

## 7.1.8 SUBURBAN RAIL LOOP (SRL) PROJECT UPDATE – CARINISH ROAD, CLAYTON REVIEW

<b>Responsible Officer:</b>	Matthew Veale
<b>Responsible Director:</b>	Peter Panagakos, Director City Development

### RECOMMENDATION

That Council:

1. Notes that Council acknowledged through the Environment Effects Statement (EES) process that whilst maintaining a preference for Carinish Road to remain open, there are potential public realm benefits to the closure of Carinish Road, however that this should not cause unacceptable local traffic impacts. Following the Minister’s Decision that a review of the closure should be undertaken, Council Officers have participated in the Carinish Road closure review process with SRLA since late 2022.
2. Notes that the SRLA has undertaken a review of the Carinish Road closure following the Ministers Decision on the Suburban Rail Loop (SRL) East Environment Effects Statement (EES) which included:
  - Investigation of 10 options, which included an option added to the process by Council. These were shortlisted to three options, which were the subject of a Multi Criteria Analysis. The SRLA ultimately decided on a preferred option of Carinish Road being closed and a right turn being introduced at Shandean Avenue onto Clayton Road (Option 2).
  - Modelling and data collection (when Carinish Road was closed for Initial Works) that demonstrated that with the Carinish Road closure was in place and the proposed modifications to Shandean Avenue, all local streets will operate within their theoretical environmental capacity. A significant benefit of Option 2, if it is confirmed as part of the Surface and Tunnel Plan amendment process that it is understood is being undertaken imminently by SRLA, is that it could be implemented before Main Works construction starts, which will see Carinish Road closed for approximately six years regardless of what option is pursued.
  - Modelling that shows, with the Carinish Road closure, there are increases in traffic along Madeleine Road, Shandean Avenue, Thompson Street (eastbound) and Flora Road. Subsequently, there are decreases in traffic along Clayton Road, Carinish Road and Colonel Street. In both the AM and PM peak periods, Prince Charles Street (south of Faulkner Street) and Faulkner Street experience increases in traffic travelling away from Clayton Station. The modelling shows that the volumes will remain within the theoretical estimated environmental capacity according to the Planning Scheme.
  - An agreed outcome that SRLA would fund a Local Area Traffic Management study, including necessary mitigation works and also pedestrian connectivity and safety improvements to Houghton Road.

- A request from Council that when Carinish Road is closed for the Main Works construction period of approximately six years, there is an expectation that continued monitoring of the local street network, including Madeleine Road, Shandeanu Avenue and Prince Charles Street, will be required and Council has requested that any agreed traffic management and parking mitigation would be addressed by the SRL project.
  - The preferred option (Option 2) of Carinish Road being closed and a right turn being introduced at Shandeanu Avenue, which may require the introduction of restricted parking (i.e. no stopping during peak periods) or potential relocation of 2P parking into a No Stopping area. This is expected to have minimal impact on parking supply.
  - An SLRA assessment of the location of PuDo (Pick up and Drop off) parking to identify if additional locations at Clayton would better serve passengers and enable access from all locations. Two additional locations were recommended on Carinish Road east (northern verge) and Mary St. These were not supported due to impact on parking for businesses and traffic impacts. Analysis that the proposed closure of Carinish Road, west of Clayton Road, allows for improved public realm and a high level of pedestrian safety by removing vehicles from directly outside of the proposed SRL Clayton Station entrance. The introduction of the right turn at Shandeanu Avenue mitigates the impact of the closure by providing the right turn for use by residents with no significant impact to the local street network. All other movements can be undertaken within the local street network.
3. Resolves to write to the CEO of the SRLA stating:
- Council maintains its position that Carinish Road should remain open with Haughton Road being preferably closed and outlining and reiterating the concerns raised during the EES process. Further advising that if SRLA pursues Carinish Road being closed and a right turn being introduced at Shandeanu Avenue onto Clayton Road (Option 2) despite Council's concerns, Council will maintain its opposition, but expects that its negotiated outcomes with SRLA, including a Local Area Traffic Management study, necessary mitigation works and also pedestrian connectivity and safety improvements to Haughton Road are honoured.
  - Council maintains its position that relocating the entrance/exit to the station further south along with the closure of Haughton Road will lead to superior and improved outcomes including but not limited to traffic movements, PuDO, and pedestrian connectivity to the Activity centre, particularly in negating the need for a pedestrian to have to almost immediately cross a road to access the Activity Centre.
  - Accepts that the issue should be resolved as soon as possible and if SRLA determines that they will pursue Option 2 as an outcome, this must be undertaken by the SRLA, rather than the future Main Works contractor, at a later time, and SRLA should commence and undertake the Surface and Tunnel Plan amendment process. This should ensure that amendments to Shandeanu Avenue, if agreed, can be implemented before Carinish Road is closed for construction for approximately six years. This should also ensure negotiated outcomes with SRLA, including the post implementation Local Area Traffic Management (LATM) study and treatments, and proposed pedestrian improvements to Haughton Road, are realised, and minimise

disruption in and around the Clayton Activity Centre and surrounding residential area.

- Requests that if SRLA's position on the preferred option changes then discussions should recommence as soon as possible on the alternative option, including the timing and implementation, and any mitigation during construction should be discussed and resolved.

4. Notes that there will be increased traffic and impact on some residential streets to the north and southwest of the station as a result of the SRLA preferred option.

5. Resolves to maintain its objections and opposition to two additional proposed PuDo locations on Carinish Road east (northern verge) and Mary St due to the impact on parking for businesses and traffic impacts.

## INTRODUCTION

The purpose of this report is to outline the outcome of the review of the road closure of Carinish Road by the Suburban Rail Loop Authority (SRLA), required by the Minister's Decision on the Environmental Effects Statement (EES) for the Suburban Rail Loop (SRL) Project.

## COUNCIL PLAN STRATEGIC OBJECTIVES

### Sustainable City

Prioritise sustainable transport options, including walking/ cycling paths and public transport.

### Enhanced Places

Improve public spaces and local employment by revitalising our employment hubs, activity centres and neighbourhood shops.

Prioritisation of pedestrians and active transport over vehicles.

Explore and facilitate major projects to transform Monash.

## BACKGROUND

Council has considered a number of reports on the SRLA project since its inception. The most recent relevant report, Council noted on 27 September 2022 as follows:

*That Council:*

1. *Notes the update on Minister's Assessment on the Suburban Rail Loop (SRL) East Environment Effects Statement (EES).*
  - *The Minister's Assessment on the SRL East EES supports the project, finding the effects on the environment will be acceptable, subject to various recommendations.*
  - *Reviews are required on the proposed road closures at Coleman Parade and Carinish Road, the Pick up Drop off (PuDo) parking at all stations, the location of the bus interchange at Monash, and the replacement car parking location at Glen Waverley.*

- *Council representation on the Urban Design Advisory Panel (UDAP) and Public Open Space Advisory Panel (POSAP) is supported, as is a voluntary purchase scheme, further business and employee assistance, noise, air quality and arboriculture improvements.*
  - *The lowering of Glen Waverley Station to enable superior interchange between stations and the extension of Myrtle Street as part of a ring road; or even that a direct 'paid area connection' is provided between the existing Glen Waverley MMRN station and proposed SRL station were not recommended by the Minister to be delivered by the project.*
  - *The Minister expects the future lowering of Glen Waverley MMRN Station will be considered as part of the Precinct Planning component of SRL East and notes that DoT advised that it intends to deliver a 'paid area connection' between the two stations in due course, subject to funding and approvals.*
2. *Notes and endorses the Council position and officers comments in response to the Inquiry and Advisory Committee recommendation and Ministers assessment at Appendix 2 of this report.*

The Minister for Environment and Climate Action (as Minister jointly administering the Environment Effects Act) released her decision on 10 August 2022 regarding the environmental effects of the SRL East project. The report from the Independent Advisory Committee (IAC) was released by the Minister at the same time.

The IAC report and Minister's Assessment can be accessed via the following link:

<https://www.planning.vic.gov.au/environment-assessment/browse-projects/projects/suburban-rail-loop-east>

The Minister supports the project, finding the effects on the environment will be acceptable, subject to various recommendations. These include reviewing the proposed road closure at Carinish Road and the short stay PuDo parking at all stations.

Monash City Council's position on the closure of Carinish Road in its EES submission was that:

Council notes that the EES states that the road network will function satisfactorily with the closure of the central part of Carinish Road. While Council acknowledges the benefits of this from a public realm perspective at the proposed SRL station, Council has concerns about the potential redistribution of traffic and impacts on the outcomes of the Clayton Activity Centre Precinct Plan 2020. Council considers further detail is required to be provided through the EES to establish that the potential traffic impacts will not have an unacceptable impact on the precinct, and in particular, on businesses within the Clayton Major Activity Centre.

