origins where connectivity has been negatively, positively or negligibly impacted by implementation of the Project Case and Ultimate Case scenarios.

This section documents the results gathered from the quantitative analysis across each mode.

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4.2.1 Pedestrian Catchment results

The results gathered from the quantitative analysis for the Pedestrian Catchments is shown in Table 1 below. Only results for the 30-minute catchments have been analysed, due to these catchments showing the most statistically significant impacts.

Table 1 – Pedestrian catchment results

	30-minute Pedestrian catchment area (m^2)			% change from Base Case	
Destination Point	**Base Case**	**Project case**	**Ultimate case**	**Project Case**	**Ultimate Case**
1	6135937.5	6165937.5	6165937.5	+0.5%	+0.5%
2	5303750	5706875	5706875	+7.6%	+7.6%
3	5418125	5384062.5	5384062.5	-0.6%	-0.6%
4	5871562.5	5879687.5	5879687.5	+0.1%	+0.1%
5	5500625	5581250	5581250	1.5%	+1.5%
6	5602500	5642500	5642500	+0.7%	+0.7%
7	6097812.5	6117500	6117500	+0.3%	+0.3%
8	5613750	5760625	5760625	+2.6%	+2.6%
9	2962187.5	2986562.5	2986562.5	+0.8%	+0.8%
10	2027187.5	2043437.5	2043437.5	+0.8%	+0.8%
11	4747812.5	4806562.5	4806562.5	+1.2%	+1.2%
12	6552500	6555312.5	6555312.5	0.0%	+0.0%
13	7145625	6799062.5	6799062.5	-4.8%	-4.8%
14	4832187.5	5240312.5	5240312.5	+8.4%	+8.4%
15	1322187.5	1327500	1327500	+0.4%	+0.4%
16	2446875	1898437.5	1898437.5	-22.4%	-22.4%
17	1925625	2589062.5	1875937.5	0.0%	-34.5%
18	3637187.5	3617187.5	3617187.5	-0.5%	-0.5%
Average % change in catchment areas				**-0.2%**	**-2.1%**
Total number of origins with decreased connectivity				**1**	**1**
Total number of negligible connectivity impacts				**15**	**15**
Total number of origins with improved connectivity				**2**	**2**

As shown, the impact to pedestrian catchments under both the Project and Ultimate Case scenarios is largely negligible. In the Project Case, the pedestrian catchment average across all destinations declines by 0.2%, while in the Ultimate Case, the pedestrian catchment average across all destinations declines by 2.1%. Broken down by destinations, most impacts to catchments are within 10% of the Base Case, with the majority of destinations recording slight improvements to their catchment size.

In contrast, Destination 16 records a significant reduction in catchment size by 22.4%. Due to Destination 16 being located on the western side of the proposed Tonkin Highway Extension, this significant impact to catchment size is due to the severing of Hopkinson Road, which provides east-west connectivity to Karbro Road and is not catered for in the proposed Project or Ultimate Case designs. Destination 17, while recording no impact to connectivity in the Project Case, records a 34.5% connectivity reduction in the Ultimate Case.

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This is due to the closure of Dairy Link to support the Freight Rail Realignment design (now separated from project). It is however, unlikely for these destinations to attract high foot traffic given their operation as an equestrian school (16) and dairy food supplier (17).

4.2.2 Cycling Catchment results

The results gathered from the quantitative analysis for the Cyclist Catchments is shown in Table 2 below. Only results for the 15-minute catchments have been analysed, due to these catchments showing the most statistically significant impacts.

Table 2 – Cycling catchment results

	15-minute cycling catchment area (m^2)			% change from Base Case	
Origin Point	**Base Case**	**Project case**	**Ultimate case**	**Project**	**Ultimate**
1	10231563	406875	406875	-96.0%	-96.0%
2	4639688	4809688	4809688	+3.7%	+3.7%
3	12872188	11931250	11931250	-7.3%	-7.3%
4	6570313	6794688	6794688	+3.4%	+3.4%
5	8810938	8244688	8244688	-6.4%	-6.4%
6	12528125	11845625	6254688	-5.4%	-50.1%
7	5987188	6254688	5352813	+4.5%	-10.6%
8	5368750	5352813	5352813	-0.3%	-0.3%
9	6617500	4443438	4443438	-32.9%	-32.9%
10	7315625	7842813	5800625	+7.2%	-20.7%
11	5736563	7842813	6897500	+36.7%	+20.2%
12	8094375	9649063	422813	+19.2%	-94.8%
13	3712500	5335938	1313125	+43.7%	-64.6%
14	4050313	4392813	4172188	+8.5%	+3.0%
15	6814375	10994375	9021875	+61.3%	+32.4%
16	8885938	11249063	11115000	+26.6%	+25.1%
17	3847500	1820000	1820000	-52.7%	-52.7%
18	6142188	7497500	7497500	+22.1%	+22.1%
19	9746563	10948750	10765000	+12.3%	+10.4%
20	7325313	7390938	7390938	+0.9%	+0.9%
21	5887188	4753750	4753750	-19.3%	-19.3%
22	7681563	6341250	6341250	-17.4%	-17.4%
23	14920313	14722188	14722188	-1.3%	-1.3%
24	14283125	14550625	14550625	+1.9%	+1.9%
25	19690938	20287188	20287188	+3.0%	+3.0%
26	17326750	16414375	16414375	-5.3%	-5.3%
27	18221875	18446875	18446875	+1.2%	+1.2%
28	6180938	5702813	5702813	-7.7%	-7.7%
29	7729375	7590313	7590313	-1.8%	-1.8%

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Average % change in catchment areas	**+0.1%**	**-12.5%**
Total number of origins with decreased connectivity	**10**	**14**
Total number of negligible connectivity impacts	**11**	**10**
Total number of origins with improved connectivity	**8**	**5**

As shown, the average impact to cyclist catchments in the Project Case is an improvement of 0.1%. In contrast, the Ultimate Case design records a 12.5% average reduction in catchment size across all origins, representing a clear decrease in cycling connectivity.

Broken down by origin, impacts to catchment sizes are broad, ranging from improvements of 61.3% in the Project Case for Origin 15, to reductions of 96% in both the Project and Ultimate cases for Origin 1. In the Project Case, approximatly a third of the origin catchments (10/29) are negatively impacted by the Tonkin Highway Extension design, with an average decrease in 25% for those impacted. This increases to 14/29 origin in the Ultimate Case, with an average decrease in 34.7%. Origins that recorded the largest reduction in connectivity include Origin 1 (-96%), 17 (-47.3%) and 9 (-67.1%). These reductions are primarily due to the severing of Jersey Road, loss of east-west connectivity to Karbro Road and severing of Shanley Road (note however that Shanley Road is proposed to be connected in the latest Project Case design (2023) thereby removing the negative impact to Origin 17).

It's noted that all catchments which are improved in the Project Case scenario, either remain the same or worsen in the Ultimate Case scenario. This is most evident for Origin 12 and 13, where connectivity is improved in the Project Case (+19.2% and +43.7%), yet significantly declines in the Ultimate Case (-94.8% and -64.6%). This presents a significant impact to connectivity in the Ultimate Case compared to the Project Case without intervention. It is recommended that the project considers alternative access routes for cyclists, particularly from Origin 1, 12, 13, 17 and 9, to avoid potential landlocking and ensure the provision of transport choice for residents.

4.2.3 Vehicle Catchment results

The results gathered from the quantitative analysis for the Vehicle Catchments is shown in Table 3 below. Only results for the 10-minute catchments have been analysed, due to these catchments showing the most statistically significant impacts.

Table 3 – Vehicle catchment results

10-minute Vehicles catchment area (m2)				% change	
Origin Point	**Base Case**	**Project case**	**Ultimate case**	**Project**	**Ultimate**
1	186921250	406875	406875	-99.8%	-99.8%
2	145670313	130923438	131160000	-10.1%	-10.0%
3	185472188	158864375	162112188	-14.3%	-12.6%
4	201372813	187840938	187834375	-6.7%	-6.7%
5	144648750	130182813	130896875	-10.0%	-9.5%
6	188244688	174072813	175709063	-7.5%	-6.7%
7	198779063	188221875	192301250	-5.3%	-3.3%
8	199102500	189756875	187079688	-4.7%	-6.0%
9	129621250	103174063	106251875	-20.4%	-18.0%
10	152945938	140830625	142734375	-7.9%	-6.7%

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11	184652188	185829688	190150313	+0.6%	+3.0%
12	164883750	163943125	422813	-0.6%	-99.7%
13	104111563	113105313	59517188	+8.6%	-42.8%
14	171499063	171819688	176002813	+0.2%	+2.6%
15	133249688	126085313	127060625	-5.4%	-4.6%
16	137443438	122442188	123285000	-10.9%	-10.3%
17	97326875	62845000	62999063	-35.4%	-35.3%
18	128058438	128660313	138723438	+0.5%	+8.3%
19	139082500	124089688	125269375	-10.8%	-9.9%
20	117465625	105481563	106410938	-10.2%	-9.4%
21	117331250	103887188	101485313	-11.5%	-13.5%
22	127680313	91725625	91745938	-28.2%	-28.1%
23	152134688	145760313	146133125	-4.2%	-3.9%
24	109071875	110905313	111479063	+1.7%	+2.2%
25	131097500	132533125	132725313	+1.1%	+1.2%
26	163016875	168999688	170491563	+3.7%	+4.6%
27	128480000	129034063	129367813	+0.4%	+0.7%
28	135066563	128224688	128750938	-5.1%	-4.7%
29	204790625	203727813	204314063	-0.5%	-0.2%
			Average % change in catchment areas	**-10.1%**	**-14.5%**
			Total number of origins with decreased connectivity	**17**	**17**
			Total number of negligible connectivity impacts	**11**	**11**
			Total number of origins with improved connectivity	**1**	**1**

As shown, the analysis has recorded a negative impact to average vehicle catchment sizes for both the Project Case (-10.1%) and Ultimate Case (-14.5%).

Broken down by origin, the analysis has shown 17/29 catchments are negatively impacted by the Project Case and Ultimate Case, with an average decrease in catchment size of 17.6% and 25% respectively. Origins that recorded the largest reduction include Origin 1 (-99.8%), 17 (-35.4%), 22 (-28.2%) and 9 (-20.4%). This is primarily due to similar network changes summarised in the previous section that impact cyclist catchments, as well as the proposed closure of the Cardup Siding Road/ Hopkinson Road intersection, which restricts both east-west and north-south connectivity for properties south of Orton Road.

While Origin 13 and Origin 14 record improved connectivity in the Project Case and Ultimate Case respectively, the extent to which they are improved is just over 8%.

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5. Conclusion

The results of the connectivity analysis have highlighted the impacts to Base Case catchment sizes across cyclists, pedestrians and vehicles for both the Project Case and the Ultimate Case scenarios.

5.1.1 Results

The key takeaways from this analysis include:

- The average impact to pedestrian catchments in both the Project and Ultimate Case is negligible.
- The average impact to cyclist catchments in the Project Case scenario is negligible, however the Ultimate Case design presents a clear decrease in average cycling connectivity and catchment size (by 12.5%).
- One third of origins recorded negative impacts to cycling connectivity in the Ultimate Case, with an average decrease in catchment size of 29.8%.
- The Ultimate Case presents a significant risk to cycling connectivity by worsening the already negative impacts of the Project Case, while also hindering the improvements created by the Project Case.
- The analysis has recorded a negative impact to average vehicle catchment sizes compared with the Base Case in both the Project Case (-10.1%) and Ultimate Case (-14.5%).
- Vehicle connectivity from 17 out of 29 origins is negatively impacted in both the Project Case and the Ultimate Case.
- While 1 origin in each the Project Case and Ultimate Case recorded improved catchments, the negative impacts outweigh the positive.

It is noted that the above outcomes do not account for the access and connectivity solutions proposed within the overall *Tonkin Highway Extension Stage 3 – Thomas Road to South Western Highway Connectivity and Accessibility Study* Report (2023).

5.1.2 Recommendations

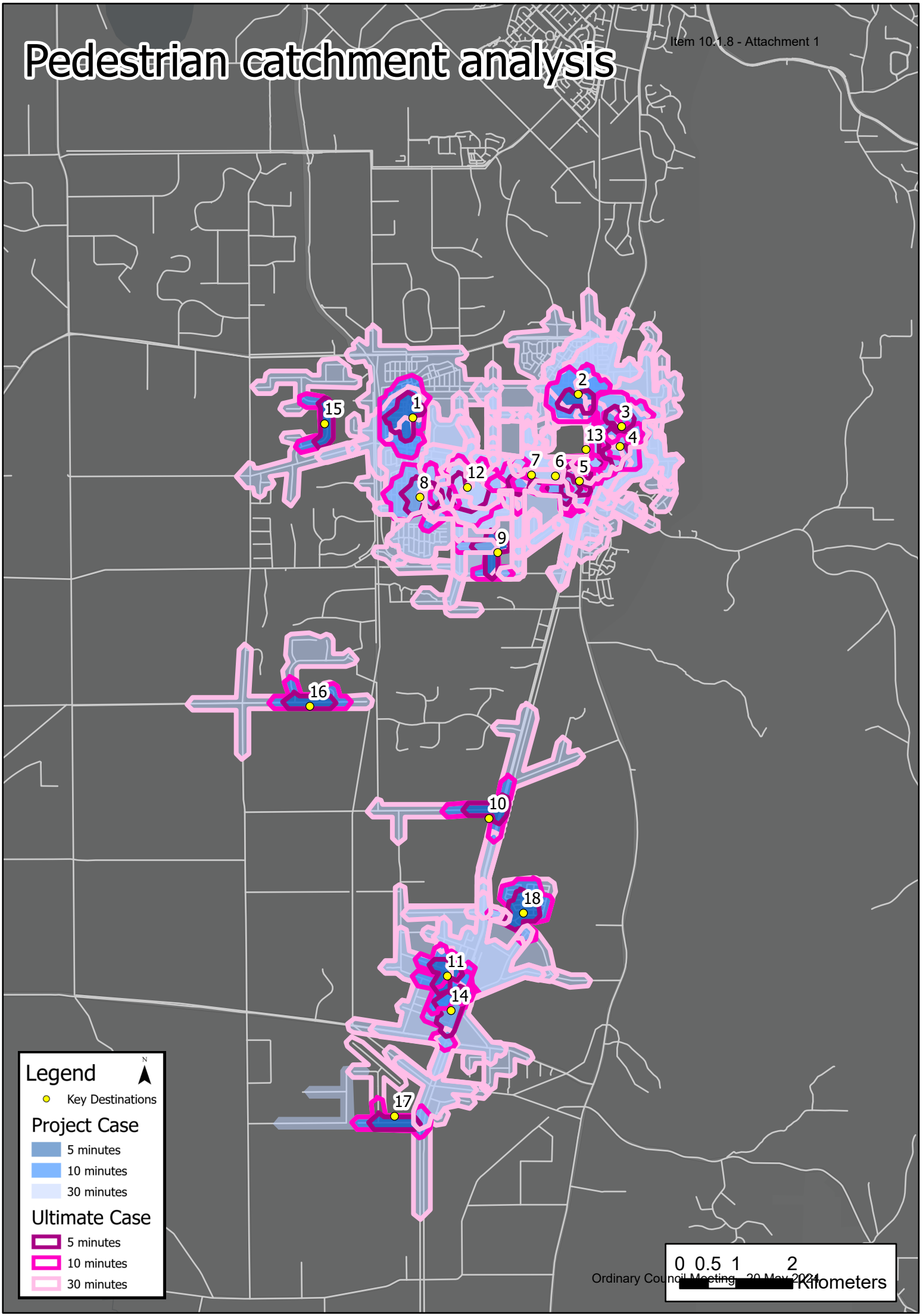
It is recommended that access and connectivity solutions are adopted as documented within the overall *Tonkin Highway Extension Stage 3 – Thomas Road to South Western Highway Connectivity and Accessibility Study* Report (2023).

It is recommended that these solutions are included within the *Tonkin Highway Extension Reference Design* package, and subsequently within the detailed design Scope of Works and Technical Criteria (SWTC).

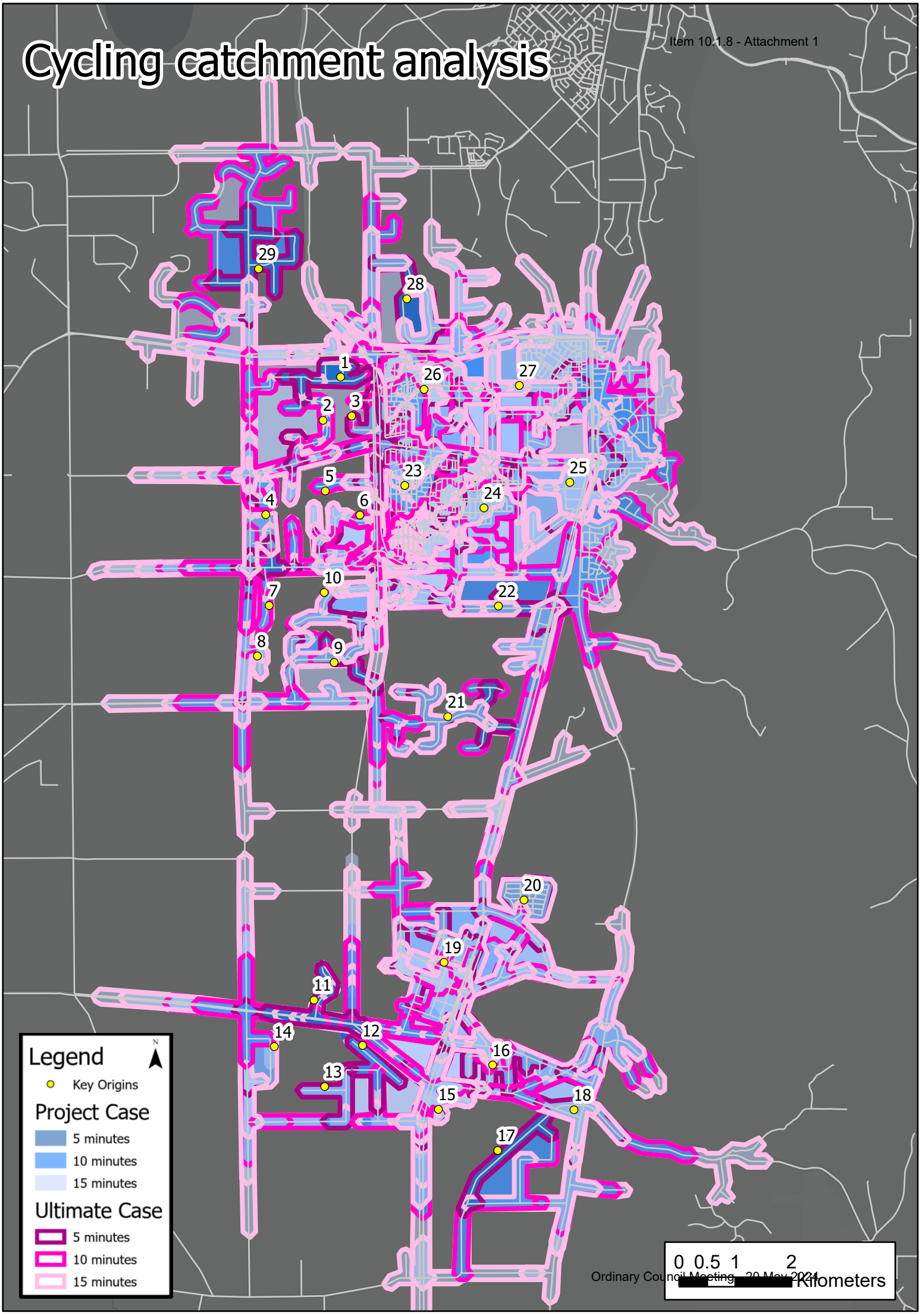
Appendix D

Do something layered PDFs

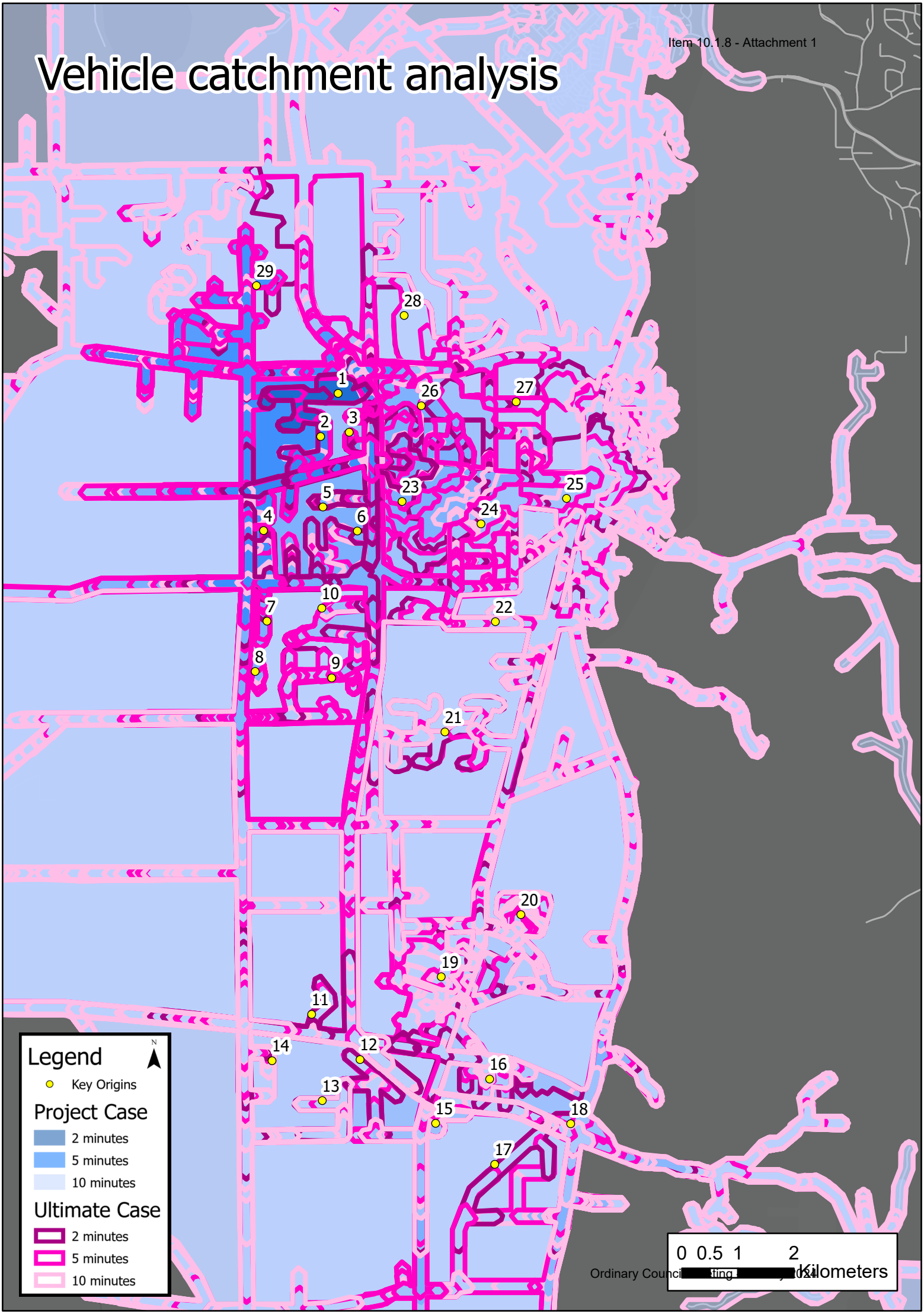
Pedestrian catchment analysis



Cycling catchment analysis



Vehicle catchment analysis



Appendix E

MCA Spreadsheets

Long List Fatal Flaw Analysis

	Option was introduced following outcomes from the SoSI at the Long List workshop on 12/03/21
	Option was removed due to changes in the preferred design.

No.	Option	Mandatory pass/ fail criteria							Shortlisted (Y/N)	Additional comments/ rationale for elimination
		Network connectivity	Safety	Constructability	Alignment with ultimate planning	Impact to the environment	Impact to heritage	Impact to zoning/ land impact/ MRS boundary		
1	**Ballak Place residential catchment**									
All modes										
1.1	Purchase properties and remove access								NO	This option requires considerable additional land take, 5-6 properties, beyond that of the ultimate alignment.
Vehicles										
1.2	Provide service road north of Thomas Road between Kargotich Road and Ballak Place								YES	While passing through the fatal flaw analysis, this option is only required if the Ballak Place/ Thomas Road intersection is closed.
Active transport										
1.3	Provide footpath on northern side of Thomas Road heading east and tying into Thomas Road interchange								YES	While not fatally flawed, future option would need to consider drainage basin constraints on the northwest quadrant of existing Tonkin Highway/ Thomas Road intersection.
1.4	Provide footpath on southern side of Thomas Road heading east and tying into Thomas Road interchange								YES	
2	**Ballak Place/ Thomas Road intersection**									
Vehicles										
2.1	Left-in left-out only with barrier kerb raised median on Thomas Road								NO	Barrier kerbs are discouraged on high speed (50kph+ roads) with a high percentage of heavy vehicles for safety reasons. Barrier kerbing would also restrict DFES/ emergency vehicle access to the development and is therefore deemed unsafe and fatally flawed. Western connectivity would be provided by roundabout at Kardan Road (Option 3.4
2.2	Left-in left-out with semi-mountable kerb median on Thomas Road for emergency vehicle								YES	Western connectivity would be provided by roundabout at Kardan Road (Option 3.4)
2.3	Left-in left-out with painted median on Thomas Road for emergency vehicles								NO	Risk that residents will disregard painted median and undertake unsafe right-hand turns therefore deemed unsafe and fatally flawed. Western connectivity would be provided by roundabout at Kardan Road (Option 3.4
2.4	Full access roundabout								NO	Distance between proposed roundabout and the Thomas Road interchange does not meet minimum separation requirements
2.5	Full access signalised								NO	Distance between proposed roundabout and the Thomas Road interchange does not meet minimum separation requirements
2.6	Full access priority-controlled seagull								YES	
2.7	Full access priority-controlled median break								YES	
2.8	Realign Ballak Place to Holstein Court and provide a 4-way intersection								NO	Distance between intersection and the Thomas Road interchange does not meet minimum separation requirements for a 4-way intersection. Option would require considerable impact to 4 properties north and south of Thomas Road beyond that of the ultimate alignment.
3	**Hopkinson Road connectivity**									
Vehicles										
3.1	Realign access to Thomas Road at a new roundabout								NO	Distance between proposed roundabout and the Thomas Road interchange does not meet minimum separation requirements
3.2	Realign access to Thomas Road at a new signalised intersection								NO	Distance between proposed roundabout and the Thomas Road interchange does not meet minimum separation requirements
3.3	Realign access to Thomas Road at a new priority controlled intersection								NO	Traffic volumes on Thomas Road anticipated to create unsafe environment for a priority controlled intersection and therefore fatally flawed
3.4	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with roundabout								YES	
3.5	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with signalised intersection								YES	
3.6	Left-in/ left-out at Hopkinson Road								YES	Would require the provision of a roundabout at Kardan Road to provide connectivity to the west for Hopkinson Road residents.
3.7	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with priority controlled intersection								YES	
Active transport										
3.8	Tie PSP into local network on Kellet Drive								YES	
Equestrian										
3.9	Tie multi-purpose routes onto the trails running alongside the northern side of Thomas Road								YES	

4	**Thomas Road interchange**										
Active transport											
4.1	Provide grade separated multi-purpose path on northern side of interchange									YES	While not fatally flawed, this option would require additional CAPEX costs
4.2	Provide grade separated multi-purpose path on southern side of interchange									YES	While not fatally flawed, this option would require additional CAPEX costs
4.3	Provide pram ramps only for east-west connectivity across interchange									YES	
4.4	Provide zebra crossings for east-west connectivity across interchange									NO	In excess of 50kph and more than 1 lane in each direction. Does not comply with State Planning and Designing for Pedestrians: Guidelines (Section 9.3)
4.5	Provide raised wombat crossings for east-west connectivity									YES	Despite many of challenges associated with a zebra crossing in this location, an option similar to this has been implemented in the Armadale Road design and should be investigated further for this location.
4.6	Provide signalised pedestrian crossings (pelican/ puffin) for east-west connectivity across interchange									NO	Does not align with long term planning of free flow entry/ exit ramps of Tonkin Highway. Signals are also not conducive of heavy vehicle flows and speeds on Thomas Road.
5	**Jersey Road residential catchment**										
Vehicles and active transport											
5.1	Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to construct new internal road layout connecting Jersey Road through to Kargotich Road with additional access road connecting with Byford Meadows Drive									YES	
5.2	New access road from Jersey Road west to tie into Kargotich Road (partial 5.1)									YES	
5.3	New access road from Jersey Road west to tie into Byford Meadows Drive (partial 5.1)									YES	Advice from SoSJ at Long List workshop dated 12/03/21, is that Jersey Road and Byford Meadows Drive connection is to be completed before the opening of Tonkin Highway. However, this would not align with DFES compliance and an additional egress route would need to be provided.
5.4	New access road from Jersey Road west to tie into Thomas Road									NO	Intersection would likely have to be left-in left-out, however would be in close proximity to Thomas Road merge treatments and would be unsafe
5.5	New access road from Jersey Road central to tie into Abernethy Road									NO	Within the boundary of a registered Threatened Ecological Community.
5.6	New access road from Jersey Road east to tie into Hopkinson Road									YES	While not fatally flawed, this option would require impacts to 2-3 properties however this impact could be minimised. Would require impacts to at least 3 owned properties on the western side of Hopkinson Road in the ultimate case.
5.7	New access road from Holstein Court north west to tie into Thomas Road									NO	Not favourable to introduce an additional intersection on Thomas Road. Intersection would likely have to be left-in left-out. Distance between intersection and the Thomas Road interchange does not meet minimum separation requirements for a 4-way intersection. Option would require considerable impact to 2-3 properties south of Thomas Road beyond that of the ultimate alignment.
5.8	New access road from Jersey Road central to tie into Hopkinson Road									YES	
6	**Abernathy Road underpass**										
Active transport											
6.1	Provide footpath on northern side of Abernathy Road (continued through underpass) to tie local network into PSP on northern side of Abernethy Road									YES	
6.2	Provide footpath on southern side of Abernathy Road (continued through underpass) to tie local network into PSP on southern side of Abernethy Road									YES	
Equestrian											
6.3	Separated equestrian underpass to the north (near Property 11), tying into existing multi-purpose trails on northern side of Abernathy Road									YES	
7	**Orton Road intersection (possible project case)**										
Active transport and equestrian											
7.1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)									YES	While not fatally flawed and likely avoiding impacts to existing buildings/ properties, this option would require additional CAPEX and land acquisition.
7.2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)									YES	While not fatally flawed and likely avoiding impacts to existing buildings/ properties, this option would require additional CAPEX and land acquisition.
7.3	Provide access to Tonkin Highway PSP on the northern side of the intersection									YES	Connection to the Tonkin Highway PSP at this location is critical for existing demand
7.4	Provide access to Tonkin Highway PSP on the southern side of the intersection									YES	Connection to the Tonkin Highway PSP at this location is critical for existing demand
8	**Orton Road interchange (project/ ultimate case)**										
Active transport and equestrian											

8.1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)									YES	While not fatally flawed and likely avoiding impacts to existing buildings/ properties, this option would require additional CAPEX and land acquisition.
8.2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)									YES	While not fatally flawed and likely avoiding impacts to existing buildings/ properties, this option would require additional CAPEX and land acquisition. Would allow for desirable connection to high amenity multi-purpose path alongside Cardup Brook
8.3	Crossing on grade separated roundabout, pram ramps only*									YES	*Active transport only
8.4	Crossing on grade separated roundabout, zebra crossings*									NO	In excess of 50kph and more than 1 lane in each direction. Does not comply with Planning and Designing for Pedestrians: Guidelines (Section 9.3). *Active transport only
8.5	Crossing on grade separated roundabout, raised wombat crossing*									YES	Despite many of challenges associated with a zebra crossing in this location, an option similar to this has been implemented in the Armadale Road design and should be investigated further for this location. *Active transport only
8.6	Crossing on grade separated roundabout, signals*									NO	Would likely have significant impacts to traffic performance on Orton Road, which is not in line with ultimate planning, while likely requiring geometric modifications impacting constructability of the roundabout
9	**Culham Vista residential catchment**										
Vehicles											
9.1	New access road from Learmouth Turn to slip road/ existing Orton Road									YES	While not fatally flawed, this will have impacts on the registered Bush Forever and Aborigina heritage site, Cardup Brook.
9.2	Extension of Doley Road to Cardup Siding Road from Orton Road intersection (in line with Byford DSP future local distributors)									YES	While not fatally flawed, this will have impacts on the registered Bush Forever and Aboriginal heritage site, Cardup Brook, however it aligns with future planning undertaken by the Shire.
9.3	Underpass on Cardup Siding Road									NO	Significant construction costs and impact to local community/ properties required to achieve required grades.
10	**Gossage Road underpass**										
Vehicles											
10.1	Vehicle underpass retaining connection between Gossage Road and Hopkinson Road									NO	While this option would involve significant CAPEX costs, it would also allow connections between the future heavy industrial area and rural residential areas of Cardup, not in alignment with future planning for the area and would have significant implications to residents. Existing road layout not of heavy vehicle/ industrial standard and would require modifications.
Equestrian and active transport											
10.2	Multi-purpose underpass continuing multi-purpose trails adjacent to Property 20									YES	While not fatally flawed, there are additional CAPEX costs to achieve required grades t provide underpass.
11	**Bishop Road interchange**										
Active transport											
11.1	Provide footpath on northern side of freight rail, passing under the Tonkin Highway									YES	Note, this would require a crossing of the freight rail and Bishop Road in order to provide connection with the Tonkin Highway PSP
11.2	Provide footpath on southern side of freight rail, passing under the Tonkin Highway									YES	Note, this would require a crossing Bishop Road in order to provide connection with the Tonkin Highway PSP.
11.3	Provide access to Tonkin Highway PSP from local footpath network on Bishop Road									YES	
12	**Bishop Road (with ultimate rail alignment)**										
Equestrian											
12.1	Convert rail underpass and track into equestrian (multi purpose) trail									YES	
13	**Scott Road residential catchment**										
Vehicles											
13.1	Retain access on Scott Road by providing underpass under Tonkin Highway in the project case and under freight rail in the ultimate case									NO	While this option would involve significant CAPEX costs, it would also allow connections between the future heavy industrial area and rural residential areas of Cardup, not in alignment with future planning for the area and would have significant implications to residents. Existing road layout not of heavy vehicle/ industrial standard and would require modifications. Additional work to the underpass would need to be undertaken in the ultimate case to accommodate the freight rail corridor.
13.2	Provide missing link between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP)									YES	Scott Road connection would need to be designed to industrial standard. Opportunity here to seek developer contribution based on a three-year delay to development
13.3	Purchase property and remove access									NO	This option requires considerable additional land take beyond that of the alignment and does not align with future planning.
14	**Mundijong Road interchange**										
Active transport											
14.1	Provide signalised pedestrian crossings (pelican/ puffin) across Tonkin Highway on/ off-ramps for east-west connections along Mundijong Road									YES	
14.2	Provide pram ramps only for east-west connectivity across interchange									YES	
14.3	Provide zebra crossings for east-west connectivity across interchange									NO	In excess of 50kph and more than 1 lane in each direction. Does not comply with State Planning and Designing for Pedestrians: Guidelines (Section 9.3)

14.4	Provide raised wombat crossings for east-west connectivity								YES	Despite many of challenges associated with a zebra crossing in this location, an option similar to this has been implemented in the Armadale Road design and should be investigated further for this location.
14.5	Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP								YES	
15	**Lampiter Road residential catchment**									
Vehicles										
15.1	Extend Ironguard Road south to Randell Road								YES	
15.2	Extend Lampiter Drive south to Randell Road								YES	
15.3	Realign Dairy Lane to run parallel to the freight rail line on the east and connect through to Randell Road on the eastern side of Property 98								YES	
16	**Echoveld Close residential catchment**									
Vehicles										
16.1	Provide underpass and extend Echoveld Close east to connect to Dairy Lane (if realigned, Long List option 15.3)								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also infeasible due to high groundwater level in this location. *Post-workshop, rail realignment design updated to pass on eastern side of Dairy Lane with no expected impacts to the Echoveld Close/ Dairy Lane intersection, removing this residential catchment as a problem area.
16.2	Provide overpass and extend Echoveld Close east to connect to Dairy Lane (if realigned, Long List option 15.3)								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also infeasible due to high groundwater level in this location. *Post-workshop, rail realignment design updated to pass on eastern side of Dairy Lane with no expected impacts to the Echoveld Close/ Dairy Lane intersection, removing this residential catchment as a problem area.
16.3	Extend Echoveld Close to the west and provide north south connection in the existing reserve adjacent to multi-purpose trail (between Properties 188 and 206 Randell Road)								YES	*Post-workshop, rail realignment design updated to pass on eastern side of Dairy Lane with no expected impacts to the Echoveld Close/ Dairy Lane intersection, removing this residential catchment as a problem area.
16.4	Purchase properties on Echoveld Road and remove access								NO	This option requires considerable additional land take beyond that of the alignment *Post-workshop, rail realignment design updated to pass on eastern side of Dairy Lane with no expected impacts to the Echoveld Close/ Dairy Lane intersection, removing this residential catchment as a problem area.
17	**Randell Road**									
Vehicles and active transport										
17.1	Provide underpass under freight rail line								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also not feasible due to high groundwater level in this location.
17.2	Provide overpass over freight rail line								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also infeasible due to high groundwater level in this location.
17.3	Provide level crossing on Randell Road to retain east-west connectivity.								YES	SoSJ has advised at Long List workshop on 12/03/21, that METRONET have allowed a new level-crossing to be provided on the regional passenger rail network as part of the Byford Extension Project. Consultation would need to be undertaken with METRONET to confirm whether a new level-crossing could be introduced on the freight rail network.
17.4	Sever east-west access but provide improved active transport amenity on Randell Road and Kargotich Road								YES	
18	**Wright Road**									
Equestrian and active transport										
18.1	Multi-purpose trail on eastern side of Wright Road								YES	
18.2	Multi-purpose trail on western side of Wright Road								YES	
18.3	Footpath on eastern side of Wright Road								YES	
18.4	Footpath on western side of Wright Road								YES	
18.5	Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway								YES	
19	**Adamson Street south**									
Vehicles and active transport										
19.1	Provide underpass connecting Adamson Street south with Adamson Street north to provide north-south connectivity across Tonkin Highway								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also infeasible due to high groundwater level in this location.
19.2	Provide new access road between Adamson Street south and Bilya Road								YES	
19.3	Provide new access road between Adamson Street south and Shanley Road								YES	

19.4	Purchase property and remove access								NO	This option requires considerable additional land take beyond that of the alignment
20	**Shanley Road**									
Vehicles and active transport										
20.1	Provide underpass to retain access from Shanley Road to South Western Highway								NO	This option requires considerable additional CAPEX cost and land acquisition cost adjacent to the structure. Tunnelling is also infeasible due to high groundwater level in this location. Shanley Road is also planned to be severed based on existing structure plans (see below).
20.2	Sever access and investigate alignment with proposed Special Rural Subdivision Lots 47, 48 and 809 Shanley Road Mardella (Shire Town Planning Scheme No.2 Amendment No. 205, 2017)								YES	
21	**Shanley Road intersection**									
Active transport										
21.1	Provide pram ramps only								YES	
21.2	Provide signalised active transport crossing (pelican/ puffin)								NO	Additional signalised intersections on South Western Highway are undesirable. This intersection is also unlikely to generate demand required for signalisation

Short List MCA ACCESSIBILITY

No.	Option	Short List Assessment Criteria							
		Network connectivity	**Safety**	**Constructability**	**Alignment with ultimate planning**	**Impact to the environment**	**Impact to heritage**	**Estimated relative construction cost**	**Impact to zoning/ land impact/ MRS boundary**
		To what extent does the option ensure that residents have reasonable and convenient access to a similar level of service prior to the extension and after the completion of extension without connectivity improvements ('do nothing')? To what extent does the option follow key desireline for the target mode type?	To what extent does the option separate vulnerable road users from motor vehicles? To what extent does the option allow high quality and dedicated infrastructure i.e. signalised crossings, wide paths, underpasses)? To what extent does the option cater for all skill levels, ages and abilities? (Number of road crossings, type of control at road crossings, volume of movements, visibility, speed at crossings and crossing widths) To what extent does the option provide vehicular road safety in line with Main Roads WA and Austroads Standards/ Guidelines?	To what extent would the surrounding network need to be shutdown in order to deliver the option? Would the option need to be upgraded from the Project Case to the Ultimate Case? To what extent does the option avoid the existence of redundant infrastructure? How challenging is the option to construct?	To what extent does the option align with prior planning (LSP, DSP, Planning Schemes, Strategies, etc.) by the SoSJ To what extent does the option align with Ultimate planning for the Tonkin Highway Extension	To what extent does the option have an impact on Environmentally Significant areas (Bush Forever, Nationally threatened species or ecological communities, significant vegetation, flora, fauna, etc.)	To what extent does the option have an impact on National, State or Aboriginal Heritage sites?	3 - Least costly, of low estimated construction cost, only option or of no comparative cost 2 - Relatively middle tier cost 1 - Most costly or of high estimated construction cost	To what extent would the option require land acquisition (number of properties impacted)? To what extent would the option extend outside the existing MRS boundary?
1	**Ballak Place residential catchment**								
Vehicles									
1.2	Provide service road north of Thomas Road between Kargotich Road and Ballak Place	Residents of Ballak Place would be made to travel up to an additional 3km to reach the Thomas Road/ Tonkin Highway intersection. Improved access for residents west of Ballak Place who currently use unsealed entry/egress from Thomas Road and will be made to travel north and use Lorenz Way, Cunningham Drive and Kargotich Road to access Thomas Road.	Ensures access to Thomas Road for all residents west of the extension via sealed road.	Construction timing crucial to retain access for residents under the scenario of Ballak Place/ Thomas Road intersection closure. High number of residential stakeholder impacts (~6 properties). Additional intersections to be constructed along with access road (~4). Open drainage channel to be avoided/ accommodated on the northern side of Thomas Road.	No alignment with current planning. Would provide formal access for future rural residential uses north of Thomas Road between Kargotich Road and Ballak Place currently zoning process with the SoSJ. Will be appropriate for both project and ultimate case.	Additional clearing of vegetation required along stretch of road.	Minimal to no impact to heritage sites.		Small impacts outside of existing MRS and to residential properties. ~6 properties.
TOTAL	4	1	3	-1	1	-1	0	3	-2
Active transport									
1.3	Provide footpath on northern side of Thomas Road heading east and tying into Thomas Road interchange	Aligns with existing multi-purpose trails on the eastern side of Tonkin Highway. Requires residents of Jersey Road catchment (soon to be expanded) to cross Thomas Road to access footpath creating additional crossing point for a significant number of residents.	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath. Requires a crossing of Thomas Road for Jersey Road residents (soon to be expanded).	Relatively low complexity in construction timing. Moderate degree of complexity tying into Thomas Road interchange in the ultimate case in regards to footprint required on structure.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	7	1	2	0	1	0	0	3	0
1.4	Provide footpath on southern side of Thomas Road heading east and tying into Thomas Road interchange	Requires residents of Ballak Place to cross Thomas Road to access footpath creating additional crossing point. Aligns with higher performing multi-purpose underpass on the southern side of the Thomas Road/ Tonkin Highway interchange	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath. Requires a crossing of Thomas Road for Ballak Place residents.	Relatively low complexity in construction timing. Moderate degree of complexity tying into Thomas Road interchange in the ultimate case in regards to footprint required on structure.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	8	2	2	0	1	0	0	3	0
2	**Ballak Place/ Thomas Road intersection**								
Vehicles									
2.2	Left-in left-out with semi-mountable kerb median on Thomas Road for emergency vehicles	Residents forced to drive an additional possible 2km in order to reach Kardan Boulevard, U-turn and head westbound on Thomas Road to the same position.	Left-in/ left-out limits vehicle conflict points of Ballak Place and Thomas Road. Allows full access for DFES vehicles. Poor active transport crossing outcomes.	Relatively low complexity in construction timing. Smallest footprint required therefore reduced complexity. Limited modifications required to existing Thomas Road duplication design.	Aligns with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	7	-3	2	2	3	0	0	3	0
2.6	Full access priority-controlled seagull	Maintains full network connectivity.	Turning slip lanes likely to reduce rear end crash risk along Thomas Road. Full access with maximum amount of vehicle conflict points.	Relatively low complexity in construction timing. Largest footprint required therefore increased complexity. Most modifications required to existing Thomas Road duplication design.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small land take required outside of existing intersection envelope.
TOTAL	4	3	1	-1	1	0	0	1	-1
2.7	Full access priority-controlled median break	Maintains full network connectivity.	Full access with maximum amount of vehicle conflict points. Provision of a median break to assist in right hand turns.	Relatively low complexity in construction timing. Moderate footprint required therefore increased complexity. Moderate number of modifications required to existing Thomas Road duplication design.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small land take required outside of existing intersection envelope.
TOTAL	6	3	1	1	0	0	0	2	-1