Council's closing submissions to the EES IAC further outlined that:

Monash CC confirms that it agrees that there are many benefits to the permanent closure of Carinish Road. But the closure should not occur if there are unacceptable traffic impacts. At this stage, traffic impacts from closure are unacceptable. Right turns from the station precinct onto Clayton Road must be facilitated.

The IAC report concluded that:

The IAC finds:

- The closure of Carinish Road will have significant impacts on local traffic movements and way finding that are not mitigated.
- The permanent closure of Carinish Road is not needed to meet the transport objective of the Project and it should be modified to allow Carinish Road to remain open.
- A temporary closure of Carinish Road is required to construct the pedestrian access adit, but the design and construction methodology should seek to minimise duration of that closure.
- The location and provision of PuDo parking should be reviewed.

The Minister's Assessment provides the following statutory assessment and decision on the project in relation to the closure of Carinish Road:

In regard to the operation phase, I share the IAC's concerns about unresolved transport network arrangements and traffic impacts in the Clayton SRL station surrounds. In my assessment, the optimum means to deliver the urban design vision for the Clayton SRL station and functional road network arrangements is still to be determined. I consider that the detailed design phase is the appropriate time to investigate alternate access arrangements and fine tune the design to address local transport effects. I therefore recommend that the surface and tunnel plan for the Clayton SRL station be amended to show that the closure of Coleman Parade is indicative only and for further consideration at the time of the Urban Design and Landscape Plan. The transport network arrangements in the Clayton SRL station surrounds will need to be further examined and resolved during detailed design and any related future precinct planning. When the UDLP for Clayton is submitted for the Minister for Planning's approval under the SCO14 Incorporated Document, I expect that it will be accompanied by a transport assessment which addresses the optimum arrangements for access to the SRL station as well as any changes or mitigation measures to surrounding local roads.

## DISCUSSION

The Carinish Road closure review process undertaken by SRLA was broadly in line with the following:

- Initial Options Development
- Shortlisting Workshop
- Stakeholder consultation
- Further Development of shortlisted options and review of PuDo
- Multicriteria Analysis (MCA) Workshop
- Stakeholder Consultation
- Preferred Option Selection

SRLA has convened a number of workshops and briefings with Council Officers. These were held on the following dates:

5 December 2022

15 February 2023

13 April 2023

11 July 2023

A site visit at Madeleine Road and Shandeanu Avenue was also undertaken by SRLA and Council Officers on 16 May 2023.

### Options

The following long list of options were identified during the initial option development. These were:

0. Carinish Road closed (Project Baseline)
1. Reinststate Carinish Road in current configuration
2. Carinish Road closed with Shandeanu Avenue modifications
3. Carinish Road Shared Zone
4. Carinish Road open with pedestrian priority
5. Haughton Road closed
6. New Carinish Road / Haughton Road intersection
7. Lillian Street connection
8. Carinish Road realignment

Monash City Council also presented an alternative option to SRLA for consideration. This:

- kept Carinish Road open with PuDo located on it;
- extended the station forecourt into Haughton Road; and
- included a relocated or new southern ground floor entrance to the station.

### Option 0 – Carinish Road closed (Project Baseline)

This option is what was proposed by the Project for the EES. Carinish Road (west) is closed between Clayton Road in the east and a new street (Station Street) to the west. Carinish Road would operate one-way eastbound between the rail underpass and Station Street. The closed section of Carinish Road is converted to public realm. Accessible Permit parking and PuDo/Commercial Passenger Vehicle (CPV) spaces will be located on the northern side of Haughton Road and the western side of Station Street. This is shown in Figure 1 that follows.

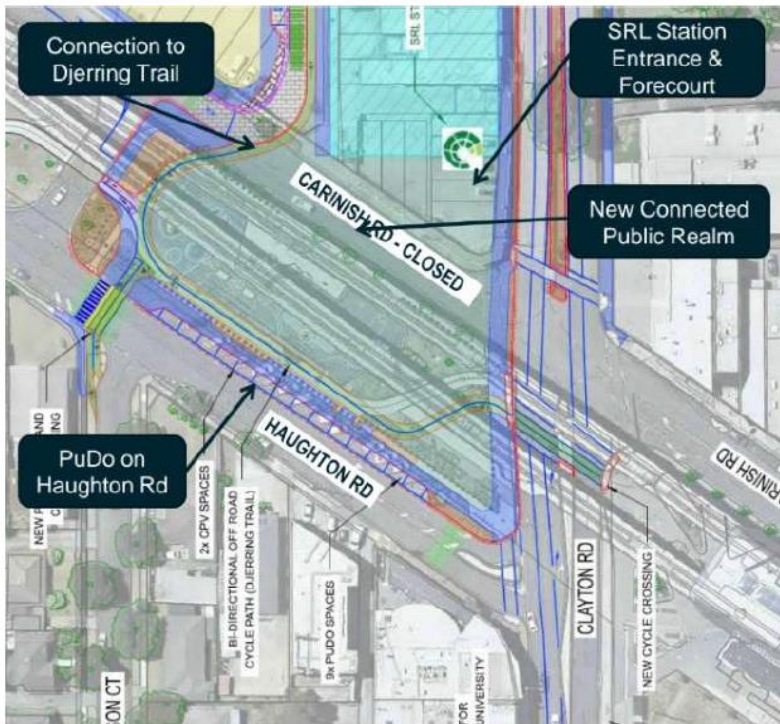


Figure 1: Carinish Road closed (Project Baseline)

Key advantages/opportunities include:

- Contiguous and integrated public realm with the station surrounds. Additional 1,100m<sup>2</sup> of public space.
- Improved Clayton Road performance due to removal of intersection leg.
- Deter potential rat running between North Road and Clayton Road.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed.

Key constraints/issues include:

- Restricted PuDo access from Clayton Road for either arrival or departure.
- Redistribution of local traffic and increased flows on some local residential streets. Estimated additional 500 vehicles per day use Madeleine Road.
- Limited Right Turn movements from existing residential pocket.
- Convoluted access for emergency services to SRL Station.

Cost:

- Baseline per Project funding submission (\$\$)

Option 1 – Reinstate Carinish Road in current configuration.

The existing roads and connectivity would remain in their current configurations when the SRL project opens (Rail Day One). Carinish Road is required to be closed for the construction of the station (approximately six years). Carinish Road would remain open for two-way traffic and to retain full directional vehicle movements at the intersection with Clayton Road. This is shown in Figure 2 that follows.



Figure 2: reinstate Carinish Road in current configuration

Key advantages/opportunities include:

- Maintenance of existing local access to surrounding local streets.
- Improved access to PuDo with opportunity to locate some on Carinish Road.
- Improved access for emergency services to SRL Station.

Key constraints/issues include:

- Loss of future public realm / open space of ~1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Less efficient connection of SRL Station cycling facilities to Djerring Trail and doesn't prioritise this north/south cycling connectivity.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Does not prioritise pedestrian movements or amenity (non-compliance to SRL East Urban Design Strategy). Breaks link between north and south of precinct.

Cost:

- Lower than Project Baseline (\$)

Option 2 – Carinish Road closed with Shandeanu Avenue modifications (SRLA preferred option)

Carinish Road (west) is closed between Clayton Road in the east and a new street (Station Street) to the west. The closed section of Carinish Road would be converted to public realm. Accessible Permit parking and PuDo/CPV spaces will be located on the northern side of Houghton Road and the western side of Station Street (however PuDo parking locations at all stations is under review).



The signalised intersection of Shandeanu Avenue would be modified to allow vehicles to turn right from Shandeanu Avenue and head south along Clayton Road. This is shown in Figure 3 that follows.



Figure 3: Carinish Road closed with Shandeanu Avenue modifications

Key advantages/opportunities include:

- Improved right turn movements from existing residential pocket. Can be implemented early so that improvements are realised during the construction period.
- Contiguous and integrated public realm with the station surrounds. Additional 1,100m<sup>2</sup> of public space.
- Improved Clayton Road performance due to removal of intersection leg.
- Maintain pedestrian safety via reduced number of traffic lanes to be crossed.

Key constraints/issues include:

- Restricted PuDo access from Clayton Road for either arrival or departure.
- Some redistribution of local traffic and increased flows on some local residential streets and reductions on other local residential streets.
- Convoluted access for emergency services to SRL Station.
- Potential minor parking modifications on Shandeanu Avenue to facilitate intersection upgrade.

Cost:

- Project Baseline + Intersection Modifications (\$\$\$)

### Option 3 – Carinish Road Shared Zone

Carinish Road (west) would be converted to a shared zone between Clayton Road in the east and a new street (Station Street) to the west. Accessible permit parking and PuDo/CPV spaces would be located on the northern side of Houghton Road and the western side of Station Street. Shared zone could operate two-way or one-way eastbound. This is shown in Figure 4 that follows.