3	Hopkinson Road connectivity								
Vehicles									
3.4	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with roundabout	Road users avoid having to travel north on Hopkinson Road to access Thomas Road via Gloaming Way or Rowley Road. Road users maintain full access to the east and west on Thomas Road.	Crossings of Thomas Road and Tonkin Highway would need to be situated away from the roundabout. Interface of priority-controlled movements. Management of speeds in comparison to non-roundabout options.	Construction timing to be coordinated with Hopkinson Road closure to retain limited access detour periods for residents north of Thomas Road. Moderate number of residential stakeholder impacts (~3 properties). Additional intersections to be constructed (~2). Largest footprint required therefore increased complexity. Most modifications required from current condition of Karden Boulevard/ Thomas Road.	Alignment with proposed District Distributor (Karden Boulevard) as identified in the Byford DSP. Preference of SoSJ to connect Hopkinson Road with Karden Boulevard. Roundabout of preference to MRWA. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small land take required outside of existing intersection envelope.
TOTAL	8	3	3	-2	3	0	0	2	-1
3.5	Realign access to Thomas Road at Karden Boulevard (proposed District Distributor) with signalised intersection	Road users avoid having to travel north on Hopkinson Road to access Thomas Road via Gloaming Way or Rowley Road. Road users maintain full access to the east and west on Thomas Road. Likely to create additional delays on Thomas Road with the introduction of new signals in close proximity to Thomas Road/ Tonkin Highway signalised interchange	Signalised active transport crossings provided along all approaches at the intersection. Straight approaches and between intersections prompting higher speeds.	Construction timing to be coordinated with Hopkinson Road closure to retain limited access detour periods for residents north of Thomas Road. Moderate number of residential stakeholder impacts (~3 properties). Additional intersections to be constructed (~2). Moderate footprint required therefore marginally increased complexity. Moderate modifications required from current condition of Karden Boulevard/ Thomas Road.	Alignment with proposed District Distributor (Karden Boulevard) as identified in the Byford DSP. Preference of SoSJ to connect Hopkinson Road with Karden Boulevard. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small landtake required outside of existing intersection envelope.
TOTAL	4	2	2	-2	2	0	0	1	-1
3.6	Left-in/ left-out at Hopkinson Road	Road users avoid having to travel north on Hopkinson Road to access Thomas Road via Gloaming Way or Rowley Road. Road users would have to travel an additional 1km to travel west from Hopkinson Road given the left-in/left-out nature of the intersection. However, this translates to the same distance as an option intersection at Kardan Boulevard.	Left-in/ left-out limits vehicle conflict points of Ballak Place and Thomas Road. Poor active transport crossing outcomes. This access point conflicts with the interchange's southbound exit ramp. Access point is within a merge zone.	Construction timing to be coordinated with Hopkinson Road closure to retain limited access detour periods for residents north of Thomas Road. Moderate number of residential stakeholder impacts (~3 properties). Additional intersections to be constructed (~2). Smallest footprint required therefore limited complexity. Least modifications required from current condition of Kardan Boulevard/ Thomas Road.	No alignment with current planning. Unpreferred by SoSJ	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	-2	1	-3	-1	-1	0	0	2	0
3.7	Realign access to Thomas Road at Kardan Boulevard (proposed District Distributor) with priority controlled intersection	Road users avoid having to travel north on Hopkinson Road to access Thomas Road via Gloaming Way or Rowley Road. Road users maintain full access to the east and west on Thomas Road.	Additional traffic lanes on Thomas Road to create additional vehicle conflict points on top of existing condition. Located just beyond a merge zone, increasing safety issues associated with a priority controlled intersection. Poor active transport crossing outcomes.	Construction timing to be coordinated with Hopkinson Road closure to retain limited access detour periods for residents north of Thomas Road. Moderate number of residential stakeholder impacts (~3 properties). Additional intersections to be constructed (~2). Moderate footprint required therefore marginally increased complexity. Moderate modifications required from current condition of Kardan Boulevard/ Thomas Road.	Alignment with proposed District Distributor (Kardan Boulevard) as identified in the Byford DSP. Preference of SoSJ to connect Hopkinson Road with Kardan Boulevard. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small land take required outside of existing intersection envelope.
TOTAL	2	3	-3	-2	2	0	0	3	-1
Active transport									
3.8	Tie PSP into local network on Kellet Drive	Access to PSP improved with formalised access.	No impacts.	Relatively low complexity required. Moderate complexity of ground conditions (1x RIVN drainage pipe, open drainage channel).	Alignment with Perth & Peel @3.5M tying Tonkin Highway PSP into strategic on-road cycling routes along Thomas Road. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	10	3	0	2	2	0	0	3	0
Equestrian									

3.9	Tie multi-purpose routes onto the trails running alongside the northern side of Thomas Road	Follows equestrian desirelines. Improves east-west connection along formal, high quality multi-purpose paths on Thomas Road.	No impacts.	No impacts.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	7	3	0	0	1	0	0	3	0
4	**Thomas Road interchange**								
Active transport									
4.1	Provide grade separated multi-purpose path on northern side of interchange	Would require more active transport and equestrian users south of the interchange to traverse north, cross Thomas Road and traverse south, in order to reach the Byford town centre. Aligns well with the Darling Downs Equine Park and Sandeli Park Trail Riding Centre. Allows connectivity for pedestrians, cyclists and equine users.	Creates an additional separated crossing for equine and active transport users. Require a high number of equine and active transport crossings from south of Thomas Road.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~3 properties). Requirement for structures adds complexity. Demand for underpass north of Thomas Road would compete with already existing underpass at Cunningham Drive (risk for redundant infrastructure).	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	1	2	3	-3	0	0	0	1	-2
4.2	Provide grade separated multi-purpose path on southern side of interchange	Aligns with existing high quality local active transport network within the built up area of Byford. Aligns well with the highly utilised horse trails within Byford and the Byford Trotters Training Complex. Allows connectivity for pedestrians, cyclists and equine users.	Creates an additional separated crossing for equine and active transport users. Require equine and active transport crossings from north of Thomas Road.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Requirement for structures adds complexity.	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Small landtake required outside of existing MRS
TOTAL	3	3	3	-3	0	0	0	1	-1
4.3	Provide pram ramps only for east-west connectivity acros interchange	No impacts.	No protection for vulnerable road users mixing with free flow vehicles likely travelling at speed. Possible sightline issues for vehicles entering/ exiting Tonkin Highway	Uncomplex and inexpensive	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	4	0	-3	3	1	0	0	3	0
4.5	Provide raised wombat crossings for east-west connectivity	Allows east-west connectivity across interchange with a dedicated crossing. Only provides connectivity for pedestrians and cyclists. Likely to lead to frequent vehicle delays and loss of free flow conditions	Slows vehicles to 20-25kph at device. Provides a designated crossing improving safety for active transport users. Possible sightline issues to be resolved with expected grades at interchange in the ultimate case. Located on free-flow ramps creating safety risks.	Relatively uncomplex and inexpensive. Recently designed for similar interchange on Armadale Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	6	1	0	2	1	0	0	2	0
5	**Jersey Road residential catchment**								
Vehicles and active transport									
5.1	Comply with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford to construct new internal road layout connecting Jersey Road through to Kargotich Road with additional access road connecting with Byford Meadows Drive	Provides full connectivity to wider network in the ultimate case.	No impacts.	Construction timing crucial to retain access for residents to Jersey Road. Transmission Overhead Powerlines to be avoided on the eastern side of Kargotich Road. Largest footprint required.	Alignment with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites. Planned to run adjacent to Municipal Inventory Place (Bateman Homestead).		Landtake required however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	6	3	0	-2	2	0	0	2	1
5.2	New access road from Jersey Road west to tie into Kargotich Road (partial 5.1)	Provides connectivity to Kargotich Road.	No impacts.	Construction timing crucial to retain access for residents to Jersey Road. Moderate footprint required. Transmission Overhead Powerlines to be avoided on the eastern side of Kargotich Road.	Partial alignment with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites. Planned to run adjacent to Municipal Inventory Place (Bateman Homestead).		Landtake required however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	5	2	0	-1	1	0	0	2	1
5.3	New access road from Jersey Road west to tie into Byford Meadows Drive (partial 5.1)	Provides connectivity to Byford Meadows Drive. Creates long, convoluted route through rural residential area from the north east pocket of the Jersey Road catchment to Abernethy Road and the wider network (~2.8km).	No impacts.	Construction timing crucial to retain access for residents to Jersey Road. Smallest footprint required. Would need to be timed alongside another access route given DFES requirements.	Partial alignment with LSP Lot 2 Thomas Road & Lot 4 Kargotich Road, Oakford Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Landtake required however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	5	1	0	-1	1	0	0	3	1

5.6	New access road from Jersey Road east to tie into Hopkinson Road	Maintains southbound connectivity for the residential catchment. Restricts northbound connectivity, making road users travel a possible ~3.7km to access the Tonkin Highway.	No impacts.	Construction timing crucial to retain access for residents to Jersey Road. Staging complexity increased with interface with Tonkin Highway in ultimate case. Second largest footprint required. Moderate number of residential stakeholder impacts (~3 properties). Moderate complexity in ground conditions (Watercorp drinking water pipe, sewer pressure main).	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	-2	2	0	-3	0	0	0	1	-2
5.8	New access road from Jersey Road central to tie into Hopkinson Road	Maintains southbound connectivity for the residential catchment. Restricts northbound connectivity, making road users travel a possible ~3.7km to access the Tonkin Highway.	No impacts.	Construction timing crucial to retain access for residents to Jersey Road. Staging complexity increased with interface with Tonkin Highway in ultimate case. Third largest footprint required. Moderate number of residential stakeholder impacts (~4 properties). Moderate complexity in ground conditions (Watercorp drinking water pipe, sewer pressure main).					Moderate impacts outside of existing MRS and to residential properties. ~4 properties.
TOTAL	-1	2	0	-2	0	0	0	1	-2
6	**Abernethy Road underpass**								
Active transport									
6.1	Provide footpath on northern side of Abernethy Road (continued through underpass) to tie local network into PSP on northern side of Abernethy Road	No additional crossings required to reach Byford Town Centre and additional community facilities on the northern side of Abernethy Road. Creates tie-in to PSP network.	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath.	Relatively low complexity in construction timing. Likely to impact the open drainage channel on the northern side of Abernethy Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	8	2	1	1	1	0	0	3	0
6.2	Provide footpath on southern side of Abernethy Road (continued through underpass) to tie local network into PSP on southern side of Abernethy Road	Active transport users required to cross Abernethy Road to access Byford Town Centre and additional community facilities on the northern side of Abernethy Road. Creates tie-in to PSP network.	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath. Two crossings of Abernethy Road required for significant portion of population living north of Abernethy Road.	Relatively low complexity in construction timing. Likely to impact the open drainage channel on the northern side of Abernethy Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	11	3	3	1	1	0	0	3	0
Equestrian									
6.3	Separated equestrian underpass to the north (near Property 11), tying into existing multi-purpose trails on northern side of Abernethy Road	Aligns with existing multi-purpose trails on northern side of Abernethy Road.	Creates an additional separated crossing for equine and active transport users.	Would require the construction of an additional underpass, separate to the required Abernathy Road underpass provided in the current design. Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~2 properties). Requirement for structures adds complexity. Moderate complexity in ground condition (Sewer pressure main)	No alignment with current planning.	Additional groundworks/ geotechnical and civil works within TEC boundary, additional complexity and care to be taken to avoid impacts to the environment.	Minimal to no impact to heritage sites. In close proximity to Aboriginal heritage site (Beenyup Brook).		Moderate impacts outside of existing MRS and to residential properties. ~2 properties.
TOTAL	4	3	3	-2	0	-1	0	3	-2
7	**Orton Road intersection (possible project case)**								
Active transport and equestrian									
7.1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)	Aligns with existing horse trails on eastern side of Hopkinson Road	Creates an additional separated crossing for equine and active transport users.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~3 properties). Requirement for structures adds complexity.	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	1	2	3	-3	0	0	0	1	-2

7.2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)	Aligns with existing horse trails on eastern side of Hopkinson Road and popular Cardup Brook multi-purpose trails on western side of Hopkinson Road. Allows access to popular equestrian routes at Cardup Nature Reserve. Links eastern semi-rural residential areas with the greater western semi-rural residential area.	Creates an additional separated crossing for equine and active transport users.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~2 properties). Requirement for structures adds complexity.	Alignment with SoSJ preference for continuation of existing horse trails as part of the extension project.	Within Bush Forever site (Cardup Brook) and would likely involve minor impacts to the environment.	Within Aboriginal heritage site (Cardup Brook) and would likely involve minor impacts to the heritage value.		Moderate impacts outside of existing MRS and to residential properties. ~2 properties.
TOTAL	2	3	3	-3	2	-1	-1	1	-2
7.3	Provide access to Tonkin Highway PSP on the northern side of the intersection	Allows access to PSP from local network. Creates need for small residential catchment to cross Orton Road from the south. Potential to link in to higher density residential catchment north of Orton Road.	Moderate increase in pedestrian/ vehicle conflict volumes crossing Orton Road from the south. Crossing infrastructure recommended to be provided in this location.	Relatively low complexity required.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	12	3	2	3	1	0	0	3	0
7.4	Provide access to Tonkin Highway PSP on the southern side of the intersection	Allows access to PSP from local network. Creates need for large residential catchment to cross Orton Road from the north.	Significant increase in pedestrian/ vehicle conflict volumes crossing Orton Road from the north. Crossing infrastructure recommended to be provided in this location.	Relatively low complexity required.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	9	1	1	3	1	0	0	3	0
8	**Orton Road interchange (project/ ultimate case)**								
Active transport and equestrian									
8.1	Provide shared, multi-purpose underpass north of the intersection (near Property 10)	Aligns with existing horse trails on eastern side of Hopkinson Road	Creates an additional separated crossing for equine and active transport users.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~3 properties). Requirement for structures adds complexity. Ability of timing groundworks and designing underpass into the ultimate design.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	1	1	3	-3	1	0	0	1	-2
8.2	Provide shared, multi-purpose underpass south of the intersection (near Property 6)	Aligns with existing horse trails on eastern side of Hopkinson Road and popular Cardup Brook multi-purpose trails on western side of Hopkinson Road. Allows access to popular equestrian routes at Cardup Nature Reserve. Links eastern semi-rural residential areas with the greater western semi-rural residential area.	Creates an additional separated crossing for equine and active transport users.	Construction more difficult/ complex/ costly than at-grade options. Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Moderate number of residential stakeholder impacts (~2 properties). Requirement for structures adds complexity. Ability of timing groundworks and designing underpass into the ultimate design.	Alignment with SoSJ preference for continuation of existing horse trails as part of the extension project. Will be appropriate for both project and ultimate case.	Within Bush Forever site (Cardup Brook) and would likely involve minor impacts to the environment.	Within Aboriginal heritage site (Cardup Brook) and would likely involve minor impacts to the heritage value.		Moderate impacts outside of existing MRS and to residential properties. ~2 properties.
TOTAL	2	3	3	-3	2	-1	-1	1	-2
8.3	Crossing on grade separated roundabout, pram ramps only*	No impacts.	No protection for vulnerable road users mixing with free flow vehicles likely travelling at speed. Possible sightline issues for vehicles entering/ exiting Tonkin Highway.	Uncomplex and inexpensive	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	5	0	-2	3	1	0	0	3	0
8.5	Crossing on grade separated roundabout, raised wombat crossing	Allows east-west connectivity across interchange with a dedicated crossing. Only provides connectivity for pedestrians and cyclists. Likely to lead to frequent vehicle delays and loss of free flow conditions	Slows vehicles to 20-25kph at device. Provides a designated crossing improving safety for active transport users. Possible sightline issues to be resolved with expected grades at interchange in the ultimate case. Located on free-flow ramps creating safety risks.	Relatively uncomplex and inexpensive. Recently designed for similar interchange on Armadale Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	6	1	0	2	1	0	0	2	0
9	**Culham Vista residential catchment**								
Vehicles									

9.1	New access road from Learmouth Turn to slip road/ existing Orton Road	Provides additional entry/ egress from catchment. Provides very good connectivity to Tonkin Highway.	No impacts.	Construction timing to be coordinated with Cardup Siding Road/ Hopkinson Road closure to retain limited access detour periods and DFES requirements. Additional intersection to be constructed on Orton Road access road. Smallest footprint required for road and additional intersection.	Does not align with current planned future road connection at Doley Road as part of the Byford DSP. Will be appropriate for both project and ultimate case.	Within Bush Forever site (Cardup Brook) and would likely involve minor impacts to the environment.	Within Aboriginal heritage site (Cardup Brook) and would likely involve minor impacts to the heritage value.		Landtake required outside of existing MRS
TOTAL	-1	2	0	-2	-1	-1	-1	3	-1
9.2	Extension of Doley Road to Cardup Siding Road from Orton Road intersection (in line with Byford DSP future local distributors)	Provides additional entry/ egress from catchment. Provides very good connectivity to Tonkin Highway. Provides future connectivity to proposed town centre a Doley Road/ Orton Road.	No impacts.	Construction timing to be coordinated with Cardup Siding Road/ Hopkinson Road closure to retain limited access detour periods and DFES requirements. Additional intersection to be constructed on Orton Road/ Doley Road. Largest footprint required for road and additional intersection.	Aligns with current planned future road connection at Doley Road as part of the Byford DSP. Will be appropriate for both project and ultimate case.	Within Bush Forever site (Cardup Brook) and would likely involve minor impacts to the environment.	Within Aboriginal heritage site (Cardup Brook) and would likely involve minor impacts to the heritage value.		Landtake required outside of existing MRS however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	4	3	0	-2	2	-1	-1	2	1
10	**Gossage Road underpass**								
Vehicles									
Equestrian and active transport									
10.2	Multi-purpose underpass continuing multi-purpose trails adjacent to Property 20	Creates additional east-west connection for active modes and equine uses. Aligns with established horse trails east and west of Hopkinson Road.	Creates an additional separated crossing for equine and active transport users.	Requirement for additional groundworks/ foundations add geotechnical and civil complexity. Significant modifications to current design needed to account for additional grades/ structures. Moderate number of residential stakeholder impacts (~2 properties). Requirement for structures adds complexity. Significant costs associated with overpass itself and earthworks needed to build Tonkin up over the underpass.	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~2 properties.
TOTAL	2	3	3	-3	0	0	0	1	-2
11	**Bishop Road interchange**								
Active transport									
11.1	Provide footpath on northern side of freight rail, passing under the Tonkin Highway	Provides east-west connection for active and equine uses. Requires crossing of Bishop Road and freight rail to access Tonkin Highway PSP.	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath. Total of 2 crossings needed, Bishop Road and freight rail to access PSP	Relatively low complexity in construction timing.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Will require acquisition either from rail reserve or from adjacent landowners.
TOTAL	8	2	2	2	1	0	0	2	-1
11.2	Provide footpath on southern side of freight rail, passing under the Tonkin Highway	Provides east-west connection for active and equine uses. Requires crossing freight rail to access Tonkin Highway PSP.	Provides separation for active transport users from vehicles on Thomas Road via a sealed footpath.	Relatively low complexity in construction timing.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected if footpath can be provided within existing road reserve.
TOTAL	12	3	3	2	1	0	0	3	0
11.3	Provide access to Tonkin Highway PSP from local footpath network on Bishop Road	Allows access to PSP from local network.	No impacts.	Relatively low complexity in construction timing.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	9	3	0	2	1	0	0	3	0
12	**Bishop Road (with ultimate rail re-alignment)**								
Equestrian									
12.1	Convert rail underpass and track into equestrian (multi-purpose) trail	Creates additional east-west horse trail.	Crossing of Bishop Road required west of Court Grammar School.	Relatively low complexity in construction timing.	No alignment with current planning.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Acquisition of the rail corridor from PTA/ARC will need to be undertaken.
TOTAL	10	3	2	3	0	0	0	3	-1
13	**Scott Road residential catchment**								

Vehicles									
13.2	Provide missing link between Scott Road east and west to complete tie in to Kargotich Road (in line with the West Mundijong Industrial Area DSP)	Creates entry/egress to residential catchment.	No impacts.	Timing with West Mundijong Industrial Area likely to increase complexity in relation to responsibility of delivery and costs.	Alignment with the West Mundijong Industrial Area DSP Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	10	3	0	1	2	0	0	3	1
14	**Mundijong Road interchange**								
Active transport									
14.1	Provide signalised pedestrian crossings (pelican/ puffin) across Tonkin Highway on/ off-ramps for east-west connections along Mundijong Road	Provides dedicated/ protected east-west active transport crossing. Removes free flow for movements entering/ exiting the Tonkin Highway significantly impacting vehicular network connectivity.	Signalised active transport crossings provided along all approaches at the intersection.	Signalised crossings more complex than unsignalised crossings.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	2	-2	3	-1	1	0	0	1	0
14.2	Provide pram ramps only for east-west connectivity across interchange	No impacts.	No protection for vulnerable road users mixing with free flow vehicles likely travelling at speed. Possible sightline issues for vehicles entering/ exiting Tonkin Highway	Uncomplex and inexpensive	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	5	0	-2	3	1	0	0	3	0
14.4	Provide raised wombat crossings for east-west connectivity	Allows east-west connectivity across interchange with a dedicated crossing. Only provides connectivity for pedestrians and cyclists. Likely to lead to frequent vehicle delays and loss of free flow conditions Removes free flow for movements entering/ exiting the Tonkin Highway significantly impacting vehicular network connectivity.	Slows vehicles to 20-25kph at device. Provides a designated crossing improving safety for active transport users. Possible sightline issues to be resolved with expected grades at interchange in the ultimate case.	Relatively uncomplex and inexpensive. Recently designed for similar interchange on Armadale Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	8	1	2	2	1	0	0	2	0
14.5	Provide ramp to connect local footpath network to the above-grade Tonkin Highway PSP	Allows access to PSP from local network.	No impacts.	Relatively low complexity in construction timing.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	9	3	0	2	1	0	0	3	0
15	**Lampiter Road residential catchment**								
Vehicles									
15.1	Extend Ironguard Road south to Randell Road	Provides north/south connection from residential catchment to Randell Road, reinstating access to the wider network.	No impacts.	Construction timing crucial to retain access for residents given closure of Lampiter Drive in the ultimate case. Additional intersections to be constructed along with access road (1). Open drainage channel to be avoided/ accommodated south of Ironguard Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected and situated within an existing road reserve.
TOTAL	6	3	0	-1	1	0	0	3	0
15.2	Extend Lampiter Drive south to Randell Road	Provides north/south connection from residential catchment to Randell Road, reinstating access to the wider network.	No impacts.	Construction timing crucial to retain access for residents given closure of Lampiter Drive in the ultimate case. High number of residential stakeholder impacts (~3 properties). Additional intersection to be constructed along with access road Open drainage channel to be avoided/ accommodated south of Ironguard Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	2	3	0	-2	1	0	0	2	-2
15.3	Realign Dairy Lane to run parallel to the freight rail line on the east and connect through to Randell Road on the eastern side of Property 98	Provides north/south connection from residential catchment to Randell Road, reinstating access to the wider network.	No impacts.	Construction timing crucial to retain access for residents given closure of Lampiter Drive in the ultimate case. High number of residential stakeholder impacts (~3 properties). Additional intersection to be constructed along with access road Open drainage channel to be avoided/ accommodated south of Ironguard Road.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Moderate impacts outside of existing MRS and to residential properties. ~3 properties.
TOTAL	1	3	0	-2	1	0	0	1	-2
16	**Randell Road**								
Vehicles and active transport									

16.3	Provide level crossing on Randell Road to retain east-west connectivity.	Provides east-west connectivity across freight rail line. Potential connectivity delays with passing trains.	No protection for all transport modes from freight rail. Active level crossing practices in-line with ARTC Level Crossing Safety to be implemented to increase safety.	Construction staging and maintained operation of existing road will be more complex when introducing rail.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	5	2	0	-1	1	0	0	3	0
16.4	Sever east-west access but provide improved active transport amenity on Randell Road and Kargotich Road	Removes east-west access. Increases travel times for all modes.	Conflicts with freight rail eliminated.	Limited complexity with full closure of access.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	6	-3	3	2	1	0	0	3	0
17	**Wright Road**								
Equestrian and active transport									
17.1	Multi-purpose trail on eastern side of Wright Road	Provides north-south connectivity for active transport and equine uses.	Creates an additional separated crossing for equine and active transport users.	Minor modifications required to current design to fit multi-purpose path on the eastern side of Wright Road. Larger footprint than standard footpath. Structures already provided here as part of the project case therefore limits complexity.. Moderate number of residential stakeholders impacts (~2 properties).	No alignment with current planning. Will be appropriate for both project and ultimate case.	Within Bush Forever site on either side of Wright Road, would likely involve minor impacts to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS
TOTAL	5	3	3	-1	1	-1	0	1	-1
17.2	Multi-purpose trail on western side of Wright Road	Provides north-south connectivity for active transport and equine uses.	Creates an additional separated crossing for equine and active transport users.	Minor modifications required to current design to fit multi-purpose path on the eastern side of Wright Road. Larger footprint than standard footpath. Structures already provided here as part of the project case therefore limits complexity.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Within Bush Forever site on either side of Wright Road, would likely involve minor impacts to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected on the western side of Wright Road.
TOTAL	8	3	3	0	1	-1	0	2	0
17.3	Footpath on eastern side of Wright Road	Provides north-south connectivity for active transport. Only provides connectivity for pedestrians and cyclists.	Creates an additional separated crossing for active transport users.	Minor modifications required to current design to fit multi-purpose path on the eastern side of Wright Road. Small footprint compared to multi-purpose paths Structures already provided here as part of the project case therefore limits complexity	No alignment with current planning. Will be appropriate for both project and ultimate case.	Within Bush Forever site on either side of Wright Road, would likely involve minor impacts to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	6	1	2	1	1	-1	0	2	0
17.4	Footpath on western side of Wright Road	Provides north-south connectivity for active transport. Only provides connectivity for pedestrians and cyclists.	Creates an additional separated crossing for active transport users.	Minor modifications required to current design to fit multi-purpose path on the eastern side of Wright Road. Small footprint compared to multi-purpose paths Structures already provided here as part of the project case therefore limits complexity	No alignment with current planning. Will be appropriate for both project and ultimate case.	Within Bush Forever site on either side of Wright Road, would likely involve minor impacts to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS
TOTAL	6	1	2	1	1	-1	0	3	-1
17.5	Link Tonkin Highway PSP with existing multi-purpose trail running parallel to northern side of highway	Allows access to PSP from local network.	No impacts.	Limited complexity. Limited residential stakeholders impacted. Limited staging complexity.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	10	3	0	3	1	0	0	3	0
18	**Adamson Street south**								
Vehicles and active transport									
18.2	Provide new access road between Adamson Street south and Bilya Road	Direct, improved access from residential catchment to wider network.	No impacts.	Existing reserve limiting complexity for approvals and land acquisition.	No alignment with current planning however lies within an existing road reserve. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS
TOTAL	8	3	0	1	2	0	0	3	-1
18.3	Provide new access road between Adamson Street south and Shanley Road	Shanley Road is proposed to be closed, restricting north-south connectivity under Tonkin Highway extension	No impacts.	No existing reserve, additional complexity.	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS
TOTAL	3	1	0	-1	1	0	0	3	-1
19	**Shanley Road**								
Vehicles and active transport									

19.2	Sever access and investigate alignment with proposed Special Rural Subdivision Lots 47, 48 and 809 Shanley Road Mardella (SoSJ Town Planning Scheme No.2 Amendment No. 205, 2017)	Creates an additional ~3.5km of travel for residents	No impacts.	Construction timing crucial to retain access for residents once the extension is built and Shanley Road is closed. Impact to residential/ agricultural land owners (–6).	In alignment with Special Rural Subdivision Lots 47, 48 and 809 Shanley Road Mardella (SoSJ Town Planning Scheme No.2 Amendment No. 205, 2017). Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		Landtake required outside of existing MRS however option aligns with planning undertaken by SoSJ and is under zoning process for road purposes.
TOTAL	3	-2	0	-1	2	0	0	3	1
20	**Shanley Road intersection**								
Active transport									
20.1	Provide pram ramps only	No impacts.	No protection for vulnerable road users mixing with free flow vehicles likely travelling at speed.	Uncomplex and inexpensive	No alignment with current planning. Will be appropriate for both project and ultimate case.	Minimal to no impact to the environment.	Minimal to no impact to heritage sites.		No land acquisition expected.
TOTAL	5	0	-2	3	1	0	0	3	0

Appendix F

Emergency Egress Review

Emergency Egress Review (19 October 2022)

Emergency Egress Review – Addendum (1 February 2024)

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Emergency Egress Review

Tonkin Highway Extension Stage 3

19 October 2022

Prepared for:
Main Roads WA
C/- Craig Mansfield
Att: Craig Mansfield

Limitations Statement

This report has been solely prepared for Main Roads WA (C/- Craig Mansfield, Att: Craig Mansfield). No express or implied warranties are made by Ecosystem Solutions Pty Ltd regarding the findings and data contained in this report. No new research or field studies were conducted other than those specifically outlined in this report. All of the information details included in this report are based upon the research provided and obtained at the time Ecosystem Solutions Pty Ltd conducted its analysis.