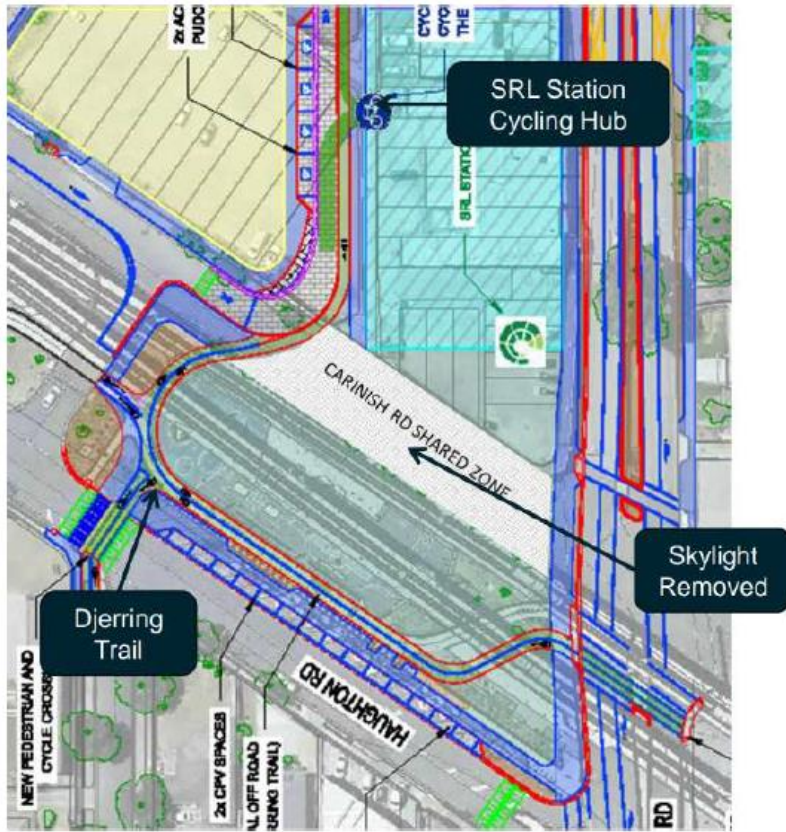


Figure 4: Carinish Road Shared Zone

Key advantages/opportunities include:

- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Improved access to PuDo with opportunity to locate some on Carinish Road.
- Improved access for emergency services to SRL Station.

Key constraints/issues include:

- Compromised scenario that has limited benefit for pedestrians or motorists. Shared zone has effective capacity of ~1000 vehicles/day and would likely not be approved by DTP due to not meeting the warrants for traffic volumes. PuDo volumes need to be considered.
- Less convenient environment for pedestrians, with reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Loss of future public realm/open space of <1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Poorer connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.

Cost:

- Similar to Project Baseline (\$\$)

#### Option 4 – Carinish Road open with Pedestrian Priority

Carinish Road (west) would remain open to traffic, but with a reduced cross-section between Clayton Road in the east and a new street (Station Street) to the west. A wide pedestrian crossing facility could be provided. Accessible permit parking and PuDo/CPV spaces would be located on the northern side of Houghton Road and the western side of Station Street. Carinish Road could operate two-way or one-way eastbound. This is shown in Figure 5 that follows.

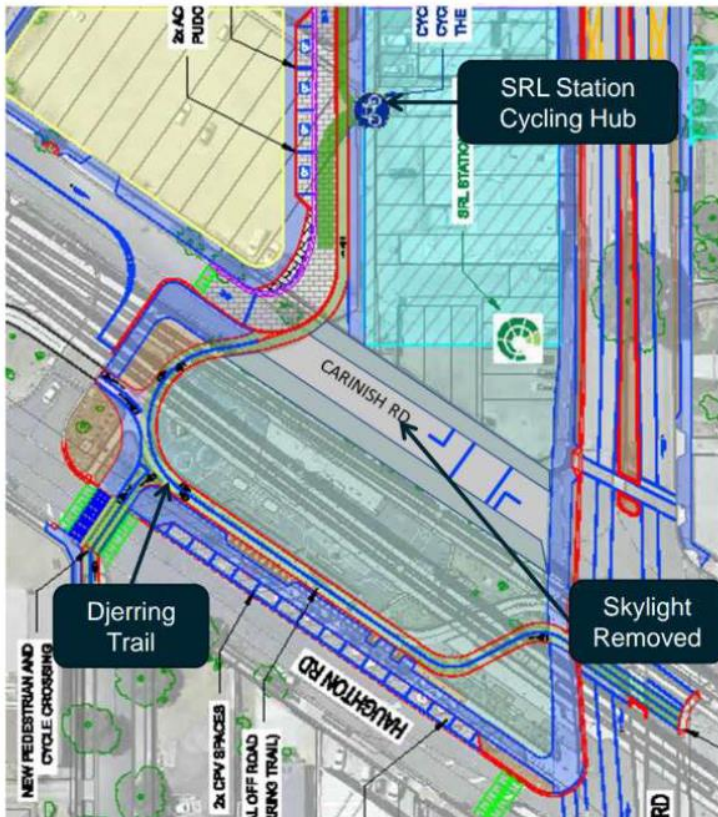


Figure 5: Carinish Road open with Pedestrian Priority

#### Key advantages/opportunities include:

- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Potential to stage closure of Carinish Road as the precinct evolves.
- Improved access to PuDo with opportunity to locate some on Carinish Road.
- Improved access for emergency services to SRL Station.

#### Key constraints/issues include:

- Less convenient environment for pedestrians, with reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Loss of future public realm / open space of <1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.

- Poorer connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Potential for queuing issues associated with pedestrian crossing.

Cost:

- Similar to Project Baseline (\$\$)

### Option 5 – Haughton Road closed

Carinish Road would allow for two-way traffic along its length and full directional turning movements at its intersection with Clayton Road. Haughton Road (west) would be closed between Clayton Road in the east and Nicholson Court to the west. The closed section of Haughton Road would be converted to public realm. This is shown in Figure 6 that follows.

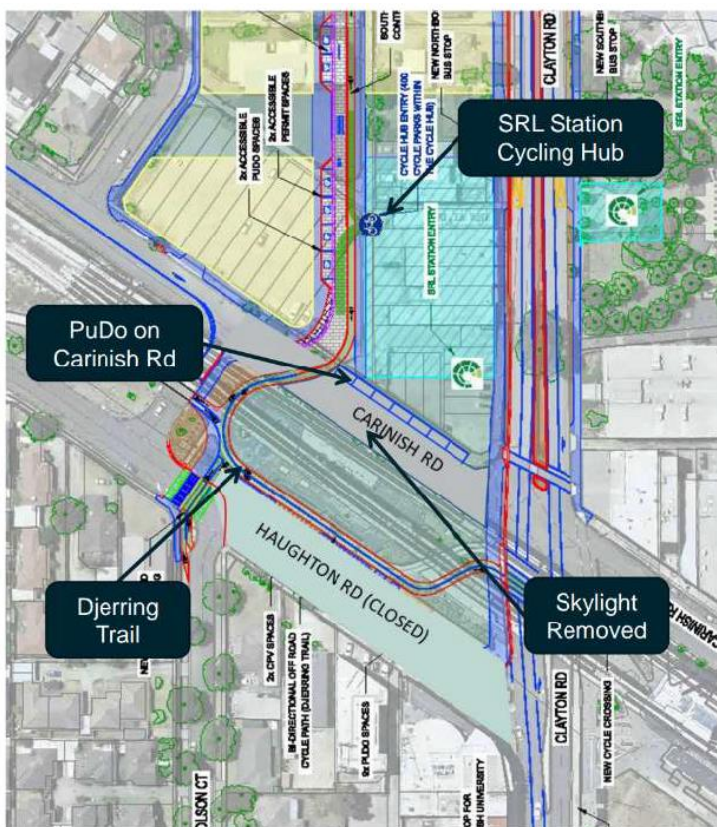


Figure 6: Haughton Road Closed

Key advantages/opportunities include:

- Aligned with Council Clayton Precinct Plan 2020.
- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Provides PuDo parking in proximity to station.
- Improved access for emergency services to SRL Station.
- Provides comparable sized provision of public realm/open space.

Key constraints/issues include:

- Restricted PuDo access from Clayton Road for arrival.

- Public realm/open space not connected to SRL Station.
- Reduced priority for connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- A left-in / left-out intersection leg is removed from Clayton Road at Haughton Road.
- Potentially reduced loss of service access for businesses on Haughton Road, however service access still maintained through rear laneway access.

Cost:

- Higher than Project Baseline (\$\$\$)

### Option 6 – New Carinish Road/Haughton Road intersection

Carinish Road east would be connected to Haughton Road west via a new signalised intersection at Clayton Road. Carinish Road (west) would be closed to vehicular traffic and the space converted to public realm. Connection into the station precinct would be via Station Street, as per the reference design. This is shown in Figure 7 that follows.