In undertaking this work the authors have made every effort to ensure the accuracy of the information used. Any conclusions drawn or recommendations made in the report are done in good faith and the consultants take no responsibility for how this information and the report are used subsequently by others.

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Document Control

Client - Main Roads WA

Site - Tonkin Highway Extension Stage 3

Version	Revision	Purpose	Author	Reviewer	Submitted	
					Form	Date
Report	A	Initial Report	GM	DC/KL	Electronic (email)	19/10/2022

Filename: \\ecoserver\Data\PROJECTS\221340 Tonkin Highway Extension Stage 3 Advice\Reports\Tonkin Highway Extension Stage 3 Emergency Egress Review KL edits.docx

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1. Introduction

Main Roads is planning to extend Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong. The extension includes five intersections, with the potential closure of several existing intersections and access ways along the corridor (Figure 1).

Ecosystem Solutions were contracted to review the project including the access strategy, to ensure appropriate emergency egress provisions are in place in line with *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7)and the associated *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines, Version 1.4, December 2021). Once a review had been conducted, Ecosystem Solutions were to undertake consultation with the Shire of Serpentine Jarrahdale ("*the Shire*") to seek agreement with proposed emergency egress provisions.

Figure 1 Tonkin Highway Extension Location

The review was conducted by Gary McMahon, Director of Ecosystem Solutions (B.Sc. M. Env Mgmt. PG Dip Bushfire Protection. C.EnvP, BPAD Level 3 (35078)). Gary has a Bachelor's degree in science, a Master's degree in ecology and Post Graduate diploma in Bushfire Protection. He was a Level 2 Bushfire Fighter at Parks and Wildlife (then CALM) for 10 years and is a current active officer of Dunsborough Fire and Rescue (since 2008). He is an accredited Level 3 Bushfire Planning and Design (BPAD) practitioner with the FPAA and an accredited Bushfire Investigator with DFES and the Arson

Squad. He has been involved in many deployments, including Black Summer – NSW Taskforce Sierra (2020), Waroona–Yarloop Bushfire (2016), Northcliffe Fires (2015) and Prevelly–Gnarabup Fires in 2011.

This report summarises the approach and results of the review and discussions with the Shire of Serpentine Jarrahdale.

2. Methodology

Ecosystem Solutions were provided the following for their review:

- Tonkin Highway Extension Stage 3 – Thomas Road to South Western Highway: Connectivity and Accessibility Study (Main Roads WA October 2021)
- Proposed alignment image
- Proposed alignment shapefile and satellite imagery.

A preliminary review of the document was conducted to provide an overview of the process to date and to determine the alignment of the site. The intention was to independently review the alignment in the first instance and determine possible bushfire access/egress issues prior to analysing the document in full, which was completed after our preliminary assessment was completed.

A list of potential issues was collated, and these were discussed in a Teams meeting with Main Roads WA staff and Arup planners. The possible issues raised were seen by the attendees to be consistent with their concerns. A number of potential solutions were discussed, and it was agreed for Gary and a representative from Arup to contact the Shire of Serpentine Jarrahdale, to discuss the suite of possible solutions and try to reach an agreement on an appropriate resolution for each of the areas of concern.

The site was visited by Gary on the 4th September 2022 and a field review of the sites of concern was conducted by road, as well as though drone inspections. This provided vital on ground feedback for several possible solutions that were discussed with the Shire of Serpentine Jarrahdale.

On Wednesday 21st September 2022, a meeting was held between Gary McMahon from Ecosystem Solutions, Andrew Trosic, Director of Development Services, Shire of Serpentine Jarrahdale and Ben Hall and Thilanka Silva from Arup. The results from this meeting are discussed below.

3. Discussion

Three areas of concern were identified during the independent review, which also aligned with the areas discussed in Section 9 of the Connectivity and Alignment Study Report:

- The Jersey Road Residential area in the north of the alignment
- The Cardup Siding Road section; and
- Lampiter Drive Residential area in the south of the proposed alignment.

These areas were considered to have limited egress and access with the proposed alignment and without alternative egress points, this would increase the risks to people in a bushfire event. Note that it was the egress of landowners and the access of emergency services that were the focus of this review – broader landscape bushfire protection issues for residents were not considered.

In considering the options available, the Bureau of Meteorology (BOM) summer wind data was analysed for Jandakot Aero, the weather station closest to the site. A broad landscape evaluation of the bushfire risk and likely bushfire behaviour and direction was then conducted, based on bushfire fuels, vegetation and wind direction.

Table 1 shows a summary of the BOM data for summer wind at 9am and 3pm.

Table 1 Summer Wind Data for Jandakot Aero

	December	January	February
9am –	Easterly winds > 40km/h 30% of the time	Easterly winds > 40km/h 30% of the time	Easterly winds > 40km/h 35% of the time
3pm	SW Winds >40km/h 55% of the time	SW Winds >40km/h 50% of the time	SW Winds >40km/h 35% of the time

In summary, the data confirms that strong easterly winds occur in the mornings and strong south westerly winds occur in the afternoon. Most bushfire events are driven by wind, this is especially the case for fires in grass/paddock/pasture areas, which includes much of surrounding landscape. Given the afternoon is the hottest part of the day, the south west bushfire was considered the highest risk for most of the sites.

3.1 Jersey Road

The proposed alignment will restrict the Jersey Road areas access/egress to a single point.

Option 1 within the Connectivity and Alignment Study Report, which utilises a gated access from the north west of Holstien Court, connecting through to Thomas Road, was considered the most effective solution for this area.

The rationale for this is as follows:

- it requires only a short upgrade of the existing access way (Figure 2) of 120m:
- it will direct residents away from a likely bushfire front or source of a bushfire (i.e. allows a northern escape route away from a south/south west bushfire: and
- will not require extensive changes to the existing road network (within a bushfire event, people are generally panicked or anxious and keeping the changes to the road network minimal will avoid confusion and increased anxiety).

Figure 2 Holstein Court access way looking north

This can be upgraded to an Emergency Access Way (EAW) as described in the Guidelines, Table 6 (extract provided in Appendix A), which aligns with SPP 3.7.

To achieve this requires a minimum trafficable area width of 6m (this is to be an all weather all vehicle surface), a minimum vertical clearance of 4.5 m and capacity to support a minimum weight

of 15 tonnes. This access is straight, short and on flat land, so all areas of compliance with SPP 3.7 are achievable. It can be gated and locked to prevent general use, with a key left with the local Bushfire Brigade and local Fire and Rescue Brigades, as well as Shire Rangers and any other personnel as considered appropriate by the local Government.

In the final meeting, further information was provided, which revealed that future infill development of the area to the west of this location, is likely to include the western extension of Jersey Road though to Kargotich Road. This will provide an additional egress route for residents as the density increases. In the interim however, the provision of an EAW to the north will provide a safe alternative evacuation route for the existing residents.

The Shire agreed with this solution.

3.2 Cardup Siding Road.

The proposed highway alignment will create a cul-de-sac at the western end of Cardup Siding Road. This landscape also has the highest bushfire hazard in the Cardup Nature Reserve, which is a large area of extreme bushfire hazard (Figure 3). The western end of Cardup Siding Road has extensive areas of residential houses with managed gardens, driveways and the road itself is wide and well-constructed (Figure 4).

Figure 3 Cardup Nature Reserve

Figure 4 Houses western section Cardup Siding Road

An extension from Doley Road south to Cardup Siding Road, though an existing road reserve, as proposed in Figure 45 of the Connectivity and Accessibility Study, would provide an outlet for

western residents should a bushfire block Cardup Siding Road at the Nature Reserve. This is the preferred option for this section of the landscape. During the discussion with the Shire, the possibility of creating an emergency access connection adjacent to the proposed alignment, from the newly formed cul–de–sac at Cardup Siding Road, north to Orton Road was discussed. This would also provide an additional egress route and would be located away from any possible radiant heat or flames should the Cardup Nature Reserve be the source of bushfire.

This solution has the benefit of allowing extension of development for the area north of Cardup Road and both strategies provide egress away from any potential bushfire head fire.

The Shire agreed that the Doley Road extension would be the best option with further discussions required in relation to the EAW to Orton Road. Any road and/or EAW constructed will comply with the engineering requirements outlined in SPP 3.7 and the Guidelines. It is also recommended that the cul–de–sac head constructed for Cardup Siding Road has a turning circle, or at least a turning head arrangement, to facilitate the turning of a 3.4 appliance. The construction standards of SPP 3.7 and the Guidelines will also apply (Figure 5).

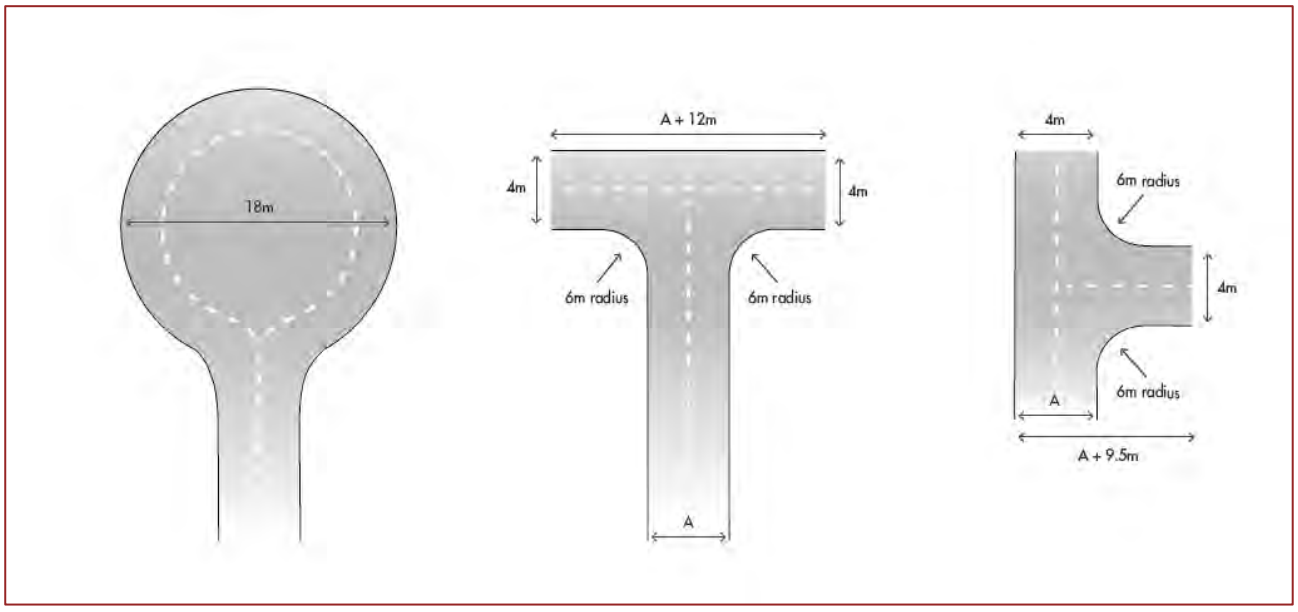

Figure 5 Turn Around area dimensions (SPP 3.7)

3.3 Lampiter Drive Area

This is the area referred to in Section 9.3 of the Connectivity and Accessibility Study. The proposed alignment will reduce the egress options for this community. The area is mainly larger rural residential areas with tree belts and windbreaks throughout, but the dominant fire behaviour will come from the large areas of grasses and pasture across the landscape (Figure 6).

Figure 6 Lampiter Drive landscapes.

The proposed solution is to upgrade a drainage easement north of Lampiter Drive, which is owned by Main Roads, and will connect the road to Tonkin Highway though a gated EAW. This is to meet with all the requirements of SPP 3.7 and the engineering/technical requirements for Vehicular Access in the Guidelines.

This solution allows northern egress to Tonkin Highway (likely away from the fire front) and won't significantly alter the existing road layout.

The Shire of Serpentine Jarrahdale were supportive of this approach in this landscape.

4. Conclusion

After reviewing the risks and access/egress aspects of the proposed alignment, the solutions outlined above were considered to be the most practical and effective solutions to the isolation of the three communities caused by the proposed southern alignment. After discussion, the Director of Development Services with the Shire of Serpentine Jarrahdale was supportive of the solutions proposed.

Appendix A Vehicular Access Technical Requirements

Extract from the *Guidelines for Planning in Bushfire Prone Areas* (V1.4, Dec 2021).

Table 6: Vehicular access technical requirements

TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way[1]	3 Fire service access route[1]	4 Battle-axe and private driveways[2]
Minimum trafficable surface (metres)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (metres)	N/A	6	6	6
Minimum vertical clearance (metres)	4.5			
Minimum weight capacity (tonnes)	15			
Maximum grade unsealed road[3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road[3]		1:7 (14.3%)		
Maximum average grade sealed road		1:10 (10%)		
Minimum inner radius of road curves (metres)		8.5		

Notes:

[1] To have crossfalls between 3 and 6%.

[2] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3] Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

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Emergency Egress Review - Addendum

Tonkin Highway Extension Stage 3

1 February 2024

Prepared for:
Main Roads WA
C/- Roger Highfield
Att: Roger Highfield

Limitations Statement

This report has been solely prepared for Main Roads WA (C/- Roger Highfield, Att: Roger Highfield). No express or implied warranties are made by Ecosystem Solutions Pty Ltd regarding the findings and data contained in this report. No new research or field studies were conducted other than those specifically outlined in this report. All of the information details included in this report are based upon the research provided and obtained at the time Ecosystem Solutions Pty Ltd conducted its analysis.

Information

In undertaking this work the authors have made every effort to ensure the accuracy of the information used. Unless otherwise stated in the report, Ecosystem Solutions Pty Ltd has not independently verified such information and cannot guarantee its accuracy or completeness.

Conclusions

Within the limitations imposed by the scope of work, preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable bushfire consultants under similar circumstances. No other warranty, expressed or implied, is made.

Reliance

This report is solely for the use of the Client and any reliance on this report by third parties will be at such party's sole risk. This report must only be presented in full and may not be used to support any other purpose than those set out in the report and the Agreement, except where prior written approval with comments are provided by Ecosystem Solutions Pty Ltd. All intellectual property rights in documents created by Ecosystem Solutions Pty Ltd remain the property of Ecosystem Solutions Pty Ltd.

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Ecosystem Solutions Pty Ltd will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of this report.

Other limitations

The opinions and measures contained in this report cannot guarantee that a structure or building will not be damaged or would survive a bushfire event on every occasion. This is due to the degree of vegetation management, the unpredictable nature of fire behaviour (knowledge in this field continues to develop) and the unpredictable nature of extreme weather conditions.

The growth, planting or removal of vegetation, poor maintenance of any fire prevention/mitigation measures, addition of structures not included in this report, or other activity can and will change the bushfire threat to all properties detailed in this report. The implementation of fire precautions will depend on the actions of the landowner or occupiers of the land, over which Ecosystem Solutions Pty Ltd has no control.

Ecosystem Solutions Pty Ltd accepts no Liability, including Liability for any Loss in connection with:

- a Claim, damage, or injury to property, or persons caused by fire;
- further growth, planting, or removal of vegetation on the Site;
- poor maintenance of any fire protection measures;
- additional structures not included in this assessment; or
- any other activity that may change the bushfire threat level.

The Client acknowledge that they have been made aware of the exclusions above and that such exclusion of Liability is reasonable in all the circumstances.

This report is valid for a period of two years only from the date of its issue.

STATEMENT OF CONFORMITY - PLANNING AND DEVELOPMENT ACT 2005

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

Gary McMahon

B.Sc. M. Env Mgmt. PG Dip Bushfire Protection. C.EnvP, BPAD Level 3 (35078)

DISCLAIMER

*All capitalised terms used in the Limitations Statement above that are not defined are defined in the Agreement between Ecosystem Solutions Pty Ltd and the Client.

** The limitations above are subject to any relevant rights or remedies that the Client may be entitled to under legislation, including Schedule 2 of the Competition and Consumer Act 2010 (Cth).

Document Control

Client - Main Roads WA

Site - Tonkin Highway Extension Stage 3

Version	Revision	Purpose	Author	Reviewer	Submitted	
					Form	Date
Initial Report	Rev A	Report	GM	DC	Electronic (email)	25/10/2023
	Rev B	Updated with MRWA comments	GM	DC	Electronic (email)	24/11/2023
	Rev C	Updated with MRWA comments	GM	DC	Electronic (email)	20/12/2023
	Rev D	Updated with MRWA comments	GM	DC	Electronic (email)	1/2/2023

Filename: Y:\PROJECTS\221340 Tonkin Highway Extension Stage 3 Advice\Reports\Stage 3 Egress Addendum November 2023 Ver C.docx

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1. Introduction

Main Roads WA is planning to extend the Tonkin Highway from Thomas Road in Oakford to South Western Highway in Mundijong. Ecosystem Solutions were contracted in October 2022 to review the project, including the access strategy, to ensure appropriate emergency egress provisions are in place, consistent with *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7) and the associated *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines, Version 1.4 December 2021).

A report was prepared and submitted to Main Roads WA in October 2022.

Ecosystem Solutions were contracted again in September 2023, to review a number of design changes to the site and consider their implications for emergency access and egress requirements.

The review of the design changes was conducted by Gary McMahon, Director of Ecosystem Solutions (B.Sc. M. Env Mgmt. PG Dip Bushfire Protection. C.EnvP, BPAD Level 3 (35078)). Gary has a Bachelor's degree in science, a Master's degree in ecology and Post Graduate diploma in Bushfire Protection. He was a Level 2 Bushfire Fighter at Parks and Wildlife (then CALM) for 10 years and is a current active officer of Dunsborough Fire and Rescue (since 2008). He is an accredited Level 3 Bushfire Planning and Design (BPAD) practitioner with the FPAA and an accredited Bushfire Investigator with DFES and the Arson Main Roads WA Squad. He has been involved in many deployments, including Black Summer – NSW Taskforce Sierra (2020), Waroona-Yarloop Bushfire (2016), Northcliffe Fires (2015) and Prevelly-Gnarabup Fires (2011).

This report is a review of the implications of those design changes.

2. Design Changes

There were three major changes to the design in the previous report. These are:

- Ballak Place – noise walls placed on highway boundary and removal of existing 6m firefighting easement on eastern property boundaries:
- Hopkinson Road – removing the connection to Thomas Road, northeast of the new interchange of Tonkin Highway and Thomas Road; and
- Cardup Siding Road – potential for connection to Principal Shared Path (PSP) and Tonkin Highway to the east of the Highway alignment

3. Methodology

The sites in question were visited again by Gary McMahon from Ecosystem Solutions on the 29th of September 2023 to review the landscape and possible fire risks/behaviour.

As with the previous report, in considering the options available, the Bureau of Meteorology (BOM) summer wind data was analysed for Jandakot Aero, the weather station closest to the site. A broad landscape evaluation of the bushfire risk and likely bushfire behaviour and direction was then conducted, based on bushfire fuels, vegetation, and wind direction.

Table 1 shows a summary of the BOM data for summer wind at 9am and 3pm.

Table 1 Summer Wind Data for Jandakot Aero

	December	January	February
9am -	Easterly winds > 40km/h 30% of the time	Easterly winds > 40km/h 30% of the time	Easterly winds > 40km/h 35% of the time
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In summary, the data confirms that strong easterly winds occur in the mornings and strong south westerly winds occur in the afternoon. Most bushfire events are driven by wind, this is especially the case for fires in grass/paddock/pasture areas, which includes much of surrounding landscape. Given the afternoon is the hottest part of the day, with the lowest humidity and strongest prevailing winds, the south west bushfire was considered the highest risk for most of the sites.

In reviewing the possible amendments, a worst-case scenario is assumed.

4. Discussion

4.1 Ballak Place

Ballak Place is a 230 m long cul-de-sac, running north from Thomas Road, approximately 280 m west of the intersection of Tonkin Highway (Figure 1). It provides access to 6 lots (510-515) which are Rural Residential lots from 2 - 3 hectares. There is currently a 6m wide easement for firefighting to the east of lots 511 and 510 (Figure 2). There is also an easement provided to the south of lots 510/515 and to the west of Lots 513, 514 and 515. It is also proposed as part of the highway development, to include a noise wall along the eastern boundary of Lots 510,511,512 & 513 and the southern boundary of Lots 510 & 512.

The surrounding landscape consists of rural or rural residential lots to the west, north and south, with a small pocket of residential lots directly to the south (Figure 1). The rural/rural residential lots consist mainly of grass paddocks, some with isolated paddock trees, however the predominant bushfire risk will be grass fires.

Figure 1: Ballak Place (circled) and surrounding landscape

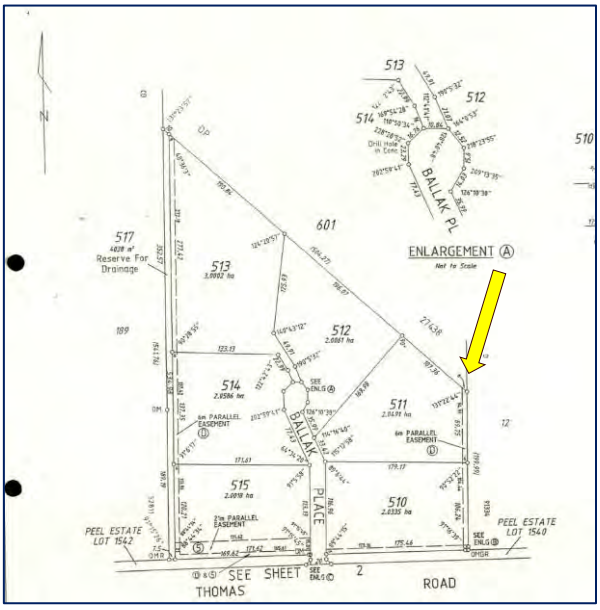


Figure 2: Ballak Place Lots and current easement (Thomas Road Oakford (L188) Subdivision 114637 Deposited Plan 27439)

While the lots in Ballak Place do not require trafficable fire breaks under the Shire of Serpentine Jarrahdale's Fire Hazard Reduction Note, those surrounding properties > 4047m2 do require trafficable firebreaks. All lots, however, are required to reduce all dead flammable materials below 8 tonnes per hectare and to ensure that all grasses are maintained under 50mm from the 1st of December until the declared end of the fire season. While there are trees within the lots and along Ballak Place, the grasses, and gardens under

them would be considered the highest potential risk for supporting a bushfire in that landscape. This means that the overall landscape bushfire risk should be significantly reduced over the bushfire season.

The overall risk to the properties in Ballak Place from bushfire would be considered low to moderate given these parameters. This is also based on the assessment that the road is a well-maintained road surface and is only 230m long, meaning evacuation of residents of the houses in the street do not exceed 350 m (the house in Lot 513 is the furthest away from Thomas Road) until they will have the ability to egress in two separate directions, which is the key intent outlined in SPP 3.7 Element 3. The current easement for firefighting purposes to the east of lots 510 and 511 do not appear to have easy access from Thomas Road, therefore would be not considered as a suitable emergency access way or egress point for landowners to the road. Given Ballack Place is only 230 m long, early evacuation from the houses would likely be possible via the existing road to the south to Thomas Road, for most bushfire situations within the surrounding landscape. As such, an Emergency Egress route to the north would not be considered necessary.

For bushfire suppression activities, including asset protection, the use of the house areas themselves, with good quality driveways and access to water as required, would be considered a more suitable area to base any defensive or suppression works.

Therefore, the existing fire access easement has limited additional safely merit in our opinion as either a containment line or an alternative egress route for landowners.

The provision of noise walls on the eastern side of the lots, may provide some shielding from any fire to the east, however the width of the highway itself and the supporting infrastructure will also reduce potential impacts from any fires coming from an easterly direction. Again, suppression or defensive firefighting activities would be best based from the house lots themselves, in most cases. Any additional noise barriers built around these houses has the potential to shield the area from radiant heat and interrupt any smaller grass fire process (assuming grasses are maintained to <50 mm as required by the Shire of Serpentine Jarrahdale). Depending on the design, placement and any gaps in the noise wall, they may provide a barrier for any landowner intending to evacuate onto Tonkin Highway, plus the highway may have sloped batters or other barriers preventing egress. Given the short distance to Thomas Road, the minimal bushfire risk and radiant heat exposure likely from the vegetation along Ballack Place, and the width and standard of the road surface itself, evacuation through the road system would be the preferred option

4.2 Hopkinson Road

In the original design, Hopkinson Road was to retain its connection to Thomas Road via a link to Kardan Boulevard. However, the current proposed design has removed the Hopkinson Road, to Thomas Road connection from the scope (Figure 3 & 4).

Figure 3: Current layout of Hopkinson Road and the surrounding landscape.

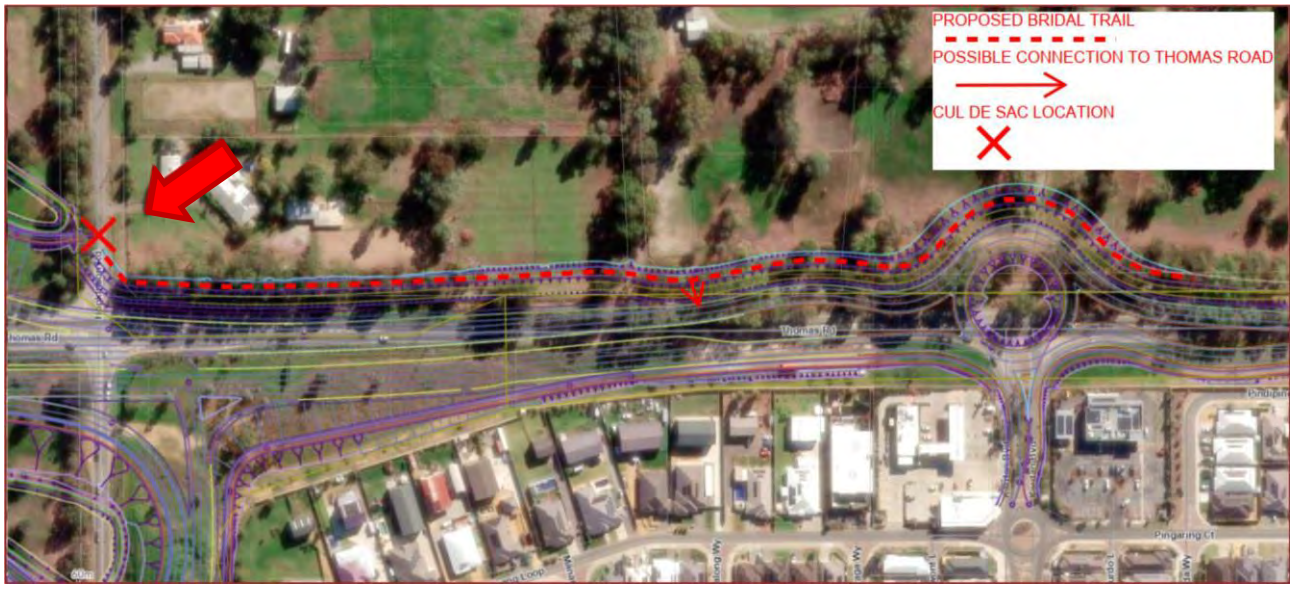


Figure 4: Design showing where Hopkinson Road is proposed to be made into cul de sac (red cross)

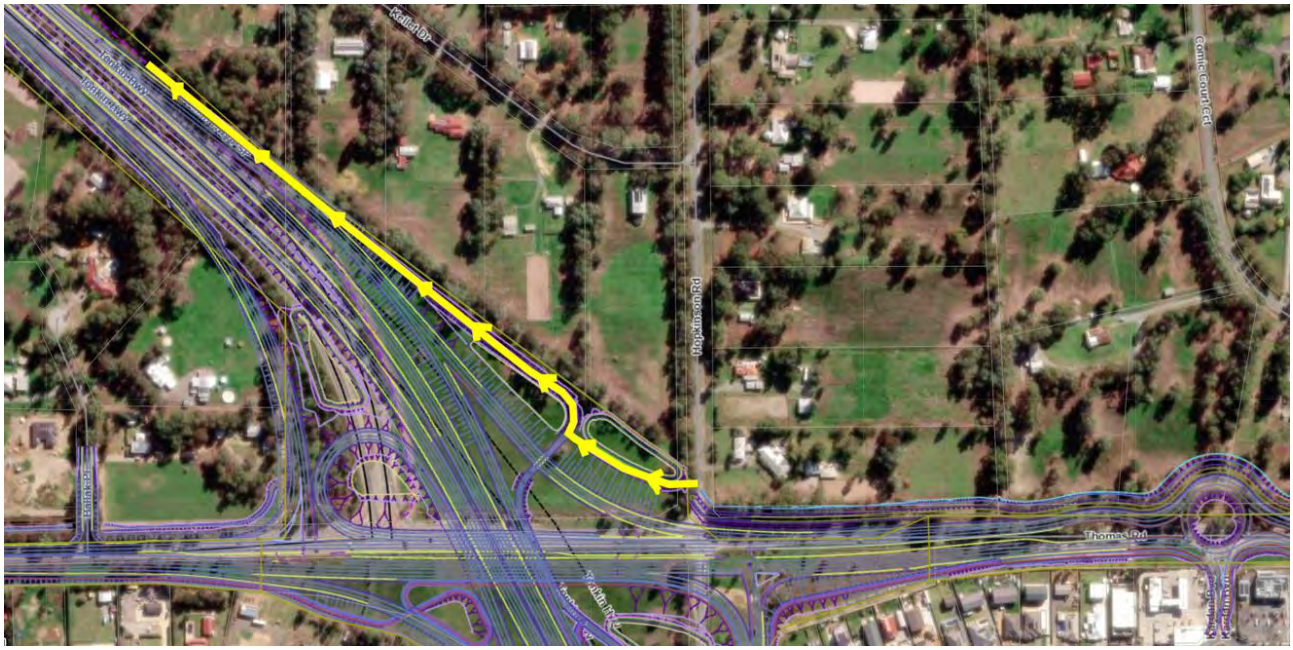


Figure 5: Hopkinson Rd Connection to PSP.

Hopkinson Road currently runs north south from Thomas Road to Rowley Road, 3 km to the north. Most of the surrounding properties are Rural Residential lots of approximately 2 ha (Figure 3). During the site investigation it appeared that many of these holdings had horses, therefore any evacuation process should consider vehicles with horse floats as a worst-case scenario.

There is an alternative emergency access/egress route to the east from Gloaming Way approximately 1.5 km to the north of the current intersection with Thomas Road. This, however, involves a convoluted pathway through the adjacent Rural Residential areas and would not be a preferable exit route due to its complexity given panic that occurs during bushfire events. This road system provides only a single egress route, which considering the amount of potential traffic, a vehicle break down or crash (very common in smoke filled environment, with added panic) could block any further egress and provide difficulties for emergency services trying to enter the area for suppression and evacuation management There are more than 35 lots with houses between Thomas Road and Gloaming Way, and many more further to the east of Hopkinson Road up to Rowley Road,

The removal of a connection to Thomas Road will have significant egress implications for residents in this area in an emergency evacuation or even a controlled egress situation in a bushfire event. While a northerly escape route is likely to be heading away from a bushfire situation (given south westerly winds, hence head fire will be likely to be moving in a North Easterly direction) the volume of people/vehicles and horse floats potentially using this route is problematic. A grass fuelled bushfire is still the likely scenario in this landscape, which while it may not be extreme (depending on the situation at the time) it is likely to produce a lot of smoke, which will cause panic and confusion in any emergency. In many situations like this, people do not rationally leave at low speed, panic induces irrational behaviours, which if that results in a crash, may block further egress, or restrict fire fighter access. Therefore, some form of alternative egress would ideally be provided.

There is a proposed Bridle Trail that will follow Thomas Road to the east (Figure 4). One possibility is for this path to be upgraded to be used for a vehicle towing a horse float, with suitable width and slope to allow traffic to escape onto Thomas Road, east of the proposed interchange. While this will still pose potential issues with the volume of vehicles that may use it, it will provide a "pressure relief" option to separate the volume of traffic. This could be gated (and locked at the discretion of the District Fire Control Officer, with keys held with local fire stations and FCO) to ensure it is only used during emergency situations.

An additional emergency egress route option would be to provide connection from the proposed Hopkinson Road cul-de-sac onto the exiting Tonkin Highway PSP (yellow line on Figure 5). This may require sections of the PSP to be designed/upgraded to support vehicles towing horse floats and potentially routing the link behind the proposed basin for more direct access which could be developed further as the deign progresses into detailed design.

Overall, we believe that some alternative egress option be developed for this location.

4.3 Cardup Siding Road

In the previous report, this area was discussed with a solution being to provide a connection between Cardup Siding Road and Orton Road vis an extension of Doley Road (green in Figure 6)

Figure 6: Original Cardup Siding Rd Options (Connectivity and Accessibility Study - Main Roads Oct 2021)

Figure 7: Doley Road Connection.

Cardup Siding Road connects to Soldiers Road to the east, however, it becomes a cul de sac to the west with the introduction of the Tonkin Highway Extension. The latest design now provides a connection through an extension of Doley Road to the north, which will provide an emergency access and egress route to the north (Figure 7).

This landscape has the highest bushfire hazard in the Cardup Nature Reserve, which is large area of extreme bushfire hazard. The western end of Cardup Siding Road has extensive areas of residential houses with managed gardens, driveways and road itself is wide and well-constructed. However, in the event of a bushfire in Cardup Nature Reserve, it is likely that Cardup Siding Road and the access to the Doley Road extension could be blocked for traffic to the east and north, hence isolation those landowners west of the reserve. This compromises 36 lots.

A preferred solution would be to have some means of an emergency access/egress way directly onto the Tonkin Highway at the Cardup Siding Road cul-de-sac. This would need to be engineered to facilitate the movement of vehicle onto the highway, with width and slope suitable for vehicles towing horse floats. This again could be gated and locked at the FCO's discretion with any keys maintained at the relevant fire station or appliances (Figure 8)

Figure 8: Suggested Cardup Siding Road Egress Option.

Other possible areas of concern and potential solutions that were raised in the previous Emergency Egress Review (Ecosystem Solutions, 2022) are still valid and no other observation of possible restricted egress were noted in the design layout provided for this current Emergency Egress Review Addendum (Ecosystem Solutions 2023).

Appendix G

2020 Tonkin Highway Extension Community Survey Results

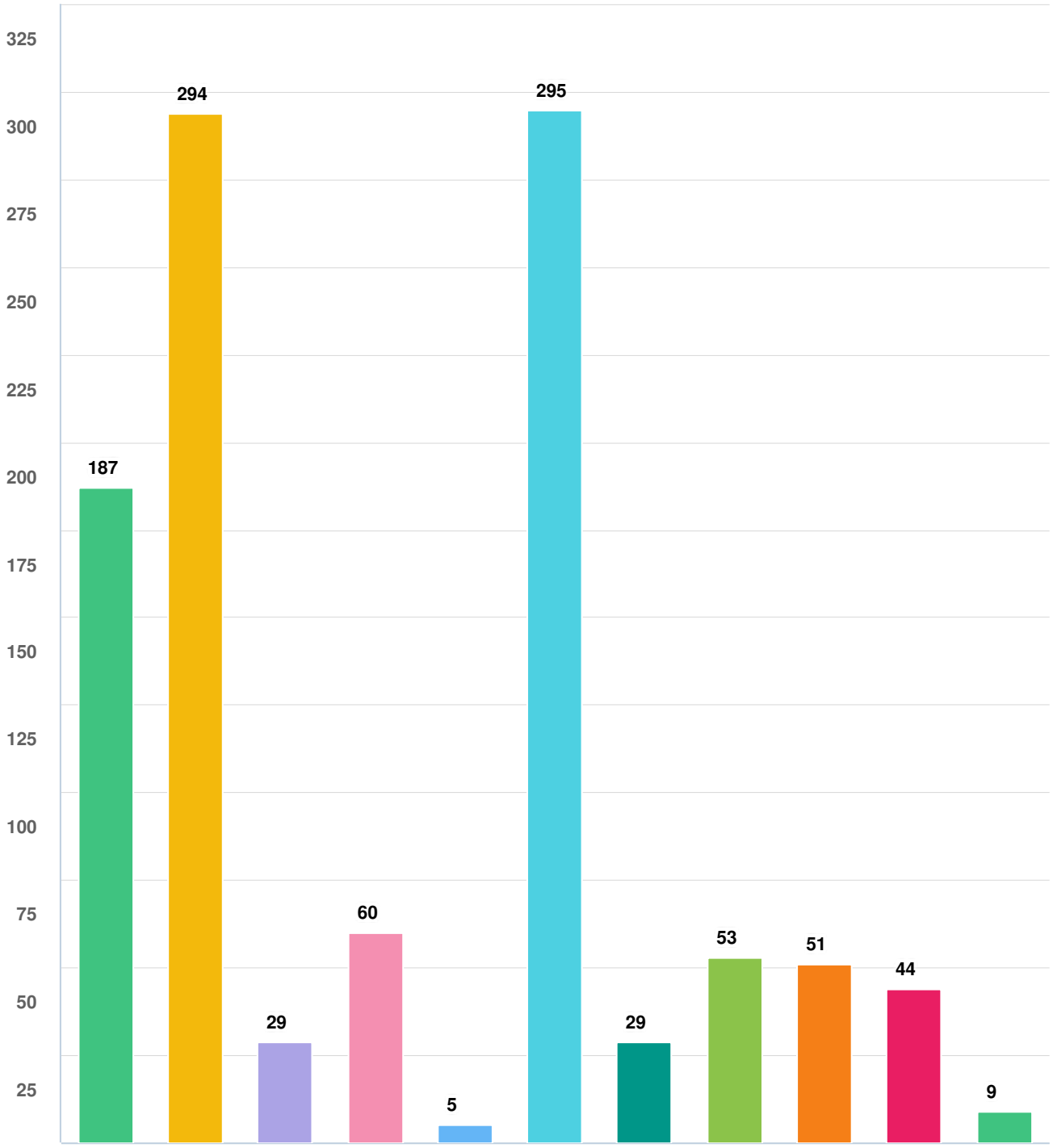
Tonkin Highway Extension - Thomas Road to South Western Highway Survey

SURVEY RESPONSE REPORT
05 July 2020 - 16 August 2020

PROJECT NAME:
Tonkin Highway Extension - Thomas Road to South Western Highway

SURVEY QUESTIONS

Q1 What is your interest in the Tonkin Highway Extension Project?

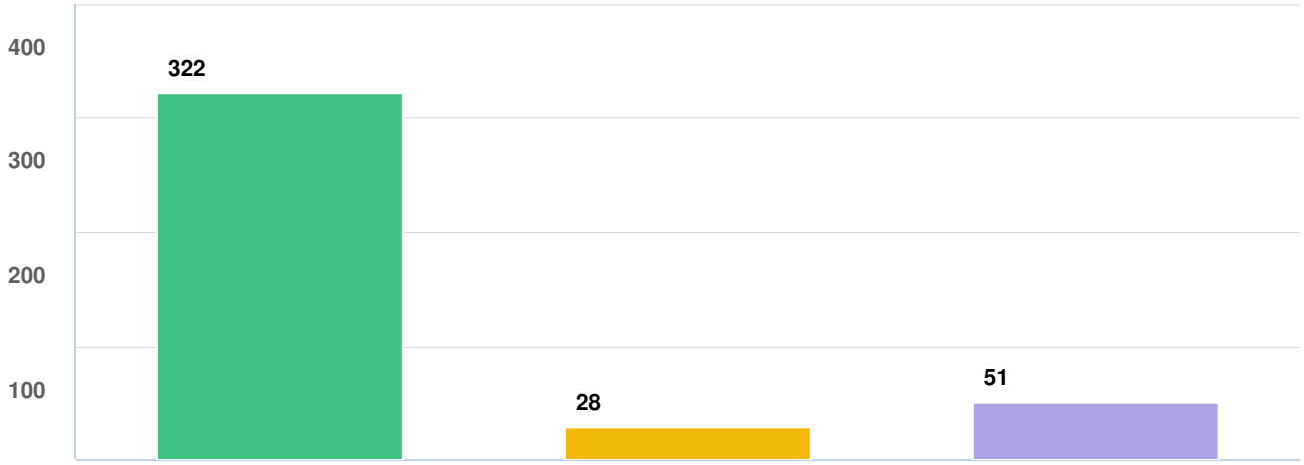


Question options

Landowner | Resident | Business owner | Work in the area | Student | Road user | Public transport user | Cyclist | Pedestrian | Horse rider | Other (please specify)

Mandatory Question (401 response(s))
Question type: Checkbox Question

Q2 Are you supportive of plans to extend Tonkin Highway from Thomas Road Oakford to South Western Highway, south of Mundijong ...

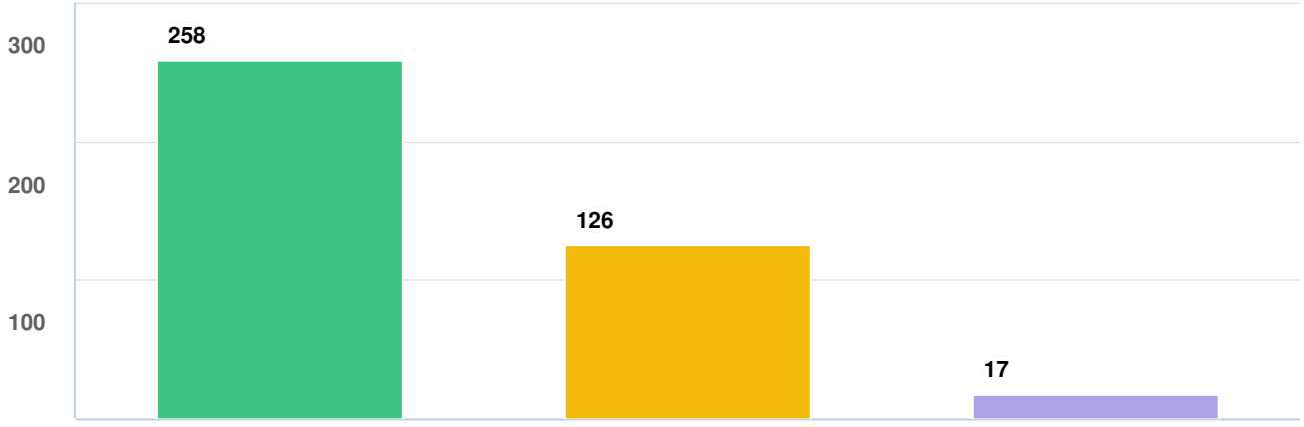


Question options

Yes No Undecided

Mandatory Question (401 response(s))
Question type: Checkbox Question

Q3 How often do you anticipate driving on the Extension?