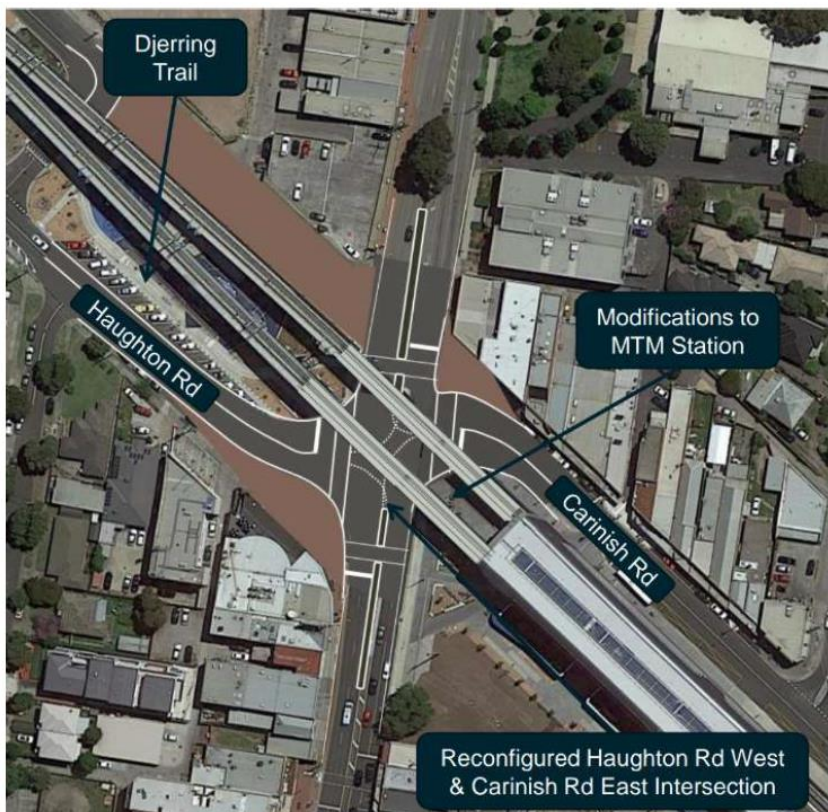


Figure 7: New Carinish Road / Haughton Road intersection

Key advantages/opportunities include:

- Maintenance of existing local access to surrounding local streets.
- Improved access for emergency services to SRL Station.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed.
- Large provision of connected open space / public realm.

- Connection of SRL Station cycling facilities to Djerring Trail.

Key constraints/issues include:

- Substantial impact to Djerring Trail users crossing Clayton Road.
- Impact to bus stops on Clayton Road southbound.
- Additional disruption on east side of Clayton Road at MTM Station.
- Restricted PuDo access from Clayton Road for arrival.

Cost:

- Significantly higher than Project Baseline (\$\$\$\$)

### Option 7 – Lillian Street Connection

A new connection from Lillian Street to Clayton Road would be provided for general traffic. This is shown in Figure 8 that follows.

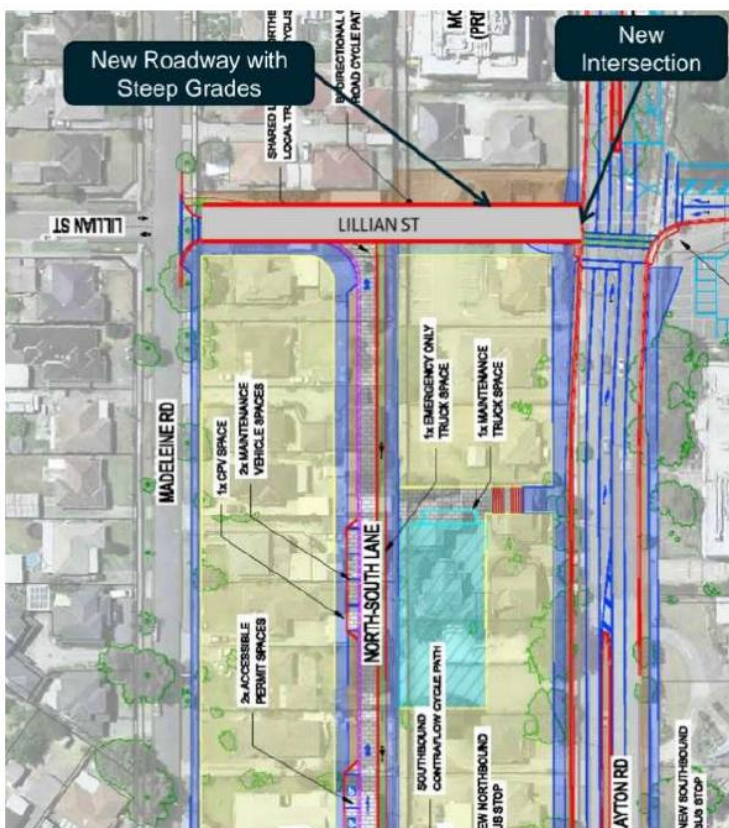


Figure 8: Lillian Street Connection

Key advantages/opportunities include:

- Improved PuDo access.
- Improved local access from streets to west.
- Maintains public realm / open space near Station entrance.
- Improved access for emergency services to SRL Station.
- Connection of SRL Station cycling facilities to Djerring Trail.

Key constraints/issues include:

- Not technically feasible - Steep incline with grades of ~10% between laneway and Clayton Road noncompliant.
- Loss of DDA Access at northern end of Station site.
- May sever important east west-cycle and pedestrian link.
- Potential concerns from residents due to redistribution of traffic to local streets.
- Reduced Clayton Road performance due to new intersection.
- Potential visual impact to northern residential neighbours.

Cost:

- Higher than Project Baseline (\$\$\$)

### Option 8 – Carinish Road Realignment

Realignment of Carinish Road from a point west of Madeleine Road and a connection to Clayton Road in the vicinity of the Remembrance Gardens. This is shown in Figure 9 that follows.

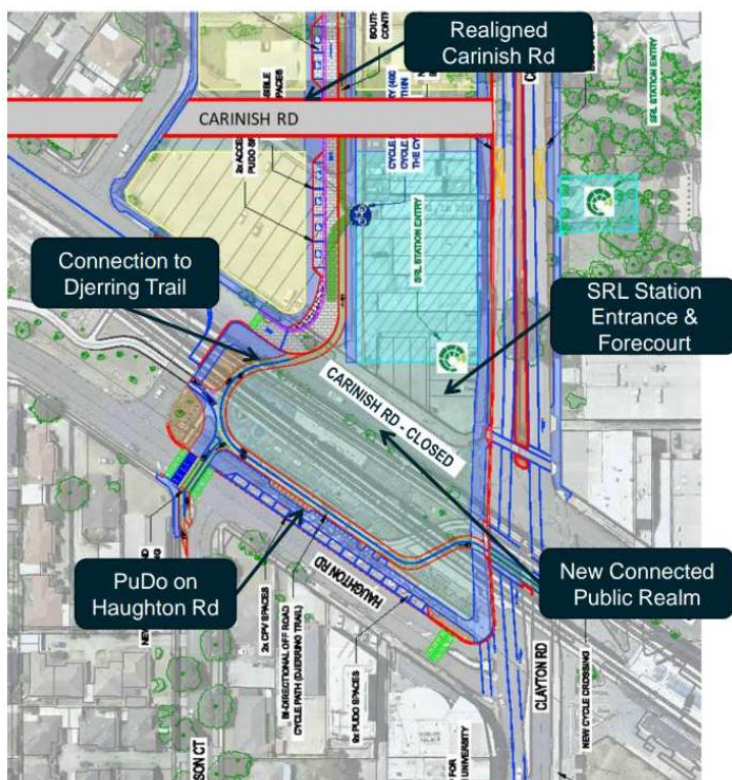


Figure 9: Carinish Road Realignment

Key advantages/opportunities include:

- Maintains public realm / open space south of Station entrance.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed from south.
- Improved PuDo access.
- Improved local access from streets to west.

Key constraints/issues include:

- Additional property acquisitions Works outside of SRL East Project boundary.
- Loss of public realm north of Station building.
- Reduced Clayton Road performance due to new intersection.
- Loss of skylights at Concourse.
- Will divide the precinct to north & south of new Carinish Road.

Cost:

- Higher than Project Baseline (\$\$\$\$)

### Monash City Council Option – Houghton Road closed and new/relocated southern entrance to SRL Station

Monash City Council provided an alternative option to those presented by SRLA (Options 0 – 8) on 6 February 2023. This is similar to Option 5 – Houghton Road Closed, however it includes an additional or relocated southern entrance to the SRL Station in the closed section of Houghton Road. This is shown in Figure 10 that follows.