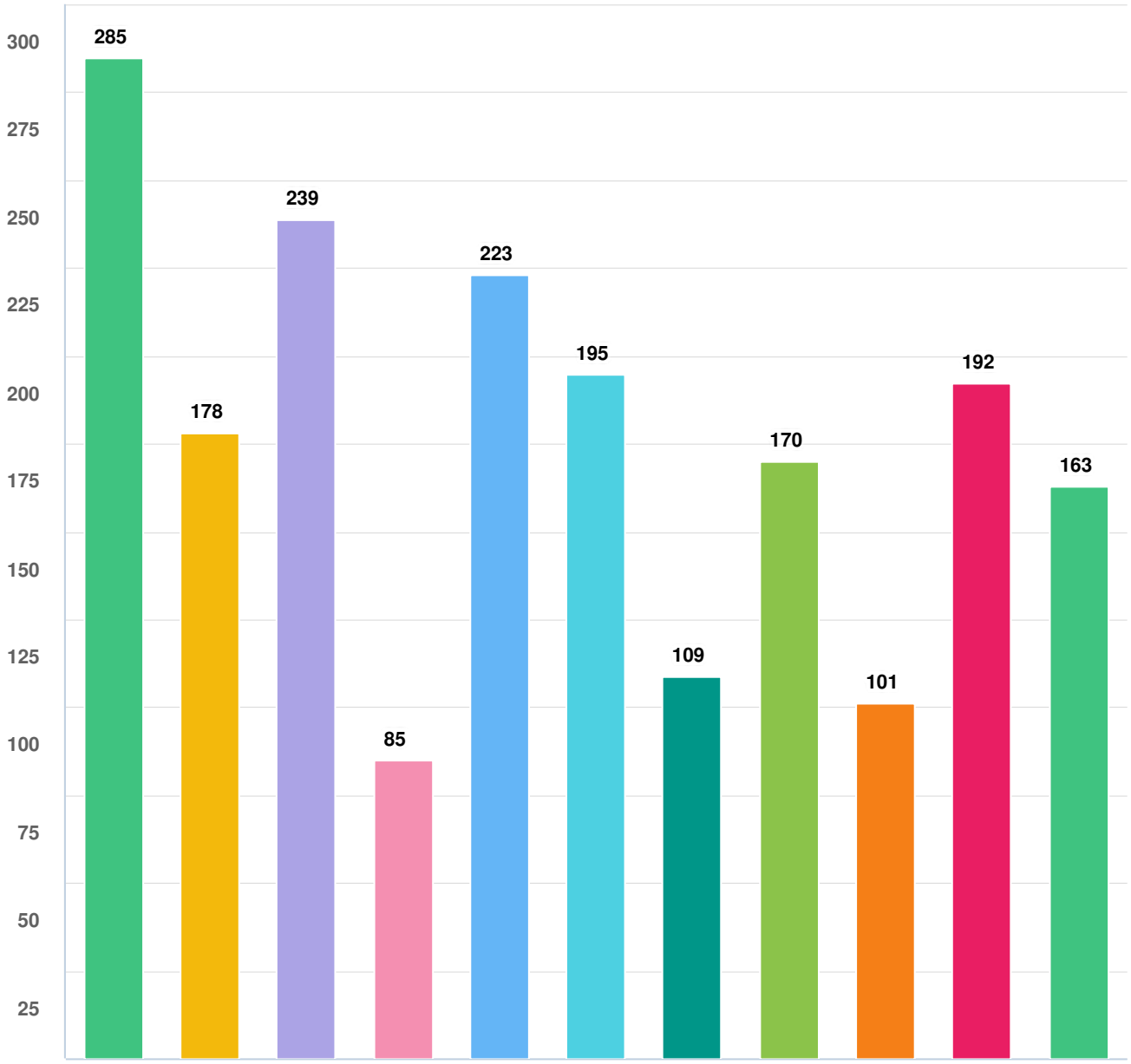


Question options

I expect to drive on the Extension regularly (at least three times per week)
I expect to drive on the Extension occassionally (fewer than three times per week)
I do not expect to drive on the Extension

Mandatory Question (401 response(s))
Question type: Checkbox Question

Q4 What priorities do you think the project needs to consider?



Question options

- New intersection upgrade plans
- Travel time savings
- Access to residential areas and/or commercial areas
- Access to recreational facilities (e.g. sport, equestrian or other)
- Safety – separating local and regional traffic to reduce congestion
- How traffic noise from the Extension will be managed for adjacent residents
- Streetscaping – landscaping and public art
- Pedestrian, equine and cyclist pathways and connections
- Proposed freight rail realignment project
- Traffic management during construction
- Environmental management - mitigating impacts to waterways, vegetation as well as approvals

Mandatory Question (401 response(s))
Question type: Checkbox Question

Q5 Do you have a comment, question or concern you wish to raise?

Dianne 7/13/2020 10:42 AM	We live in the Cardup area and as far as we can see on the map given to us, there will be no way for our community to access the Tonkin unless we drive around to Orton Road or all the way to Bishop Road and our access to roads on the west side of the Tonkin, Bishop, Gossage etc. will be closed off. There is a proposed subdivision for the area close to the Tonkin, on Cardup Siding Road, with fairly dense housing and if there should be a fire in the area, we would have only one exit, that being Cardup Siding Road. A very dangerous situation.
BCLawler 7/13/2020 12:08 PM	- destroying our view - noise pollution - effecting our house price ? - bring crime to the area
Cardup-resident 7/13/2020 01:01 PM	The Cardup drainage channels are full during winter. How will you upgrade drainage to code with the extra water run off? How will kids cross Tonkin highway from west of the highway in Cardup to access, schools, sporting facilities and friends living east of the highway? Can an over pass bridges be added at Gossage or Cavanagh?
harvey678 7/13/2020 01:32 PM	Extension should also include upgrades of intersection roads so that local traffic can be supported by these "distributor" roads.
kylie75 7/13/2020 01:54 PM	Would like to have seen some future proofing in this project by not having traffic lights at the intersections.
Jimh 7/13/2020 02:03 PM	How does one access Cardup Siding Road from Hopkinson Road once work completed as there is no mention of those residents who use this road to travel to Byford
Debz 7/13/2020 04:18 PM	I would like to know what will happen to cardup siding road and and how we willgain access to learmouth turn. If your block off hopkinson/cardup sidng road we only have one way out which is to drive up towards sputh west highway along cardup siding. This is dangerous. We are in a fire zone. We cannot have 1 exit. Please let me know what the plans are for cardup siding road, access to hopkinson and learmouth turn. at the moment we turn right directly off cardup siding onto hopkinson. We do not want to have to go all the way around.
Troy 7/13/2020 04:48 PM	Residents living on West side of proposed extension will be impacted by significant increase of traffic noise for quite some distance due to the extremely strong and regular Easterly winds that move through the area. I would be hoping for a quality noise suppression barrier such a limestone wall to run the length of the upgrade to reduce the impact. Please keep in mind that most residents including ourselves moved to the area and onto larger lifestyle properties for the peace and quiet it offered.

Meegs87 7/13/2020 07:19 PM	Will there be suitable pedestrian crossing at junction of Wright Rd and Watkins rd
Mardella65 7/13/2020 07:19 PM	Where can I access proposed intersection, on/off ramp ariel view ?
Cristina 7/13/2020 07:19 PM	Needs to have Pathway along Thomas road to the Tonkin highway cycle path. From the redgum estate.
Ryan Lehtonen 7/13/2020 07:27 PM	Main concern will be the impact of value to immediate surrounding home owners
Lian 7/13/2020 07:29 PM	Look forward to the commencement, hope a cycle path will also be built
jarrah83 7/13/2020 07:33 PM	The extension will make life so much easier for many of us who commute to work. Public train line from Byford next please!
Me&OnlyMe 7/13/2020 07:34 PM	I am concerned of the impact on traffic on Watkins Rd during and after the construction of the extension. I am concerned that the extension will not be completed in one stage, therefore stopping at Mundijong / Watkins Rds and increasing traffic on these roads whilst awaiting the remaining section to South Western Hwy is built. I am concerned about traffic noise, particularly at night which is amplified in a rural environment and even more so when the easterly winds blow
Mayzie08 7/13/2020 07:36 PM	Please place interchange/bridges, don’t have traffic lights at every intersection, let’s be the future of having it done right the first time not plan for future upgrades. Also be a great idea to plan Tonkin Hwy to head directly east from South West Hwy to link up with Albany Hwy and then Brookton Hwy. This provide would be great for trucks to use especially if the new port will be located at Henderson. It will stop the big bottle neck of trucks in Armadale creating a safer traffic network and jobs.
Belinda99 7/13/2020 07:38 PM	1. If you are building an overpass at Abernathy Rd, you should also allow vehicles to drive under the Tonkin as well as pedestrians and horse riders. Both to connect the southwest Oakford Community to schools and shops in Byford, as well as providing another route if there is an accident on Thomas. 2. Would like an access on to Thomas Rd from Hopkinson north (maybe left turn only) as if closed will add 5km each way to travel to school/shops. 3. Make sure the cycle way along the Tonkin actually joins with local paths. Have been waiting 15 years for the cycle way ending at Thomas Rd to be connected with Byford. Thomas Rd is too dangerous to cycle on.
justjusto 7/13/2020 07:42 PM	Abernethy road has been upgraded. Why is this being considered for an exit instead of Orton Road.

JustDoug 7/13/2020 07:55 PM	Please install bridges traffic lights add no value to reduction in tine
LJL 7/13/2020 07:55 PM	Access to Cardup siding natural reserve to ride my horse from Cavanagh close
Davemcg 7/13/2020 07:56 PM	Needs to be done asap to spark more development in the area
Cardup2 7/13/2020 07:58 PM	It is time this went ahead. The area is developing fast with more people using the Tonkin Highway Electrification of train line to Byford is needed.
RenaeCardup 7/13/2020 08:05 PM	Installation of noise barriers for adjacent residences
Peterings 7/13/2020 08:10 PM	This extension would add great value and safety in getting to and from work and shops. I look forward to seeing this extension started.
Jo_oakford 7/13/2020 08:11 PM	I think it's well overdue, hopefully it will reduce the traffic on Hopkinson Rd and Thomas Rd
ENPlus 7/13/2020 08:23 PM	Vehicle access to Tonkin Highway is needed at Abernethy Road. Having to access the Highway via Thomas or Mundijong Road will be very highly inconvenient and will likely increase my travel time to work. This would also be the case for most in the Byford town centre. From a town planning perspective, it would make more sense to ensure easier access to the Byford Town Centre. I will also be putting this to the Shire of SJ.
Ellie 7/13/2020 08:26 PM	Less traffic lights on the extension, more merge on/off ramps instead
BabyGus 7/13/2020 08:28 PM	Safe access to equestrian areas within the area. Concerned how this will effect current equestrian estates. Please keep them coldersacked. Do not make the current equestrian areas through roads to suburban estates because animals and traffic do not mix. Consider the rural feel and seperate suburbia from acerage. The roads near the trotting complex In Byford are atrocious. There should have been more consideration towards the residents. More planning into keeping the equestrian residents happy. There have been several deaths on Briggs road. And it's not good enough. There has to be a happy medium.
Louise0121 7/13/2020 08:39 PM	Will an overpass be considered for entering Thomas road? This will save on traffic wait times
Clar8 7/13/2020 08:43 PM	Think an over pass would be good.

Name01 7/13/2020 08:50 PM	Please let residents know when action is happening
Caz20 7/13/2020 08:57 PM	How will the water run off from the Hwy be prevented from flooding the properties that run along side the Highway? Hwy needs to flow and not stop start with using traffic lights this will create noise pollution how will this be managed?
LH 7/13/2020 09:13 PM	How close to properties backing on to Hopkinson Rd between Thomas Rd and Abernethy Rd will the hwy be? Will a surveyor inspect all properties next to the hwy extension in this area prior to works and upon completion of works to ascertain if any damage has been caused due to vibrations/movement caused by the works? Will trees along Hopkinson Rd be saved as they are the natural habitat of many native birds in the area including gallahs, kookaburras, black cockatoos, etc? What will be put in place if anything, to act as a sound barrier along this stretch of the extension which will run closely to properties on both sides of Hopkinson Rd?
Jezza95 7/13/2020 09:14 PM	What is happening to the Thomas Rd end of Hopkinson Rd, from Abernethy to Hopkinson? Many people use this to get on to the highway. Please reduce the use of traffic lights, it makes travel time so much longer
Natemannin 7/13/2020 09:15 PM	Nil
Horse Power 7/13/2020 09:17 PM	Will there be proper overpass and will these be upgraded at other intersection between Thomas rd and forrestfield? What steps will be put in place to control traffic on Thomas rd during the construction?
Akilminster 7/13/2020 09:19 PM	What would be the estimated number of freight vehicles using the extension and how would this impact local traffic and noise pollution?
AJ22 7/13/2020 09:26 PM	No traffic lights at intersections, make the right decision now. Make it like the gateway project. Which works perfectly, and main roads will have all residents talking how good main roads have done this project. Not complaining about the project after it is completed. I also have a concern for bullock drive as many people ride horses on side of the road, with increased traffic due to Hopkinson road closure. Could be potentially dangerous to horse riders with more traffic and the bends on bullock drive. I am not a horse rider, just have a concern.
NeilW233 7/13/2020 09:30 PM	What is to happen to Hopkinson Rd North and Thomas rd intersection after the road modifications has finished
Ralphy 7/13/2020 09:36 PM	No traffic lights, and keep access to west of Hopkinton road separated from the east side, access west to residents only.
Jessie23 7/13/2020 10:15 PM	Exit into byford

CjMcEnnulty 7/13/2020 10:26 PM	Abernathy road, very busy main road Why isn't a planned exist? Connections the Glades, Byford West and Kalima estates
Jack2909 7/13/2020 10:33 PM	Less traffic lights, more use of over/underpasses. Do it once, do it right.
Airstrike2001 7/13/2020 10:42 PM	Firstly this survey is frustrating as it gives no new information about the tonkin highway extension other than what is already known. The project should look at using abernethy road as the main transport route into Byford townsite and not Orton road. Abernethy has just been redesigned and is a major road into the majority of Byford. Using Orton road as the main entry into Byford gives no benefit to approx 2/3rds of the Byford community as it is easier to get off at thomas road and go from there. Going to the southern side of Byford only supports 1/3rd of the community and has no real benefit to business and residents in Byford town as all heavy vehicles will continue going up thomas to South West as it will be more economically viable and easier as there are traffic signals to control traffic. The section of Thomas road between Tonkin and South West highway can't handle the traffic that flows down it at the moment and the council does not maintain this road to required standards as it is full of potholes that are repaired every time it rains.
Hazy49 7/13/2020 10:45 PM	This extension process will have a direct impact on my families daily commute as well as a noise/fume impact during and after completion which we were not aware of when buying our property 2 years ago. This may devalue our property. The construction process may inhibit our daily commute.
VPSINGH86 7/13/2020 11:22 PM	REALLY HOPE TO SEE THE WORK BEGIN IN THE NEXT FEW MONTHS
rise34 7/14/2020 12:17 AM	Environmental considerations must be paramount. Preserving the rural nature of area is vital.
Dfokk 7/14/2020 02:37 AM	Its been promised for years. Get it done.
Josie 7/14/2020 05:53 AM	Traffic management at the s.w. hwy intersection . Concern there needs to be traffic lights because of the heavy haulage that will use it
Ned 7/14/2020 07:02 AM	I am a local farmer who carries out re-vegetation works.. currently involved in planting 100,000 seedlings @ the Doral mine in Keysbrook. we would like the opportunity to be involved in planting locally sourced seedlings..(local nursery- AUSTRALIAN NATIVE NURSERY- in Oakford-Nancy Scade) . I have a good record of success in my 40 + years of reveg.. in fact I have planted some of the subdivisions that this new extension passes thru : near Gossage Rd/Karbro Dr., & Hopkinson Rd. NJK

yakcam64 7/14/2020 07:37 AM	I think this new extension will be great for the area and limit thought traffic though the byford residential zone. - I like how Abernethy road is a pedestrian walk through and not a major access point to the extension.
MJJ 7/14/2020 07:37 AM	Why no intersection at Abernathy Rd? Will there be on and off ramps?
Stuart_Herring 7/14/2020 07:52 AM	How best will local traffic be removed from local road onto the new extension
Nic 7/14/2020 08:00 AM	Abernethy should be the major on ramp and should not be closed off. Shire have done major revamp of this road and it is a major thoroughfare for Byford /Oakford residents.
Marisa 7/14/2020 08:48 AM	Effect on bridle paths and road safety for equestrians
Brenno 7/14/2020 09:32 AM	Just get on with it
BAW 7/14/2020 09:33 AM	With no on ramp at Abernethy Road, much more traffic will use Briggs And Malarkey roads as a short cut to Thomas Road, especially if Malarkey Road is extended through to Thomas Road. These two roads are already very busy and becoming dangerous. They are both on the trotting complex, a designated horse area. It is becoming untenable to get horses to the track crossing these two roads now, let alone with what I would think would be dramatic increase in traffic flow.
Stac 7/14/2020 09:35 AM	Tonkin highway is already congested ++ at each set of traffic lights in peak hour. Then adding in the high volume of oversized loads and trucks it is worse. Plans should be made to remove all traffic lights to allow for better traffic management.
Vickih10 7/14/2020 09:36 AM	Can you please drop the practice of installing traffic lights at all major intersections on Tonkin Highway and put in overpasses at time of construction? The most frustrating thing about taking the Tonkin Highway is the number of traffic lights between Thomas Road and Roe Highway. Heavy haulage vehicles use the Highway with direct access to/from Thomas Road and the need to have to stop at every set of lights is both frustrating and dangerous, given the amount of traffic using the roadway daily. Why the roads have to be built with traffic lights instead of overpasses, is beyond comprehension. Yes it will cost more, but the delays and the need to go BACK and re-do all these intersections as time progresses is mind boggling. A bit of forward planning for future traffic increases, especially with upgrades to Thomas Road, is warranted.
Classicgt 7/14/2020 09:48 AM	Do it right from the start and remove the traffic lights - put in over passes.

Paul45 7/14/2020 10:05 AM	Closing Abanathay road will direct a lot of traffic onto Kardan Blvd and past a primary school. I believe this will make crossing the road a lot more dangeroue for kids crossing the road.
youtoo 7/14/2020 10:25 AM	Will Watkins road stay accessible to South West hwy?
Maldini3 7/14/2020 10:55 AM	Having business in the area I see it important to have acess from Bishop and Orton Roads both on and off the Tonkin Highway.
mhs123 7/14/2020 11:17 AM	What are the plans for Jarrahdale Road that runs through a small residential area of a 50 KM zone when the intersection of Tonkin to South West highway is complete? Jarrahdale Road is going to become the obvious choice for large freight and traffic to get to Albany Hwy. We already have too much traffic on this road and I know locals would prefer it to be diverted away.
pspeering 7/14/2020 11:38 AM	Impact to the existing highly vulnerable flora and fauna needs to be very tightly managed. Severe penalties need to be built into the contracts and companies need to be blacklisted from future government work if they negatively impact on our environment.
DanielM 7/14/2020 12:16 PM	This project needs to be done with extensive future planning in mind. The intersection at Thomas road absolutely has to become an overpass if congestion is to be decreased and safety is to be increased. Ideally, all intersections will be overpasses.
Ngumpa 7/14/2020 01:43 PM	I am interested in how the road will improve traffic efficiency in the area. In particular ensuring there is a speed limit that is high enough to support rapid movement throughout the area. The quality of the road surface is also important to me, do not wish to have a poorly surfaced road leading to damages like the North Link
Beneybom 7/14/2020 01:57 PM	When is the commencement of work going to start?
Karen1 7/14/2020 02:04 PM	How will this effect the traffic use in Jarrahdale Road especially freight? I live here and moved here for peace,tranquility and community engagement. I would be horrified if our little town were to be used as a thoroughfare for traffic, specifically freight using it to bypass the Armadale Road entry to Albany Highway. There are already numerous wildlife casualties due to accident, speeding and large trucks using This road which wasnt designed for 21st Century traffic congestion.
Popjohn1 7/14/2020 02:09 PM	Please sir/madam include a PsP along Thomas Road from South Western hwy to Tonkin junction. Currently too much traffic on Thomas making it difficult for safe cycling/riding. And include bridges just like northbound from Airport.
EileenN	May need to upgrade intersection of Karnup Road and South West Highway

7/14/2020 03:11 PM	for increased traffic using this route to access Serpentine.
Violet 7/14/2020 03:29 PM	I would like to see connections for pedestrian, equine and cyclists fully considered and catered for with trails, pathways etc remaining connected and future trails, pathways etc taken into consideration given the high future growth that will be experienced in the Shire surrounding the foot print of the Tonkin Hwy Extension.
Marshy081 7/14/2020 03:36 PM	Don't drop speed limits
Davo 7/14/2020 03:43 PM	The Tonkin Highway Extension - Thomas Road to South Western Highway is a project that will have a significant knock effect on the traffic movement and flows within Byford. Importantly, the intersection at Thomas Road & Malarkey Road must be constructed as part of the Tonkin Highway Extension project. Malarkey Road (formerly known as San Simeon Boulevard) is located in the northern portion of the Byford DSP area, providing a northwest-southeast connection between Thomas Road and Abernethy Road. San Simeon Boulevard will play an important district role by providing a direct connection for residents and traffic into the Byford Town Centre. The road will provide direct access to and from the Town Centre and assist in limiting vehicle movements through the Byford Trotting Complex. Thomas Road & Kardan Boulevard intersection is NOT identified in the Byford DSP as the Thomas Road deviation connecting with the Byford Town Centre. Priority must be given to the construction of the Thomas Road & Malarkey Road intersection to effectively manage the increasing traffic numbers through a population and housing growth in Byford.
Q G-S 7/14/2020 04:28 PM	I think it is of great importance that Abernathy Road be open for vehicular traffic as well as pedestrian and equine, under the Tonkin extension to keep residents on the western side of Hopkinson connected to Byford and all the facilities and connections on the eastern side of Abernethy like grocery stores, schools, childcare, fuel stations, local businesses, Op Shops, restaurants and food outlets. It would of huge disadvantage and inconvenience to cut off those residents by closing Abernathy Road to cars. Also, the sound proofing fence to follow all along the Tonkin extension to protect Byford from the increased traffic noise levels. Many of us have moved here for the peace and quiet, and there’s no reason a highway extension should disturb this. For the sake of the local environment, local waterways and creeks (like Beenyup Brook) be restored and protected in tandem with the highway extension, with a huge number of tree plantings along both sides of the highway, greening the entire way past Byford and helping keep the air clean.
Johnno 05 7/14/2020 04:30 PM	I would like to ask if the intersection will be fly overs rather than traffic lights
Kstamp19	How will the smaller roads such as cavanagh close etc be able to get access

7/14/2020 04:51 PM	to BYFORD.... will Hopkinson road still be accessible
Whatcanisay 7/14/2020 04:56 PM	The residents of our shire are not being included on decisions. The Department of Transport is making the decisions then asking our opinions when nothing we say will change what they have planned.
rod 56 7/14/2020 05:53 PM	Removal of trees on my boundry they need to go damaging my property
Mara123 7/14/2020 07:20 PM	How will people residing off of Abernethy, Charolais, Jersey and Devon access Tonkin hwy. How will the people in this pocket access Byford?
Alison Leggo 7/14/2020 08:28 PM	I would like to see traffic lights removed from the Tonkin and replaced with merging lanes like what is available north of Hale Road. This makes traffic flow much more managable and gives all less aggravation and fule costs
Mike89 7/14/2020 08:42 PM	How will noise be managed. As a home owner land value might be reduced. We own a house on Zircon drive. How close will the extension be
GBW 7/14/2020 10:13 PM	How will you ensure heavy vehicle traffic does increase on Jarrahdale Rd?
Elishaone 7/14/2020 11:18 PM	I am concerned about the future of the Hopkinson rd/Thomas Rd and then Tonkin intersection. Am undecided but it might be the best option to make Hopkinson a cul de sac north of Thomas
Bok-Walla Park 7/15/2020 08:57 AM	Increased traffic along Orton Road, and new Intersections
ByfordResident 7/15/2020 09:47 AM	I hope when looking at intersections for this project that MRD does not propose to use traffic lights. I travel every day from Byford to Forrestfield and the amount of traffic lights is rediculous. It seems all attention is being given to the Northern Suburbs and South of the river continues to live in the past with traffic lights every few kilometers. When can we see an improvement? This will be the main truck access from the south and yet trucks spend most of the time waiting at lights or accelerating away from. Then theres the impact of fumes from the traffic. Surely MRD can see the sense in getting rid of the lights, or perhaps planning only extends till the next election. Southbound Tonkin is an absolute disgrace
Byford80 7/15/2020 01:13 PM	Attn Main roads If abernethy rd doesn't have an intersection to the tonkin highway....it will drag thousands of residents down kardan Blvd... or Briggs rd. These are residential roads not designed for major traffic flow. It is inevitable that accidents involving children and pedestrians will occur. Car crashes due to inattention...speed zones causing major congestion... frustrated drivers making poor choices or taking risks. The nature and severity of the accidents could include death. This is a major health and safety issue that needs to be addressed immediately. Main roads has a duty

	of care to the entire community ...which if it is not addressed... will be liable for damages or compensation. In addition having an underpass for pedestrians and horses... sure is a wonderful idea but will bring additional issues involving theft/escape. This will attract unwanted visitors to the community able to evade the authorities. Please take all these points into consideration as it is imperative we keep the community safe. You may even save a substantial amount of money not having to build an overpass for a little tunnel. Regards Zak
Jaland 7/15/2020 10:14 PM	Please don't add more traffic lights
Domekat 7/16/2020 10:14 PM	Will there be access to and from Abernethy Road - Tonkin Highway, or will the backstreets off Thomas and Orton have to be used to gain access to the main residential and shopping areas of Byford
IanL 7/17/2020 07:23 AM	What will happen to Hopkinson road between Thomas and Orton road? Will the trees between Hopkinson road and Kalimna Estate be saved? Will closing Abernethy road access to both the Tonkin HWY access and Hopkinson road increase the through traffic on Kardan Blvd from Abernethy road to Thomas road? Why not make Thomas, Orton, Bishop and Mundijong road intersections overpass now? This has to be cheaper than doing it in the future (lets think long term)?
TLFK88 7/17/2020 05:22 PM	I believe there should be a interchange at Abernethy road as it is the main entrance into Byford.
stuart1 7/18/2020 01:12 PM	I live off Cardup Siding Road (close to Hopkinson Road) in Byford. I am concerned about Cardup Siding Road being closed off and the only exit in case of emergency (i.e. fire) being all the way in the east on Soldiers Road. This would leave us trapped unless the Doley Road extension to Cardup Siding Road is also undertaken to counter this. This road also needs to be done as we will not have any viable access to Tonkin Hwy without heading to South Western Hwy first. I am aware of these issues having also been raised recently with Local MP Matthew Swinbourne during a meeting of local landowners.
bluedory 7/18/2020 08:45 PM	What is happening to Hopkinson Rd and the local roads that currently join onto Hopkinson Rd?
Loltom 7/19/2020 07:11 PM	What road access will there be for the crossroad at Abernathy & Hopkinson Road towards Byford shops and schools.
Chris.darren 7/20/2020 11:54 AM	I would like to know why there will be intersections/traffic lights. Why can't be the same as North of the airport much safer and time saving easier for all road users. Also Orton road needs major attention if you expecting that to be a main road in as parts south are dangerous one bridge is only one lane and is really bad now.