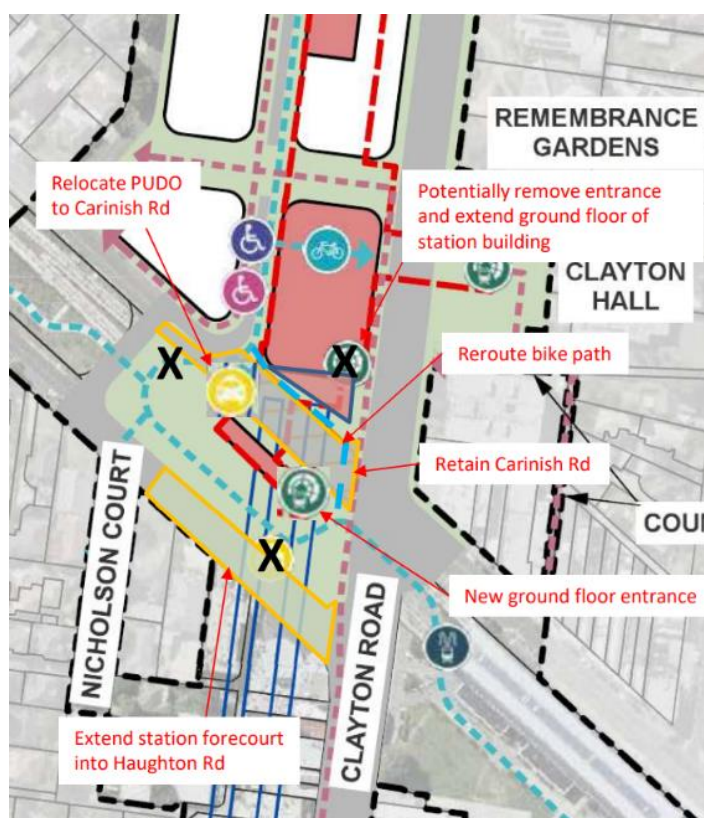


Figure 10: Houghton Road Closed and new/relocated southern station entrance

Key advantages/opportunities include:

- Aligned with Council Clayton Precinct Plan 2020.
- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.



- Provides PuDo parking in proximity to station.
- Improved access for emergency services to SRL Station.
- Provides comparable sized provision of public realm/open space.

Key constraints/issues include:

- Public realm/open space not connected to SRL Station.
- Reduced priority for connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Potentially reduced loss of service access for businesses on Houghton Road, however service access still maintained through rear laneway access.

Cost:

- Significantly higher than Project Baseline (\$\$\$\$)

SRLA also provided the further key reasons on why they did not consider this proposal feasible as set out below:

Technically, the relocation of the main station entrance per the proposed arrangement/location has the following disadvantages (as assessed in detail by SRLA/AJM during Concept Design phase):

- Additional Gate Line - Moving the southern entrance any further south drives the need for a second gate line – a single concourse level gate line (for the southern and eastern entrances) is not possible. An additional gate line would add to staffing costs.
- Loss of Public Realm - The additional gate line cannot be located underground due to the presence of existing rail viaduct substructure. The result is a loss of ground level area, circa 400m<sup>2</sup>, to accommodate a new ground level gate line and staffing rooms.
- Wayfinding - Compromised wayfinding at concourse level as result of mixed exiting and interchanging passengers travelling south through a common corridor.
- Construction Risk - Significant increase in below ground works under the rail viaducts.
- Flooding - The area south of Carinish Road is subject to flooding, so a new station entrance here would require, ramping to increase levels, flood gates, additional underground storage or a combination of these.

The proposed station entrance configuration is different to the arrangement/location as shown on the approved Surface and Tunnel Plans (in accordance with the SRL East Incorporated Document). Change to the main station entrance location poses approvals and thus delivery risks to SRL East Rail and Infrastructure, irrespective of the merits and technical challenges.

With the exclusion of the station entrance location, the proposal is largely comparable/similar to Option 5, which was deemed a non-suitable option for further pursuit in detailed analysis.

It is considered that the preceding key reasons provided by the SRLA on why Council's suggested option is not considered feasible can be overcome through design solutions, that it is agreed will

cost more, but will result in an outcome that is better integrated with the existing Clayton station and the Clayton Activity Centre to the south.

Whilst officers appreciate the desire from SRLA to provide public realm/open space as an entry to the station, as an underground station, there is opportunity for this to be provided in what is considered a more appropriate location. A person existing the station (other than when they are interchanging between the two stations) will have to almost immediately cross a road to continue their journey south. Having the station entrance further to the south, including with the closure of Houghton Road, will lead to much improved pedestrian connectivity into the core of the Clayton Activity centre, without the need to almost immediately cross a road. Council maintains that this is a superior outcome for the Activity centre and pedestrians. Further, there is no doubt that there will be increased traffic and impact upon the residential area to the north and southwest of the station as a result of the SRLA preferred option.

The summary of the analysis of the long list of Options 0 – 8 undertaken by SRLA, with input from stakeholders, is included in Table 1 that follows. The report (SRL-AJM-NAP-RES-REP-XTR-NAP-0002585 Carinish Road, Clayton Traffic Assessment) attached as Appendix 1 also includes further detail on the assessment of the long list of options.

Option	Connectivity				Liveability			Cost	Discussion / Status
	Local Road Access	PuDo	Ped. & Cycle Access & Safety	Clayton Road Performance	Public Open Space	Station Wayfinding	Urban Design Strategy		
Baseline – Carinish Rd Closed	✗	✗	✓	✓	✓	✓	✓	\$\$	Investigate other options relative to baseline
1 – Reinstate Carinish Rd in Current Configuration	✓	✓	✗	✗	✗	✗	✗	\$	Dismiss. Significant impact to Station Precinct & Safety
2 – Carinish Rd Closed with Shandeanu Ave Mods	—	✗	✓	✓	✓	✓	✓	\$\$\$	Investigate Further
3 – Carinish Rd Shared Zone	✓	✓	✗	✗	—	✗	—	\$	Dismiss. Volumes not within Shared Zone Limits
4 – Carinish Rd Open w/ Pedestrian Priority	✓	✓	—	✗	—	✗	—	\$	Investigate Further. UDS and early UDAP engagement
5 – Houghton Rd Closed	✓	✗	—	✗	—	✗	✗	\$\$\$	Dismiss. High cost with minimal benefits
6 – New Carinish / Houghton Intersection	✓	—	✗	✗	✓	✓	✗	\$\$\$\$	Dismiss. Significant impact to Djerring Trail
7 – Lillian Street Connection	✓	—	✗	—	✓	✓	✗	\$\$\$	Dismiss. Not technically feasible due to grades
8 – Carinish Road Realignment	✓	✓	—	✗	—	✗	—	\$\$\$\$	Dismiss. Further property acquisition for minimal benefits

Table 1: Long List of Options Initial Assessment

Three options were shortlisted for the Multi-Criteria Analysis (MCA):

- Option 0 (Project Baseline)
- Option 2 (Carinish Road closed with Shandeanu Avenue Modifications) - SRLA preferred option
- Option 4 (Carinish Road open with Pedestrian Priority)

#### Multi-Criteria Analysis (MCA) of Short List of Options

Option 2 (Carinish Road closed with Shandeanu Avenue Modifications) was assessed as being an improvement on the Baseline (and is the SRLA’s preferred option) for the following reasons:

- Providing improved connections and linkage to the south/east (by car only);

- Reduced travel time for vehicle trips originating from west of Clayton Road seeking to access destinations to the south along Clayton Road;
- Implementation of the right turn is an advantage for local residents through increased accessibility; and
- Improved wayfinding for vehicle trips originating within the station precinct and to the west of Clayton Road seeking to access destinations to the south along Clayton Road via Shandeanu Avenue.

Option 4 (Carinish Road open with Pedestrian Priority) was assessed as performing worse than the Baseline due to:

- High volume of pedestrians, cyclists and some bus passengers must cross the traffic lane;
- Requires protection to avoid errant vehicles entering pedestrian areas;
- Potential for unsafe and traffic disruptive practices such as the possibility of people stopping very near station and dropping off;
- Limits the ability to provide the public realm set out in the SRL East Urban Design Strategy. Road creates barrier within the public realm between the station forecourt and recreational space.

#### SRLA Preferred Option (2) – Carinish Road closed with Shandeanu Avenue Right Turn

Following the MCA, the introduction of a right turn at Shandeanu Avenue for residents was recommended as the preferred option by SRLA. This is proposed as mitigation for local access issues caused by the closure of Carinish Road, which was the primary concern that Council raised as part of the EES process and is outlined in the Background section of this report.

It is proposed that the current left turn only lane will be converted to a combined left and right turn lane on the western leg of the Shandeanu Avenue/Clayton Road/Dixon Street intersection. Figures 3 and 11 show the proposal.