Benjamin Hodkinson 7/20/2020 07:10 PM	As a resident who's boundry fence is very close to the tonkin highway extension, I am very concerend about the road noise from passing traffic on the tonkin hwy. I am also concern about the reduction of privacy that the tonkin hwy extension will bring to my propery due to the increase of traffic and the potentional of lost flora and fauna as a result of the construction of the project. I would like to ask a few questions: 1. As my propery is very close to the hwy will i be provided with some kind of noise barrier? If so will this be in the form of a noise wall or will this be landscaped. 2. There seems to be a row of very large trees along Hopkinson rd between Cavangh street and Gossage rd that are lovley and have black cockatoos nesting regulary. Are these trees to be destroyed as a result of the construction of the tonkin hwy extension? 3.Is there a smoother bitumen that can be layed in order to decrease any road noise created by faster moving traffic in the area?
Hendrik Alberts 7/21/2020 09:20 AM	I am really concearned about the addition noise from Tonkin hiway to our house
Kiarra92 7/21/2020 12:43 PM	I feel this is a waste of money when half the roads in the Shire of Serpentine Jarrahdale are undriveable due to the terrible conditions and amount of pot holes. The extension seems to be an exact replica of South West Highway. Both go to the same place and start at practically the same place. Out of all of the information we have received in the mail not one thing has told me why this is a relevant extension and I can not see the point really. Surely this money can be put to much better use!
R4nd3ll 7/21/2020 12:43 PM	Why spend money on connecting to the SW Highway when the ultimate plan is to connect to the Forest Hwy. Why not include the Freight rail in same reserve as the Tonkin Hwy.
Kat55 7/21/2020 04:27 PM	I live on the immediate south side of mundijong rd where intersection of future Tonkin will be. I am in the middle of developing my property to enable more efficient management of horses which is now at a standstill and property unsellable. I don't know if my place will be aquired in 1yr or 5 yrs..any ideas? Pumping a lot of labour and money into maintaining the place knowing it's unsellable and will be taken from me one day is pretty stressful.
hsr23 7/22/2020 09:57 AM	What is the need to realign the existing freight rail
Rob440 7/22/2020 11:09 AM	There are a lot of homes down the western side of the Tonkin hwy extension and a noise barrier (wall) must be installed is there an intention for a wall to be built down the western side. Also road that run parallel to the extension and will have access to the extension via close proximity to new intersection are future causes of accidents eg. Hopkins Rd joining Orton Rd close to the Tonkin/ Orton Rd intersection. These areas need traffic management such as a round about installed. What are the plans for such hazards and unsafe areas?
Ghostrider	I'm concerned about the use of Kargotich Road when the new extension is

7/22/2020 03:17 PM	built. What steps are being taken by MRWA and Serpentine Jarrahdale Shire to reduce traffic along Kargotich Road between Mundijong Road and Thomas Road once the project is finalised? Road users coming from Rockingham, Mandurah etc to work in south eastern parts of Perth will still be inclined to use Kargotich Road as a short cut instead of driving the extra 1 to 1.5km to get onto the freeway. This defeats the purpose of the extension in my view. Will MRWA and the shire be planning on implementing road adjustments to Kargotich Road such as chicanes, blockages to deter traffic using this road once the extension is built? My other concern is whether MRWA and SJ Shire are factoring in horse bridle trail link to Darling downs from the Oakford and Cardup side of Tonkin Highway? Is MRWA planning on installing bridges at all intersections along the new extension? Thank you
Lot 19 Echoveld CLose 7/22/2020 05:20 PM	The proposed path for the freight rail realignment runs through residential properties. It should stay following the Tonkin highway as was proposed years ago. There is enough rural land on the north side of Mundijong road to move the Tonkin further east to allow the rail to stay where it will not cause any disturbance to residential properties.
rod 7/23/2020 07:18 AM	I live right behind the Tonkin / Tomas Road intersection and I am very concerned about noise levels. I am hoping serious consideration is being given to erecting a wall to prevent noise in this area. Also, we have water ingress and flooding from the current open paddock area where the proposed extension will be already- a good water management plan will be needed to prevent a worsening of the situation.
Mel 7/23/2020 08:29 AM	My house will look out toward tonkin hwy, i want to ensure the noise is limited and that it looks nice. Trees planted to obscure view is preferred.
Phil77 7/23/2020 01:22 PM	Concerned in the decision to connect Orton Road to Tonkin Highway and not Abernathy. Currently a large amount of traffic uses Abernathy / Hopkinson to get to Tonkin Highway and not Orton Road. With the extension this means that the traffic will either need to use Kardan (increasing the amount of traffic going past the Primary School) or have to use Orton which is currently narrow and in very poor condition on the section east of Hopkinson. Also interested in how the Shared Path along Tonkin will connect into local Paths as there are currently no Paths on Thomas / Orton and the Path on Abernathy ends at Kardan.
Peter Cardup 7/23/2020 01:48 PM	I have two concerns based on the delivered information: SAFETY Bishop road, this is currently a road used mainly for access to Court Grammar school, so traffic is extreme twice per day. Using this road as a new intersection seems an extremely unsafe option. Also traffic managment would be a nightmare. TRAFFIC MANAGEMENT (trucks): There is already a lot of LOCAL truck traffic around Byford/Cardup, Specifically from the Wormall business on Cardup siding road, there are also many other 'semi' trucks in evidence around the area. From the proposal map the two access junctions would be Orton rd. and Bishop road (see safety above). In the near future there is a major subdivision approved for the corner of Cardup Siding

	road & Hopkinson rd.(access to this could only be via Cardup siding rd. from the east. There is also a vast area bordering Cardup siding rd/SW highway/Soldiers rd/Norman rd. which is zoned Industrial. No matter what businesses are established there, there will obviously be a significant use of trucks for all constructions & ongoing for deliveries.
ABOUT TIME 7/23/2020 02:43 PM	Access to Byford main area SHOULD be at Abernathy Rd, NOT Orton, as Abernathy is CURRENTLY the main access to town from Hopkinson & should remain as such mainly for convenience as Orton rd is in the middle of paddocks, no housing near proposed Highway extension.
Ginny 7/23/2020 04:55 PM	At present, residents on the west side of Hopkinson Rd have no idea how this is going to affect us. What is going to happen to residents who use Abernethy Rd to get into their properties? How do we get into Byford? There should be NO lights along the extension from Thomas Road Oakford to South Western Highway a they all need to be flyovers. And it should be visual pleasing as the Armadale/Nicholson Rd intersection/flyover. Lastly what is going to happen to Kargotich and Thomas Rd intersection?
PHILL64 7/23/2020 07:10 PM	I think a noise barrier should be put in place to protect Residents from the traffic
Potsfarm 7/24/2020 02:13 PM	why isn't this project already underway
Minty 7/25/2020 06:41 PM	I am a resident and I can already hear the traffic on Tonkin and Thomas how will this noise be dealt with. I am also a horse rider that has to sometimes tackle non local traffic in the area and frankly riding next to Thomas can be concerning, will this be impacted. How is this extension going to impact on the use of Thomas and Hopkinson Roads?
Jim 7/27/2020 12:53 AM	Underpass at Abernethy road is NOT warranted. Pedestrians can use the dual use path on the East side, and when need ed to cross to the West side use the intersection at Thomas road or Orton road. The number of horses that would use it is very small, most horses will enter a tunnel type structure without significant training, and most riders are unable to control horses inside tunnel or underpasses. Then when they have traveled through where are they going in number that they cannot go via the controlled intersections. traffic traveling south from Thomas road intersection inthe main will have to climb the small incline of the underpass. This will increase traffic noise. Traffic traveling north will have to brake traveling down the decline again increasing the traffic noise particularly truck air brakes. The underpass will potentially attract persons to use it as a hang out. many in built up areas have become antisocial center points. It will be difficult to manage or police with at 8 km round trip to get to the other side via road.
rustylegend 7/27/2020 01:53 PM	Noise attenuation for both construction and ongoing traffic

Janis 7/27/2020 02:35 PM	will the highway be hot mix or high noise aggregate?
Harry Hyper 7/27/2020 05:52 PM	We need to have more than just one underpass cross over as planned. I would like to see a crossover for walkers, equestrian and cyclists between Orton rd and Bishop rd. Also what type of road surface will be constructed? I would like to see asphalt and not chip seal as to reduce noise. Also I would like to see a wall on the western side around gossage rd as to help with the impact of noise.
MBCardup 7/29/2020 11:02 AM	A noise wall will be important for nearby residents in Byford and Cardup. An underpass at intersections such as Gossage Rd to access the cycle path on the east side.
Bah 7/30/2020 02:58 PM	Should be a bridge over Thomas rd due to amount of traffic on Thomas..going to be accidents on this intersection
RayR 7/30/2020 03:01 PM	I drive the back roads from Whitby to get to either Nicholson Rd or Tonkin Hwy 5 days a week to get to work in Canningvale. I think that a Tonkin Hwy extension is much needed and should have happened years ago. It will enable people in this area to get to major roadways in a shorter period of time, will allow for a more fluid drive, and will ease congestion in intersections (some of which have no lights or even roundabouts.
CosiB 7/30/2020 03:06 PM	I'm looking forawrd to the road extension. It would eliminate some of the current dangerous intersection that are currently on the exsisting roads through Byford
notrafficnoise 7/30/2020 03:10 PM	I would be greatly offended if the same surface was used as the north end of Tonkin which is creating noise issue for residents, damage issues for road users, and seems to be unresolved for locals there. It would be negligent for main roads to allow the same thing to occur again, here. I am entitled to quiet enjoyment of my property and I will fight to defend this right.
Deicide 7/30/2020 03:11 PM	This project is well overdue, the excessive number of heavy trucks that uses Thomas Rd through byford is both excessively noisy to residents, ruins the road, and the road is not designed for the type and volume of traffic it currently has to deal with.
Ash55 7/30/2020 03:21 PM	I have concerns about the increase of traffic going through the town of Jarrahdale the safety of speeding cars and trucks with our children in the small town seemingly nothing has been done about it now .
Starbabeau 7/30/2020 03:51 PM	No been waiting
Neil351 7/30/2020 04:07 PM	Will Watkins Road be made a No Through Road where it currently meets South Western Highway?
Dan1968	With the Highway extension and proposed rail realignment I see a benefit in

7/30/2020 04:56 PM	the elimination of dangerous level crossing points throughout the area
Tankrammer 7/30/2020 05:38 PM	Quite wasting time and get it done. This has been talked about for decades.
NichoJay92 7/30/2020 06:01 PM	It really needs to be fully grade separated south of Kelvin road with 3 lanes in either direct in the start stop nature is really inefficient and would have a further negative impact on congestion. Forrest road should be reconnected also grade separated it can be a bit of a trouble spot there and Champion Drive should have a connection to Southern River road
Shagga 7/30/2020 06:01 PM	Heavy Vehicle rest area is essential. I'm astounded there wasn't one factored into Northlink.
Byford 7/30/2020 06:15 PM	Upgrade the Abernethy railway crossing next to south western highway. Make a tunnel or bridge to avoid the level crossing right next to a school with kids being very close to a potential hazard.
Henk 7/30/2020 06:19 PM	Think this extension is unneccessary and will have a negative effect on Jarrahdale road use (too much heavy traffic)
Beavis 7/30/2020 06:53 PM	Will all of the intersections from hale road through to Thomas road be upgraded? The amount of traffic lights on a so-called highway is ridiculous. Forrest road intersection is also very dangerous.
scs 7/30/2020 06:59 PM	This idea was proposed over 10 years ago, nothing progressed with it and now all of a sudden it is happening, where is the consultation with affected properties along the proposed way now? I have lived near the proposed road for the past 5 years and there has been nothing mentioned at all apart from this survey. How do we know this is still considered appropriate use of money.
Nath 7/30/2020 07:44 PM	I would NOT like to see Jarrahdale Rd used as a go between for excessive or large amounts of traffic including trucks etc from Albany hwy to sth west hwy and vise versa. There would need to be an alternative route for traffic.
Thepsychoseason 7/30/2020 07:56 PM	i cant beleive its taken over 10 years for this project
Louise21 7/30/2020 07:59 PM	Less traffic lights to keep traffic flowing
Edward 7/30/2020 08:28 PM	Thomas rd intersection needs an overpass. It is already really busy and just upgrading it is a waste of money. Spend the money and do it right the first time!
SteveDorr 7/30/2020 09:00 PM	Truck rest areas with toilets showers and shelter for long haul driver to camp overnight at or have their regulation rest breaks, unlike the northern frieght link which has zero consideration for heavy vehicle operators other than a

	heavy vehicle inspection point which has no toilet or place to rest away from your truck
KimL 7/30/2020 11:14 PM	Why upgrade Abernathy to be the main road into Byford, and then not connect it to Tonkin Hwy?
Bella28 7/31/2020 05:09 AM	How many intersections to get to byford and will it be easy to get from byford to Oakford?
Kirsty888 7/31/2020 05:48 AM	Intersections need to be on/off ramps and overpasses not lights. The number of light and light runners on Tonkin highway is ridiculous already and dangerous
Retief 7/31/2020 05:57 AM	Can we have bridges all at all the intersections and remove the traffic lights, like you have done north of the airport
Tonkin highway ext. 7/31/2020 07:16 AM	Will it be an intersection at tonkin and thomas road or a fly over? Will there be access to hopkinson road.
Davew 7/31/2020 09:40 AM	Please remove traffic lights south from hale road
Kenneth 7/31/2020 09:44 AM	Get going ASAP
Sir Levi the Great 7/31/2020 10:25 AM	Getting rid of all the Traffic lights between Roe and Thomas would be fantastic. Horrible atop start traffic when you’re in an 87.5 ton double.
hootboj420 7/31/2020 10:42 AM	I’d like to see the southern end of Tonkin turned into a Freeway just like the northern end. This extension is only going make driving through existing lights even worse
Kristie 7/31/2020 11:16 AM	Concerned that environmental impact will be “overlooked” in the name of progress
Lil546 7/31/2020 11:39 AM	Please get this started, our local roads are dangerous and traffic in the area is growing, with Shire showing no concern in repairing these dangerous single lane shared roads. Concerns are with traffic management during construction, work on sections that do not disrupt traffic flow first. Prepared possible detours prior to setting them up and ensure that they do not hinder traffic movement or travel times.
Shane1 7/31/2020 12:15 PM	Speed should be matched to SW hwy
Micko 7/31/2020 03:19 PM	Is this part of the transport access into the Port of Kwinana and Outer Harbour?

Birchwood 7/31/2020 05:59 PM	As a rural resident living directly west of the proposed extension my primary concerns are around what measures will be used to reduce traffic noise and what measures will be used to limit the impact of construction activities, in particular with regard to dust management.
Fiona Siobhan 8/01/2020 07:27 AM	What plans are in place to protect the endangered bandicoots in the area?
Buffy 8/01/2020 07:27 AM	I'd like to see the Tonkin built with no traffic lights, keep traffic moving, less noise, safety and driving time reduced. North end of Tonkin is brilliant because no lights. Build it right the first time.
ReeceMS 8/01/2020 07:57 AM	The intersections at Thomas Rd and Mundijong rd should be graded intersections to allow free flow of traffic through the busier roads.
Jay of Cardup 8/01/2020 08:55 AM	This just needs to happen, waited long enough, each intersection needs overpass so traffic keeps flowing, and actually saves time going down highway so it is preferred route and reduce traffic on local roads
Budah 8/01/2020 09:00 AM	Please do not use traffic lights. There are far too many traffic lights already. North link is great how about south link to the same standard
PetDeg 8/01/2020 09:01 AM	Thomas road MUST be have a Bridge over it , no traffic lights or round about.
Sueallen75 8/01/2020 09:15 AM	What will be the restrictions on construction times and days of the week and considerations for noise for residents? Is there an expected construction period?
wildblueskiez 8/01/2020 09:21 AM	NO traffic lights at intersections. under/over passes only please
anonymous20 8/01/2020 09:28 AM	Consideration needs to be made for those residents living between Hopkinson and Kargotich roads and how will they gain access to Byford without having to get onto Thomas road or having to drive away from Byford just to come back again to another intersection? Eg; Gossage Road, Cavanagh Close. Intersections or on/merge ramps/slip lanes need to be considered for residents needing access to Byford. Cutting off all the streets that have access to Hopkinson road now is not practical and will only frustrate your residents further than what they already are knowing those roads are going to be blocked off in the future. Please think logically and how this would affect you if you are a resident living between Hopkinson & Kargotich and using Hopkinson daily to access Byford.
MJL72 8/01/2020 09:48 AM	Abernathy and Hopkinson should remain open to local traffic to reduce the need to use highway to get to Byford Town for everyone living west of Hopkinson. Orton Road would become major thoroughfare to Byford and it is not fit for the huge influx in traffic it will get unless it is completely redone from south west highway to Kargotich road and beyond. Single lane, windy

	roads are not An appropriate alternative - Abernethy Road is upgraded and a better option.
Peter30 8/01/2020 09:52 AM	Has all the land needed for the project been gazetted as a road reserve or do some private properties need to be acquired ?
AJAY71 8/01/2020 09:56 AM	What will happen to residents that live off Hopkinson road (ie Jersey Rd) if Extension is completed and how will they be able to access children's schools in Byford , shopping centres etc ????
Tan 8/01/2020 10:00 AM	Entry and exit of Tonkin close to Byford. I believe most residents would have to travel south to enter and exit their main residential location to travel north. This I think should be revised to be closer.
MatthewScofield 8/01/2020 10:03 AM	I work in Real estate in Oakford, selling properties that have no physical barrier between the property and Hwy makes a massive difference to sale prices and demand. I am doing a development on the property between Gossage road and Bishop of about 150 lots, they will need a noise attenuation wall to be constructed. This needs to be allowed for in the planning now.
Serpy 8/01/2020 10:09 AM	What sort of timeline are we looking at
Stecrox 8/01/2020 10:13 AM	Yes as we live on the west side of the extension. Blocking of access to Abernathy road from Hopkinson road needs rethinking. This is the route a large majority of people take to access byford public services. For example. Woolworths and Coles and also the ymca centre or Briggs Park for children sports and byford secondary school or the catholic college. The alternative either adds 10 mins onto the journey or severely increase traffic down Kardan road which is not suitable for this kind of increase in traffic as it is a road for residentiL access. In general the residents of oakford are not happy at our main access to byford being closed off
Drew_thorpe 8/01/2020 10:15 AM	With such a large infrastructures works need to completed linking the Tonkin with Freeways,otherwise there will impact on roads. The works need to have limited environmental impact
Joshua 8/01/2020 10:43 AM	No intersections on the Hwy. Make every intersection and overpass, this is obvious. It saves travel time, reduces congestion, makes the road safer to travel. It’s a no brained.
KatieO 8/01/2020 11:01 AM	We don't want Orton rd blocked off. Please we crossover hopkinson rd to orton rd several times per day for school runs and to access the shops as all of the other residents do and this will be a major inconvenience
Wadex 8/01/2020 11:13 AM	We need to have overpasses at all intersections to reduce interactions with local Traffic.
Chandra 8/01/2020 11:43 AM	Would like to know more about the plans of Thomas road, Hopkinson road and Abernethy interSections will be planned.

Dean 8/01/2020 12:01 PM	We need Equine tunnels so the bridle tracks are not seperated.
dmarkol 8/01/2020 12:34 PM	I am concerned about the traffic noise from the extension impacting on my "quiet" rural lifestyle. My concern is that the government wont spend the money to install noise barriers like they have done in other areas with more voters. Also due to roads being cut off making it harder to travel east/west concern is that my street will become a "rat run"
J 8/01/2020 01:52 PM	I fear go the safety of those using the Byford trotting complex along with Kardan blvd . The increase of traffic through these areas will be extremely dangerous. The trotting complex Briggs Rd in particular is already a huge safety hazard. Added traffic combined with horses I fear will be a fatal combination . It would make more sense to have Abernathy Rd and Thomas Rd made the same set up as Corfield st & Albany highway. With that the school on Kardan blvd & the trotting complex area could be protected from excessive traffic . This set up will also make the traffic flow along the Tonkin hwy and that would keep noise levels to a minimum for residents nearby. Truck drivers would also thank you as this would help with the constant stop/ start for which the Tonkin highway is renown for . PLEASE protect the equine users of the complex that has been in situ since 1968 in constant use & protect the children at the school on Kardan blvd.
Kaz10 8/01/2020 03:18 PM	This project has been on the cards for SO long and finally something is really being done about it. So please do it well. We need no traffic lights at intersections - please do flyovers or underpasses with ramps. Please also consider a exit/entry at Abernethy Road as this is the main road into Byford where all the shops, amenities, schools and sporting areas are. It just makes sense. Finally, please do not delay this project any longer and have it begin ASAP. This is such a fast growing area that has been forgotten about for far too long by state governments and now is the time to get it moving and actually done. The people of Byford and surrounding suburbs deserve this. So much money is spent North of the river on freeway and highway extensions yet nothing is spent south of the river in the Byford area. South Western Hwy between Armadale and Byford also desperately needs reviewing and upgraded to dual lanes each way with proper kerbing, landcaping and street lighting. As does Thomas Road from Tonkin Hwy to South West Hwy. Again, the large growing population of Byford deserve some upgrades to the roads that are now taking alot more traffic than they were ever built for! Thank you and can't wait to see it all finished soon!!
sas 1970 8/01/2020 04:11 PM	If Abernethy rd is blocked off I will have to back track and go to Orton rd to go to Byford adding at least a extra 5-10mins each way. I need to go back and forth to Byford at least 3 times per day, drop off kids at schhol and go to work then pick up kids from school drop them home then go back to work in Byford then go back home when finished , not to mention going to shops ,parks or taking kids to friends houses

Pia 8/01/2020 05:19 PM	I would like to see a roundabout at the end where it meets Southwestern Highway.
Kezmac 8/01/2020 05:57 PM	Access from Hopkinson road to Byford shops. Currently Abernethy is the road taken. The highway will block this and means cars have to drive up to Thomas to turn across over Tonkin to come back around to Byford
Heather B 8/01/2020 08:38 PM	Please make the Abernethy Rd underpass accessible to cars. I live just south of Abernethy and it will take us much longer to get to my kids school, the local shops, library, etc.
64 8/01/2020 09:15 PM	I would prefer it not to divide the community in half. Why can't the Tonkin go further to the West there is so much more room. I don't want the noise, the pollution or any of it where I live. Kargotich road has lot of space around it and runs directly onto to Mundijong Road. This is a much simpler and more direct route. Why is this going straight through a country suburb ? I really think your planners need to take another look.
Ashleyblaine 8/01/2020 10:10 PM	Concerned about the increase in trucks following the route up to Jarrahdale rd. The intersection at the end of our street (Staff st & Jarrahdale rd) is quite difficult to see sometimes due to cars parking in the cafe car park too close to the road, you're unable to see beyond them into oncoming traffic to pull out onto Jarrahdale rd from Staff st. Also Staff st has kids living on it that cross the road to travel to school. Often trucks come belting down jarrahdale rd & have not slowed down & are speeding through. Could you consider slowing traffic with road markings & improving visibility at this intersection? If jarrahdale rd becomes a thoroughfare for trucks this will become dangerous. One child has already been killed on this road.
Storm 8/01/2020 10:40 PM	Electric vehicle charging station nearby? Possibly one of those solar canopy installations?
Jake 8/01/2020 11:52 PM	I'd like it to consider ease of use and ensure traffic flows rather than building up.
Brianb 8/02/2020 08:05 AM	We need to remove the lights on Thomas. New intersections of this size shouldn't have them. It's going to create an issue on what is becoming a busier and busier road and will only get busier of Westport goes ahead. Surely it's better to do this properly the first time with a bridge?
CAN18 8/02/2020 08:12 AM	I'm concerned about the junction of Tonkin Hwy at South West Hwy (the location in relation to Jarrahdale) and the subsequent increase of traffic (especially heavy vehicles and trucks) into Jarrahdale.
Rf82 8/02/2020 08:27 AM	Lack of overpass planning for existing intersections along tonkin
Til 8/02/2020 08:44 AM	As this will take Hopkinson road away from us, please consider traffic on Soldiers Road will increase as that will be our only way in and out fir many of

	us that usually access Hopkinson.
PB1 8/02/2020 08:50 AM	Will this be truck friendly road
Steve Rees 8/02/2020 12:40 PM	The job it self needs to be a 24hr opertion 7ays a week to stop dragging it out for so long Get with the times Transport WA
LizzieR 8/02/2020 04:34 PM	Would like to see more over passes at intersections rather than lights, the same as the northern section of the Tonkin highway, it’s built amazing
Nearby 8/02/2020 04:49 PM	Are any wildlife corridors planned to enable creatures to get across the highway safely?
Erika 8/02/2020 07:36 PM	Feel that upgrade of existing Tonkin highway to get rid of traffic lights should be of a higher priority.
Andy 8/02/2020 08:02 PM	I hope the upgrade includes overpasses not traffic lights to reduce congestion at all intersections constructed and future upgrades include overpasses all the way from byford and back to the airport
MatW 8/02/2020 09:10 PM	No traffic lights at all even after exiting off going hwy. there is ways to do it. USA for example does this brilliantly
Brian Oneil 8/03/2020 10:01 AM	This has been talked about for a long time I believe general public doesn't believe it will actually happen. Residential growth in area has been great but traffic flows starting to suffer and bottleneck and becoming dangerous in areas
Jjp 8/03/2020 10:56 AM	How will local residents access Hopkinson road and roads that connect to Hopkinson road if there is no connection to Hopkinson road at Orton road.their only option will be to use Bullock drive which has many adults and children riding horses on it. If Bullock drive becomes a local thoroughfare someone will be injured or killed. To me it makes no logical sense not to included access to Hopkinson road from Orton road.
TroyF 8/03/2020 01:21 PM	What will the impact on Forrest road be? Currently this is a dangerous intersection; will this extension make it more dangerous? Or, are there plans to upgrade this intersection?
Danielle_Oakford 8/03/2020 05:50 PM	I'm concerned about the impact this is going to have on my rural lifestyle. The whole reason I live in Oakford. The noise is a concern. The loss of privacy. This is devastating.
Harro 8/03/2020 08:22 PM	Will the intersections be bridge's?? If not why not. North of the river Tonkin has bridges.
Jodes760 8/03/2020 10:46 PM	I am also very interested in the safety of all the new intersections that will be built. There are a few horror intersections around especially on Hopkinson Rd

	so hope this is considered. Spend money on safety and making practical intersections that save travel time rather than spend money on art and making it look nice.
BevanC 8/03/2020 11:02 PM	Why are they planning traffic light intersections. Why not flyovers or spaghetti junctions like Tonkin hwy north of Roe.
Resident 1 8/04/2020 09:28 AM	I wish to convey that Abernathy rd underpass should only be used for pedestrians and equestrian as planned and not to have a possible traffic way planned as a lot of trucks and other traffic use this route to Henderson at the moment and would continue at a high level which is creating excess noise on Abernathy rd. If it is closed to traffic locals can use there nearest access piont and spread any congestion out to have well run estates and not have Abernathy rd as a highway.
Kyzza 8/04/2020 09:50 AM	Fly overs, this is a main arterial road connection, please avoid a temporary upgrade that will last 5 not even years, build the section big enough for the future, now.
Nicolle 8/04/2020 11:42 AM	My property backs into Hopkinson rd, would like to know plans for a wall ? Land hump ? Once Tonkin is extended. Also Jersey rd entry to tonkin
Phil-WestCycle 8/04/2020 02:41 PM	Ensure safe and convenient east-west connectivity for bike riders and pedestrians. Grade separated shared paths at every grade-separated intersection/interchange
Neil Cardup 8/04/2020 02:54 PM	Lived in leVer wSy for 19 years - will I be compensated for drop in land and house value?
Boxfords 8/04/2020 03:23 PM	What it the intersection at south west highway going to be like including access to Jarrahdale road
NMcA 8/04/2020 03:29 PM	I believe all intersections should have underpasses or overpasses otherwise safety will be an issue especially since larger trucks and more traffic will use the extension.
Wdr577 8/04/2020 03:36 PM	Please no traffic signals / lights.
Glennb 8/04/2020 03:47 PM	Want to know how it will effect my property as its going to be next to my house
Nedda15 8/04/2020 03:50 PM	Understand that Jersey Road is going to be probably closed off. So we are going to be forced into using Kargotich & Thomas Road intersection. That really needs to be fixed so it's not a death trap BEFORE the Tonkin Hwy extension happens.
Negan 8/04/2020 03:56 PM	It just seems pointless to do this extension at all. Byford has completely changed since the extension was first proposed. What was relevant then is

	no longer relevant now. Too many residential areas around now. The roads we have currently work well.
jimjams 8/04/2020 04:40 PM	We live very close to the new extension with our property backing onto it and are very worried about traffic noise. How will this be minimised?
Byford20 8/04/2020 05:12 PM	We would like to know how we will exit from Cardup Siding Road either onto the Tonkin Highway or to travel west into the Oakford area. Also Abernethy Road, being a main thoroughfare stops dead at the new extension, which will be a huge problem. Could there be intersections for both Cardup SidingRoad and Abernethy Roas such as Forrest Road
Alycat 8/04/2020 05:17 PM	I feel these monies would be far better spent by investing in Thomas Rd upgrades as the HGV etc already utilise this route well. You would be showing respect and empathy to the local environment and residents by allowing them to continue to live in the peaceful style that they chose to live in when they moved to the area. Furthermore the proposed train route is useless as it would only travel North South and not encumber local areas of employment and entitlements such as Rockingham. To travel to Mandurah or Rockingham commuters will still have to travel to ths city first. Many of us dislike going to the city for various reasons and are therefore forced to be confronted by it when currently commuting on Armadale line. Please leave Mundijong alone. It is a lovely little township and community. Byford is growing rapidly and believe that the proposal will also bring unwanted visitors (transient opportunists will see crime rates increase significantly. We can leave doors and cars unlocked currently. We are lucky to live here . We chose to buy homes here for the lifestyle .Please leave us alone. Motivation for this comes from counsellors on the shire who own businesses, yes multiple in the byford cardup area and they are purely wanting to increase revenue for themselves. Pure greed over the local community. Heartbreaking.
Kaylene 8/04/2020 05:34 PM	I am very concerned about Hopkinson Road and Abernethy Rd being cut off.
Nisarg 8/04/2020 05:37 PM	Our property is located adjacent to Tonkin Hwy extension, off Hopkinson Rd in Cardup. We are currently accessing the property from Hokinson Rd. We don't have any information about the futue plan when Tonkin Hwy get extended over the Hopkinson Rd. We don't know if access to our property still available during and after construction of Tonkin Hwy from Hopkinson Rd. We would like to raise our concern that MRWA provides us more infromation and get us involved in planning phase to dicuss our future access to our property. Also, we have significant trees in large number along the Hopkinson Rd so what will happen to these trees? Do MRWA require to clear these trees as part of extension? How MRWA controls the noise and traffic pollution once its operational? What impact to noise in our area?
Cheryll30 8/04/2020 05:55 PM	Would like the intersections to all be on and off ramps to reduce potential road trauma cause by collisions and reduce congestion and travel times as

	has been done on all the intersections on the northern Ellenbrook section. Work also need to commence ASAP. This has been promised to us since the Tonkin was extended to Thomas rd. And is well overdue.
Ness78 8/04/2020 06:48 PM	I think we dont need the highway Can spend the money on something else
Shane117 8/04/2020 06:49 PM	I think the money would be better spent upgrading existing interchanges first
CassD 8/04/2020 07:34 PM	How the access to court grammar will be heading east from kargotich rd via bishop rd.
Trentjzx 8/04/2020 07:35 PM	15m easement offset at the back of my property
B19 8/04/2020 07:44 PM	Access is needed to/from Abernethy road to/from the North side. Too much traffic will be driving through estates otherwise. I think it needs to be similar to Farrington road and the freeway where the ramps are only on North side
Tezza 8/04/2020 08:07 PM	Put bridges in place for crossroads ie Thomas road
ryankiernan 8/04/2020 09:45 PM	I'm concerned about the lack of a connection from Abernethy Road and how the proposed extension will accommodate the traffic that use Abernethy Road as a connection to and from the Byford townsite.
Kortenj 8/04/2020 10:20 PM	It would be good if there is access to the cycle path from Gossage Rd, Cardup
Noname 8/05/2020 04:55 AM	Needs to be Abernethy road exit and entry otherwise some residents will have to travel backwards to access Tonkin hwy or drive through roads such as Kardan boulevard which has roundabouts, a school and not suited for heavy traffic.
GG123 8/05/2020 08:22 AM	Safety of cyclist during and after construction is paramount to me
Ringo* 8/05/2020 10:37 AM	If Hopkinson Road cannot be accessed via Orton Road then my street (Bullock Drive) will become severely congested with local traffic who will access Hopkinson via Bullock rather than getting on to Tonkin Hwy to get to Abernathy.
Von Sutherland 8/05/2020 12:03 PM	Concerned for detour routes during the extension construction (i.e. the area is primarily equestrian with horses often on usually quiet streets).
Lawrie50 8/05/2020 02:05 PM	Tonkin Highway is an excellent bypass road east of the Kwinana Freeway. I like driving on it when going to the airport.I like the rural aspect when I drive,

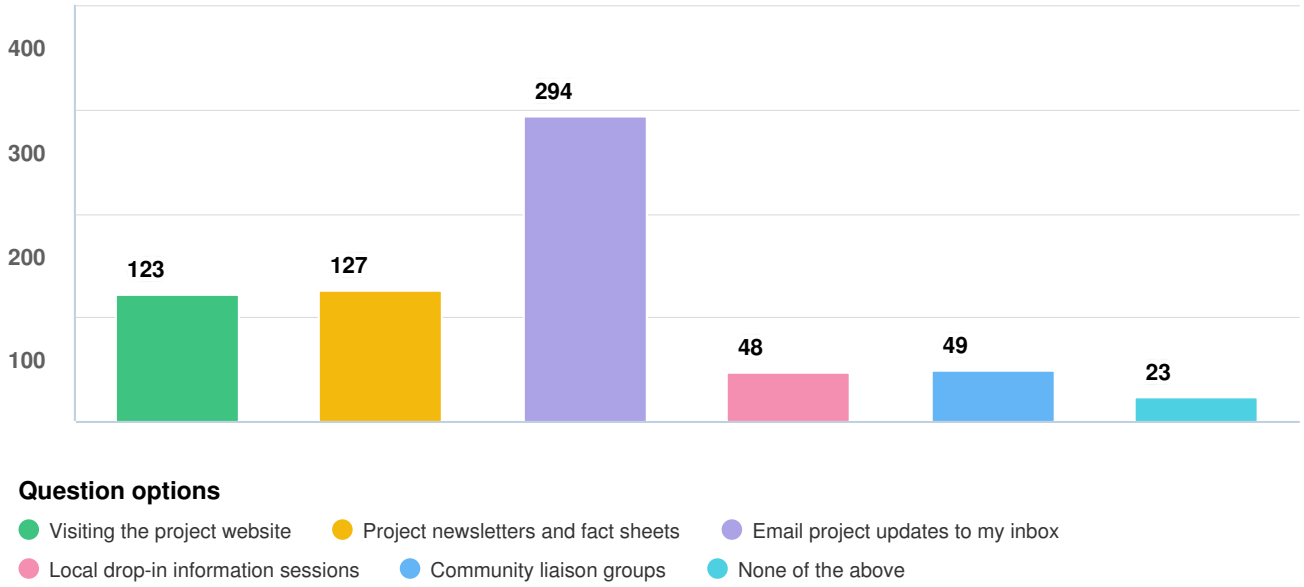
	almost like country road driving.
Bianath 8/05/2020 09:34 PM	The closure of Abernathy road is a concern for most of us on the Oakford side of Abernathy as getting to the schools and shops will be quite a detour around for us
Susan64 8/05/2020 10:23 PM	The extension was supposed to start this year. In light of the knowledge that all parts of this project are fully funded is this still correct and if not when will there be a start?
Di 808 8/06/2020 02:28 AM	I am opposed to the freight rail realignment
Morgan73 8/06/2020 03:10 PM	Don’t want Bullock Drive turned into a major thoroughfare for traffic accessing Orton Rd and Hopkinson Rd.Should only be for local traffic and horse riders accessing the bridle paths 50 KH speed limit.
Bridget 8/06/2020 07:20 PM	That Bullock Drive Oakford will have increased amount of traffic due to being a connecting road between Hopkinson and Orton. This will result in increased amount of noise as well as trucks.
Denal 8/06/2020 07:27 PM	I reside on Hopkinson Drive Oakford and I am concerned where the on and off ramps will be and how they will impact a residential road. My understanding is that Orton Road will be the on and off ramp and as such those wishing to use Hopkinson road will use bullock drive as a thoroughfair. We have found as soon as there are issues at this intersection drivers turn into bullock drive to get to orton road which sees significant road traffic to a very quiet street.
LiliB 8/07/2020 12:28 PM	As a landowner on Bullock Drive I have seen increased traffic use of this meandering road that can't be explained by the minor changes to resident numbers. This quiet road with many hidden bends and no pathways is not suited or safe to an increase in traffic (or to become a major traffic access road) that may arise as a result of the road being used as a shortcut or thoroughfare for users resulting from the Tonkin Hwy extension. Traffic users travelling from Orton Rd to Hopkinson Rd to Abernethy Rd are likely to opt to use Bullock Drive as a shortcut but not be respectful to speed considerations, generated noise or other users of this meandering and winding country road.
douglas6 8/08/2020 09:26 AM	We are not in favour of Bullock drive becoming a thoroughfare or major access road to get from Orton road to Hopkinson road to Abernethy road. We had heard rumour that Bullock drive was to be closed off at the Hopkinson road end to make it a no through road and this is what we are in favour of. Our house overlooks Bullock drive and we do not want to be left looking over what potentially could become a very busy road. Bullock drive has a couple of large s bends and in becoming a thoroughfare it would be potential for many road accidents and become dangerous to drive on.
Mickey 8/08/2020 10:01 AM	What plans are in place to stop local roads becoming traffic thoroughfares because of road closures surrounding the Tonkin extension. In particular the closure of parts of Hopkinson Road around Orton Road area which will create

	traffic thru Bullock Drive to access Abernethy Road, all in Oakford/Byford suburbs?
Chnnang 8/08/2020 12:26 PM	Concerned about possible increase in through traffic along Bullock drive. Traffic would likely increase from Orton rd to Abernathy rd via Bullock dr if Abernathy maintains a connection to Hopkinson rd.
izzy123 8/08/2020 10:24 PM	Improve black spots in the area
Awesam 8/09/2020 08:26 AM	Terminating Tonkin Highway at South West Highway needs to be future proofed to enable extension to the future Pinjarra Bypass and effectively create an alternative/secondary north/south spine to Kwinana Freeway (as marked out in the Perth and Peel @3.5 million plan). South West Highway won't be adequate to manage the long term population projections, and I'm concerned consideration to future extensions has not been given thought. Ideally the proposed termination needs to be short term only, as regional traffic will at some long need to avoid travelling through Serpentine, Keysbrook, North Dandalup and Pinjarra. Thought also needs to be given to residents who don't directly live in the corridor such as those from Rockingham and Mandurah, but who could use Tonkin Highway to access the Airport/eastern suburbs with improvements to east/west links and reduce pressure on Kwinana Freeway and Roe Highway.
bullockbob 8/09/2020 03:36 PM	Concern has been raised that additional local and all regional traffic will be routed onto the minor road of Bullock Drive, Oakford due to changes made to Hopkinson Road. The minor road of Bullock Dr has not been designed to cater for high traffic volumes and would be quite dangerous for residents on Bullock Dr. Such a proposal should not be considered.
shane77 8/09/2020 08:05 PM	Abernathy Road must remain open to local traffic. It has all the shops that residents of both sides of this extension use almost daily. Shutting it off from West side residents is clearly the brain child of a non resident. A local traffic underpass would work. Orton Road should not become an intersection. Tonkin Hwy is already notorious as a stop start road. By putting multiple unnecessary intersections on such a short stretch of road as this extension is would be counter productive. This Tonkin Hwy extension should be considered just a Byford Bypass since it is so short so should be left as free flowing as possible. What is happening to Hopkinson Road? Your map is severely lacking in any detail. How can anyone make informed decisions when there is no detail to work from? This is an important question and detail must be put to the local residence as soon as possible. What Noise Abatement is going to be used if any? It must be used! My property is going to be drowned out in traffic noise and being a ratepayer i deserve noise abatement just like any high density area gets. This extension must have an environmental replanting using local native shrubs and trees that is properly carried out. This is a rural green area and that feel must be maintained unlike basically all of the rest of Tonkin Hwy which is a wasteland. If this is the bar you work to raise it! Massively!

Rider1231947 8/09/2020 08:44 PM	There needs to be a Principal Shared Path on Thomas road from Tonkin hwy to South Western Hwy as this is a major road to Byford At the present time it is not safe for cyclist or pedestrains between these to Hwys.
TNC 8/09/2020 09:04 PM	Concern: The increased traffic on South Western Highway (SWH) and safe access to rural residences. Also the increased traffic noise along SWH and its impact on local residential homes and the toll of environmental issues caused on our nature corridors.
Mish48 8/09/2020 11:16 PM	I am greatly concerned that Bullock Drive will become even more dangerous to use than it currently is .. drivers are using It as a cut through from Hopkinson and orton .. the road has never been designed for a high volume of traffic .. we can no longer ride bikes or horses on orton and Hopkinson as it's dangerous .. bullock drive has a bend which has poor visibility .. when a pedestrian.. cyclist... rider is on that bend cars speed around it.. and if two cars are on it at the same time there is literally no where for the rider .. cyclist... pedestrian to go ! This has been raised with the local council several times
MyView1 8/10/2020 11:16 AM	Why wont Abernethy Road be an intersection? It is a major road into Byford. Instead money is being wasted on underpasses for equine users. How many horse riders are using Abernethy and how are they even getting there - it means they need to be parking somewhere near Abernethy Road to use an underpass. Cutting off the western side of Byford by not allowing Abernethy to be an intersection is then pushing cars/trucks through the suburbs which is dangerous and more wear & tear on those roads let alone the extra noises that will affect nearby residents.and residents on the western side of the proposed Hwy access the shared paths? Will the new intersections consist of traffic lights? If so there will be more time delays with congestions as it is currently free flowing. Will Cardup Siding Road be cut off? If so will residents have to use Bishop to Soldiers but then there is no intersection to get onto Tonkin Hwy to access South West Hwy.

Optional question (252 response(s), 149 skipped)
Question type: Essay Question

Q6 How would you like to be kept informed?



Mandatory Question (401 response(s))
Question type: Checkbox Question

Appendix H

Connectivity and Accessibility Study Map

March 2024

Tonkin Highway Extension

Thomas Road to South Western Highway

Australian Government

mainroads WESTERN AUSTRALIA

Accessibility and Connectivity Map

Agreed Local Network Modifications

Project Case

1. East-West Shared Path Running Along Southern Verge of Thomas Road
2. Ballak Place Left-in Left-out Treatment at Thomas Road
3. Hopkinson Road Cul-De-Sac
4. PSP Connection to Local Network at Kellet Drive
5. Grade-separated East-West Shared Path Crossings at Thomas Road & Tonkin Highway Interchange
6. Allow Compatibility with Local Structure Plan to Address Jersey Road Catchment Connectivity
7. Gated Bushfire Emergency Access from Jersey Road Catchment to Tonkin Highway and Thomas Road
8. Abernethy Road Vehicle, Pedestrian and Equestrian Underpass
9. PSP Connection to Residential Area at Copper Road
10. East-West Shared Path Running Along Northern Verge of Orton Road
11. Doley Road Extension from Orton Road to Cardup Siding Road
12. Gated Bushfire Emergency Access from Cardup Siding Road to Tonkin Highway
13. Gated Bushfire Emergency Access from Lot 33 Development to Hopkinson Road
14. East-West Dedicated Equine Underpass North of Gossage Road
15. East-West Shared Path Running Between Bishop Road and Freight Rail Corridor
16. Connecting Shared Path from Bishop Road to Tonkin Highway PSP
17. Scott Road Connecting Link to Kargotich Road
18. East-West Shared Path Running Along Northern Verge of Mundijong Road
19. Gated Bushfire Emergency Access from Lampiter Drive to Tonkin Highway and Mundijong Road
20. PSP Connection to Residential Area at Adamson Street
21. Shanley Road Vehicle, Pedestrian and Equine Underpass

Indicative only and subject to change

Legend

- Tonkin Highway Extension Project
- Thomas Road Upgrade Project
- Principal Shared Paths
- Shared Paths
- Local Road Modifications
- Existing Road Closure
- Cul-de-sac
- Underpass
- Bridge