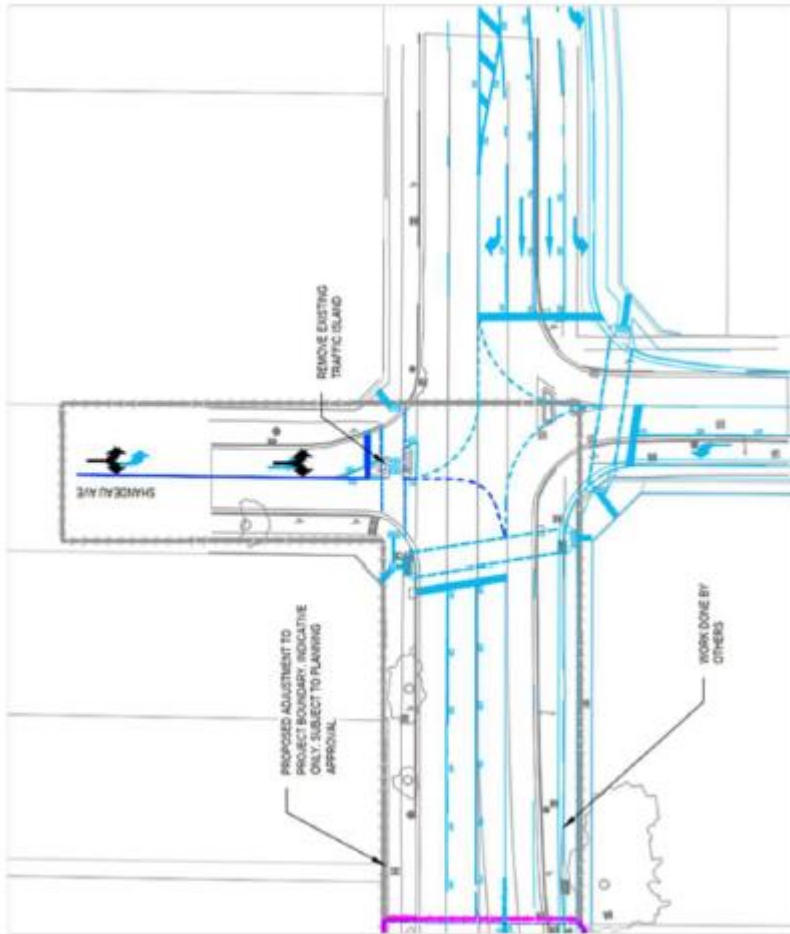


Figure 11: Shandean Avenue Right Turn

Council noted that this proposal, by introducing a right turn lane, would go some way to addressing the impact on local access that the proposed closure of Carinish Road causes. This being that the closure of Carinish Road with no mitigation removes the only right turn out of the western side of Clayton Road between North Road and Centre Road.

Concerns were still raised, however, on the impact of increased traffic on local streets, particularly Madeleine Road, Shandean Avenue and Prince Charles Street. The assessment and response to this by SRLA is outlined later in the report. Further, SRLA have agreed to fund a Local Area Traffic Management (LATM) study post implementation and also any mitigation treatments required by this, where a nexus to the SRL Project is established.

Pedestrian connectivity to the south was also raised by Council, with this proposal. In response SRLA developed a proposal for Houghton Road between Clayton Road and the Link Road to improve pedestrian connectivity to the Clayton Activity Centre. This option is currently at a concept design stage and requires further design development. Council Officers have provided initial comments on this proposal and consider that it should improve pedestrian connectivity and safety.

Transport Modelling

Transport modelling was used to assess the impact of closing Carinish Road and the effects of providing an additional right turn movement at Shandeanu Avenue. The report (SRL-AJM-NAP-RES-REP-XTR-NAP-0002585 Carinish Road, Clayton Traffic Assessment) attached as Appendix 1 includes further detail on the transport modelling undertaken.

When comparing the No SRL vs SRL in 2041 with Carinish Road closed and a right turn at Shandeanu Avenue, the modelling predicts that, with the Carinish Road closure, there are increases in traffic along Madeleine Road, Shandeanu Avenue, Thompson Street (eastbound) and Flora Road. Subsequently, there are decreases in traffic along Clayton Road, Carinish Road and Colonel Street. It should be noted that in both the AM and PM peak periods, Prince Charles Street (south of Faulkner Street) and Faulkner Street experience increases in traffic when travelling away from Clayton Station, due to some redistributed traffic from Carinish Road utilising this corridor as an alternate route. The modelling shows that the volumes will remain within the theoretical estimated environmental capacity according to the Planning Scheme.

Whilst the modelling is relied upon by SRLA in support of their preferred option, it stands that there would likely be little to no additional impact, and further road mitigation works would unlikely be unnecessary if Carinish Road were to remain open with Haughton Road being closed as an alternative.

#### Residential Exit Route Analysis

This transport modelling analysis compares three scenarios: No SRL; Carinish Road closed (Project Baseline); and Carinish Road closed with Shandeanu Avenue right turn (Preferred Option) to measure whether any additional traffic uses the local street network over the No SRL scenario. It does this by analysing the traffic on links that exit the area.

It showed that the total number of vehicles exiting the area is consistent between scenarios, suggesting no additional traffic on the local street network when Carinish Road is closed, or when a right-turn is allowed at Shandeanu Avenue.

It should be noted that the No SRL scenario, when Carinish Road is open would likely attract additional through (rat running) traffic through that route, between North Road and Clayton Road, as this is an attractive short cut. One of the benefits of the Carinish Road closed with Shandeanu Avenue right turn Option is that it should deter this rat-running traffic between North Road and Clayton Road from using local streets as a shortcut, as there would not be a travel time benefit in doing so.

#### Analysis of Shandeanu Avenue/Clayton Road intersection

To provide a more robust assessment, an additional traffic modelling analysis was undertaken for the Shandeanu Avenue intersection with and without the signalised right turn to Clayton Road.

One of the key comparisons sought was the anticipated queue length on Shandeanu Avenue and therefore what potential impact this will have on on-street parking.

Both modelling analyses indicate increased queueing on Shandeanu Avenue when the right turn lane is introduced. The total queue length is predicted to be 50 metres and could impact existing on-street parking with implications for passing vehicles due to the width of Shandeanu Avenue. This may require the introduction of restricted parking (i.e. No Stopping during peak periods) or

potential relocation of 2P parking into a legacy No Stopping area that may not be required anymore. This is expected to have minimal impact on parking supply and would be monitored. The existing parking restrictions on Shandeanu Avenue are shown in Figure 12 that follows.

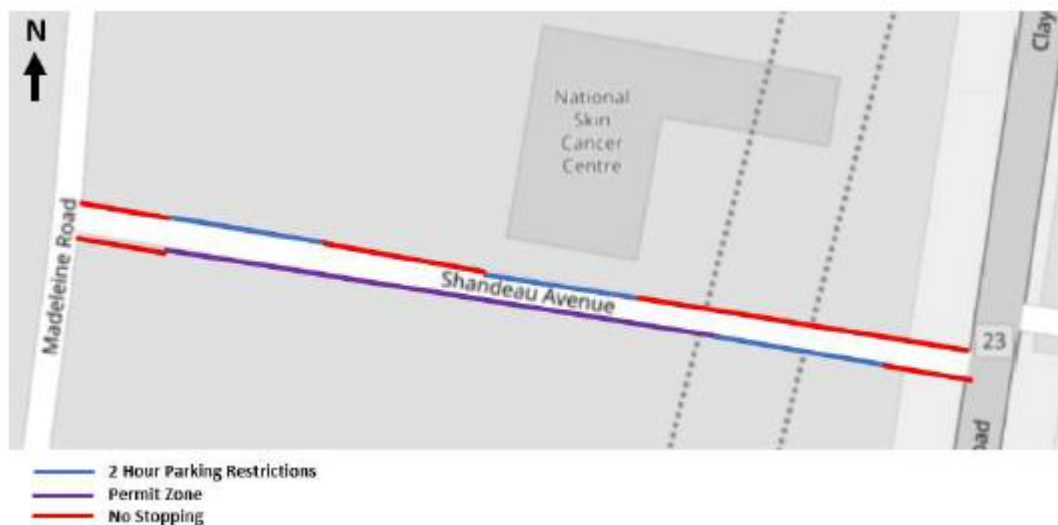


Figure 12: Shandeanu Avenue Parking Restrictions

### Traffic Surveys

Noting the limitations of transport modelling and that it is one part of assessing the impact of such a proposal, SRLA commissioned traffic surveys (tube counts) that were conducted in 15 locations throughout Clayton from 27 September to 24 October 2022, with supplementary surveys being undertaken from 23 November to 29 November 2022.

The surveys allowed for:

- A comparison of traffic volumes on the local road network before and after the closure of Carinish Road for Initial Works;
- Indication of travel behaviours during the closure of Carinish Road; and
- Verification of the traffic modelling that was previously undertaken.

Carinish Road was closed after the first week of surveys from 4 October to 11 November 2022 and would provide an indication of the impact to the surrounding road network should the SRL Project permanently close Carinish Road. SRLA acknowledged that there was a rostered day off for construction workers during this period however, this date was still within a “collectable” survey period based on VicRoads guidelines and it is unlikely that the rostered day off would have materially affected the results.

Figure 13 shows the locations of the surveys within the Clayton Precinct and Table 5 summarises the traffic volumes captured from the surveys:

No.	Clayton Precinct Survey Locations
1	Browns Road to the north of Carinish Road
2	Flora Road to the north of Carinish Road
3	Flora Road to the south of North Road
4	Shandeanu Avenue to the west of Clayton Road
5	Colonel Street to the west of Clayton Road
6	Thompson Street to the west of Madeleine Road
7	Prince Charles Street to the north of Centre Road
8	Prince Charles Street to the south of Haughton Road
9	Madeleine Road, between Carinish Rd and Lillian St
10	Haughton Road to the east of Clayton Road
11	Haughton Road to the west of Clayton Road
12	Valley Street to the east of Huntingdale Road
13	Carinish Road to the east of Clayton Road
14	Carinish Road to the west of Clayton Road
15	Lillian Street to the west of Madeleine Road



Figure 13: Traffic Survey Locations in Clayton Precinct

The closure of Carinish Road led to a fairly consistent redistribution of traffic to the surrounding network, in line with the forecasts modelled in the SRLA East Traffic and Transport Impact Assessment (TTIA). Prince Charles Street experienced the highest increase of traffic diverted (between 800 to 1,100 daily vehicles at either end of the street) from Carinish Road, mostly in the southbound direction, while Shandeanu Avenue had a relatively modest increase in comparison (+400 daily vehicles). Despite the increase of traffic volumes, as noted previously, the overall numbers were within the estimated environmental capacity for all streets.

It is noted however that there was no right turn at Shandeanu Avenue when the survey was conducted. The introduction of the proposed Shandeanu Avenue right turn movement to Clayton Road is expected to further reduce the expected impacts on the local street network, especially Prince Charles Street, from the closure of Carinish Road.

Monitoring, Review and Mitigation Requirements

Should SRLA’s preferred option, of Carinish Road being closed and a right turn introduced at Shandeanu Avenue, be pursued one of the major benefits of this is that it could be implemented before Main Works construction activities require the closure of Carinish Road for approximately six years. This should provide significant mitigation of the impact of the closure on local access during this time. During this construction period however, continued monitoring of the local street network will be required and Council has requested that any agreed traffic management and parking mitigation would be addressed by the SRL project.

As has been previously outlined in the report, SRLA have also agreed to fund a Local Area Traffic Management (LATM) study post implementation and also any mitigation treatments required by this, where a nexus to the SRL Project is established. It is considered that this study would be most appropriately undertaken once Main Works construction has been completed and the street network and travel patterns have settled.

#### Pick up and Drop off (PuDo) Parking Location Assessment

As part of the Carinish Road closure review and in response to the Minister's Decision on the EES, SRLA assessed the location of PuDo parking to identify if additional locations at Clayton would better serve passengers and enable access from all locations.

The assessment included:

- Site suitability (i.e. current use and ease of conversion);
- Vehicle accessibility;
- Distance to SRL station entry;
- Multi-modal use; and
- Stakeholder impacts.

SRL East currently proposes PuDo and CPV (taxi) spaces on the northern verge of Houghton Road west and with Accessible Permit parking in the new Station Street. There are two existing MTM PuDo bays on the northern side of Carinish Road, immediately west of Mary Street. This is shown in Figure 14 that follows.

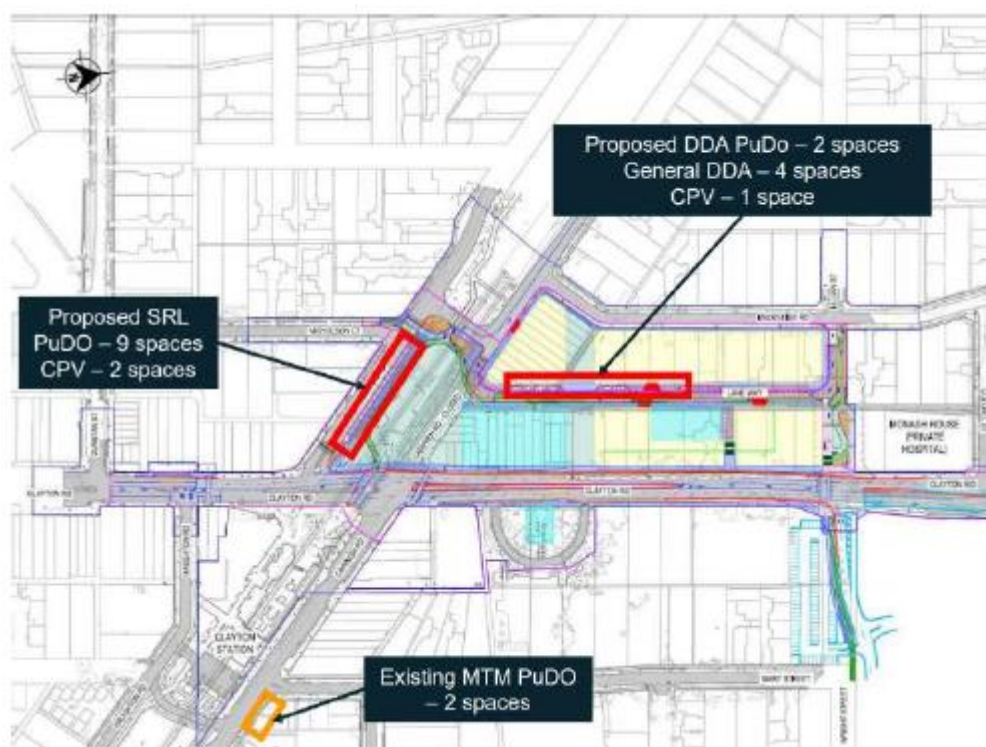


Figure 14: Proposed SRL PuDo and existing MTM PuDo

Five additional potential sites were assessed for PuDo parking and are shown in Figure 15 that follows.





Figure 15: SRLA Assessment of additional PuDo locations

The existing location of PuDo requires circuitous access for vehicles from north and east. Dispersing PuDo across multiple locations should provide greater choice for passengers to access the station and will assist in providing for the 2051 requirement of 18 parking spaces (this total includes the nine parking spaces required to be provided when the SRL Station opens (Rail Day One)).

Following the MCA by SRLA, it was recommended that the alternate locations on Carinish Road east (northern verge) (No. 2 in Figure 17) and Mary St (No. 3 in Figure 17) be pursued and operate in conjunction with Haughton Road and Station Street.

Council Officers have provided feedback to SRLA on these options, that they are not supported for the following reasons:

Carinish Road east (northern verge):

- Impact on parking that is well used by customers of adjacent businesses; and
- Parking in this location has already been reduced by the previous Level Crossing Removal Program (LXRP) project locating power poles within the on-street parking areas.

Mary Street:

- Concern that users will egress parking through laneway adjacent to Clayton Hall, which is unsuitable for any additional traffic; and
- Parking in this area is already well used by school traffic.

It is considered that additional PuDo locations that were investigated further on Carinish Road, east of Mary Street are more suitable locations. Other potential locations for PuDo on Haughton Road were also suggested by Council Officers.

## **NEXT STEPS**

Following the process undertaken so far by SRLA, which has been outlined earlier in the report and is also in the attached report (SRL-AJM-NAP-RES-REP-XTR-NAP-0002585 Carinish Road, Clayton Traffic Assessment), it is understood the next step would be an application for approval of an amendment to the Surface and Tunnel Plans. This process requires a 28-day consultation period.

The use and development of the Project Land for the purposes of the Project must be undertaken generally in accordance with the approved Surface and Tunnel Plans that were approved by the Minister for Environment and Climate Action in October 2022 as part of the SRL East Incorporated Document. They may be amended with the approval of the Minister for Planning. The approved Clayton Surface and Tunnel Plan, includes an indicative closure of Carinish Road and notes:

Carinish Road Closure: Indicative and subject to traffic modelling, detailed design and consultation with the relevant stakeholders and will be located on the UDLP.

The traffic modelling and consultation component of this is outlined in the report (SRL-AJM-NAP-RES-REP-XTR-NAP-0002585 Carinish Road, Clayton Traffic Assessment), which is attached as Appendix 1.

An application for approval of an amendment to the Surface and Tunnel Plans must be accompanied by a schedule explaining the proposed amendments and a written statement from SRLA explaining and supporting the proposed amendment, including:

- a. A description of the form and extent of any consultation undertaken with relevant councils, relevant government agencies and other stakeholders concerning the proposed amendment; and
- b. a written response to comments from relevant councils, relevant government agencies and other stakeholders.

It is understood that this process could either be pursued by SRLA imminently or could be done by their Managing Contractor for the Main Works at Clayton following their engagement. Noting that Council Officers have worked through this review closely with SRLA since late 2022 and have negotiated additional outcomes, such as the post implementation Local Area Traffic Management (LATM) study and proposed pedestrian improvements to Haughton Road, it is considered that there could be a risk of not achieving these outcomes if the process were left to the Main Works Managing Contractor. Further, to implement the right turn at Shandean Avenue before Carinish Road is closed for construction for approximately six years, it is understood this requirement could be included in the Main Works contract for Clayton, if this is agreed as part of the Surface and Tunnel Plans amendment process to be undertaken by SRLA. Whilst Council maintains its position on what the most appropriate outcome should be, as detailed earlier in the report, if the SRLA proposes to proceed with its preferred option, it is imperative that this be implemented as soon as possible so as to provide the maximum benefit. If however, the view of the SRLA changes and aligns with Councils preference, then the timing and implementation and any mitigation during construction should be discussed and resolved.

The application would also need to take into the Environmental Management Framework (EMF) requirement that relates to the closure of Carinish Road, Environmental Performance Requirement (EPR) T6-2 Road transport design and operation:

Develop and implement street network designs for each affected street within the Project Land in consultation with the relevant road management authorities that includes:

- c) Assessment of the potential closure of Carinish Road, Clayton and Coleman Parade, Glen Waverley. The designs ultimately adopted at each location must consider pedestrian safety and traffic movements in the surrounding street network.

The Urban Design Strategy (UDS), which was approved by the Minister for Environment and Climate Action in October 2022 includes place specific requirements for Carinish Road, that any application would need to align with and are outlined as follows:

1(c) Provide a new urban place that:

- i. Prioritises pedestrian movement
- ii. Builds on the identity of the existing Clayton railway station
- iii. Creates an appropriate connection and setting for a new SRL station entrance
- iv. Provides a coherent, visually uncluttered and coordinated user experience
- v. Includes urban greening and shading to create an inviting place and to offer visual relief from surrounding built form and hard paved areas
- vi. Supports increased activity and improved passive surveillance with good visibility to the new SRL station entrance from Clayton Road
- vii. Is well-integrated with the community space below the viaduct, maintaining access, and supporting the continued use of the community space as an activated, well-lit and high amenity location
- viii. Maintains and enhances north south pedestrian connectivity
- ix. Considers opportunities for heritage interpretation that are consistent with the heritage interpretation strategy developed for the Clayton Station Level Crossing Removal Project.



Figure 16: Excerpt from UDS showing place specific requirements for Carinish Road

## FINANCIAL IMPLICATIONS

There are no financial implications to this report.

## POLICY IMPLICATIONS

The SRL East project and the social, economic and environmental benefits that will come from the anticipated level of investment is consistent with Council and State Government Policies.

### Consistency with Council Strategies and Policies

#### Monash 2021: A Thriving Community (2010)

This long-term strategy states (as relevant) that our community values convenience (we are in walking distance to all we need); a balance between residential, commercial and industrial development; good connections to bus and train services, and easy access by train/freeway; we have a friendly, community-based atmosphere in shopping strips; and a safe place to live and bring up a family.

#### Other relevant Strategies

- Clayton Activity Centre Precinct Plan
- Monash Integrated Transport Strategy
- Monash Economic Development Strategy

#### Monash Planning Scheme

Clauses from the Monash Planning Scheme that are relevant to Clayton include:

- Clause 11.06 – Metropolitan Melbourne
- Clause 17 – Economic Development
- Clause 21.05 (MSS) – Economic Development
- Clause 21.06 (MSS) – Activity Centres
- Clause 22.03 – Industry and Business Development and Character Policy

### State Government Policy Context

#### Plan Melbourne

There are numerous references and policy directions throughout Plan Melbourne that highlight the importance of the MNEIC, specifically.

*“Direction 1.1 Create a city structure that strengthens Melbourne’s competitiveness for jobs and investment”*

*“Policy 1.1.4 Support the significant employment and servicing role of Health and Education Precincts across Melbourne”*

*“Policy 1.17 Plan for adequate commercial land across Melbourne”*

*“Direction 2.2 Deliver more housing closer to jobs and public transport”*

*“Direction 2.4 Facilitate decision-making processes for housing in the right locations”*

*“Direction 3.1 Transform Melbourne’s transport system to support a productive city”*

*“Policy 3.1.2 Provide high quality public transport access to job rich areas”*

## **CONSULTATION**

Community consultation was not required.

## **SOCIAL IMPLICATIONS**

There are no social implications to this report.

## **HUMAN RIGHTS CONSIDERATIONS**

There are no human rights implications to this report.

## **GENDER IMPACT ASSESSMENT**

A GIA was not completed because this agenda item is not a ‘policy’, ‘program’ or ‘service’.

## **CONCLUSION**

The SRLA has developed a number of options for consideration and identified its preferred option. This is not Councils preferred option and it is believed that a superior outcome for the project is needed. That being said, it is recognised that this issue needs to be resolved as soon as possible, and if SRLA re to proceed with their preferred option, it is imperative that the Surface and Tunnel Plans be amended and all works are implemented prior to the commencement of the Main Works construction, which will see Carinish Road closed for approximately six years regardless of what option is pursued. If however, the view of the SRLA changes and aligns with Councils preference, then the timing and implementation and any mitigation during construction should be discussed and resolved.

## **ATTACHMENT LIST**

1. SRL Carinish Road, Clayton Traffic Assessment - Redacted [7.1.8.1 - 144 pages]

# Suburban Rail Loop

PREPARED FOR SUBURBAN RAIL LOOP AUTHORITY

**SRL-AJM-NAP-RES-REP-XTR-NAP-0002585**  
**Carinish Road, Clayton**  
**Traffic Assessment**

DATE 10 AUGUST 2023  
REVISION B

**CONFIDENTIAL**



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This document should be read in full and no excerpts are to be taken as representative of the findings.



## Contents

<b>Executive Summary</b>	<b>1</b>
<b>1 Introduction</b>	<b>5</b>
1.1 SRL East Planning Approval	5
<b>2 Station Reference Design</b>	<b>10</b>
2.1 Traffic Impact Summary	10
<b>3 Background and Existing Conditions</b>	<b>15</b>
3.1 Existing Road Networks	15
3.2 Existing traffic volumes	17
3.3 Traffic Surveys with Carinish Road Closure	19
<b>4 Stakeholder Consultation</b>	<b>22</b>
<b>5 Carinish Road Option Assessment Summary</b>	<b>24</b>
5.1 Process	24
5.2 Long List of Options	24
5.3 Long List of Options Initial Assessment	34
5.4 Long List of Options Recommendations and Next Steps	35
5.5 Short List of Options	35
5.6 Multi-Criteria Analysis (MCA) Assessment of Short List of Options	37
5.7 Carinish Road Assessment Recommendation	37
5.8 PuDo Location Assessment	38
<b>6 Preferred Solution</b>	<b>41</b>
6.1 Shandeanu Avenue Right Turn	41
6.2 Pedestrian Safety	42
6.3 PuDo Location	42
<b>7 Traffic Modelling</b>	<b>43</b>
7.1 Traffic Modelling Assessment	43
7.2 VISUM Modelling	43
7.3 VISSIM Modelling	51
7.4 SIDRA Analysis	59
7.5 Comparison of VISSIM and SIDRA Outputs	63
<b>8 Conclusion</b>	<b>64</b>

## Appendices

### Appendix A

Carinish Rd Assessment Summary

### Appendix B

Clayton Road, Dixon Street, Shandeanu Avenue - 2041 with SRL SIDRA Results

### Appendix C

Clayton Road, Dixon Street, Shandeanu Avenue – Volume Changes

# Executive Summary

## Introduction

The Suburban Rail Loop Authority (SRLA) has engaged Aurecon-Jacobs-Mott MacDonald Joint Venture (AJM-JV) to undertake an assessment of potential options and the impacts for closure of Carinish Road west (at Clayton Road). This is in direct response to EPR T6-2 Road transport design and operation:

2. Develop and implement street network designs for each affected street within the Project Land in consultation with the relevant road management authorities that includes:

c): Assessment of the potential closure of Carinish Road, Clayton and Coleman Parade, Glen Waverley. The designs ultimately adopted at each location must consider pedestrian safety and traffic movements in the surrounding street network.

A range of options were investigated which included full and partial closure of Carinish Road, changes to other street connections to Clayton Road and redistribution of Pick up and Drop off parking (PuDo) to improve access to the SRL Clayton Station.

## Carinish Road Options Assessment

Eight potential options for changes to Carinish Road (west) in addition to the Baseline, which envisaged a closure of a section of road to provide public realm, were identified during initial option development. An initial assessment was undertaken to determine three short list options to take to a final Multi Criteria Assessment (MCA) to identify the preferred solution for walking and cycling safety and managing traffic at Carinish Road and the surrounding street network.

The assessment of the short list of options considered closing Carinish Road (Baseline), closing Carinish Road with Shandeanu Avenue modifications (Option 2), and leaving Carinish Road open with pedestrian priority (Option 4). These assessments included alternate locations for PuDo at Carinish Road east (northern verge) and Mary Street operating in conjunction with Haughton Road.

The MCA identified the closure of Carinish Road with a new right turn from Shandeanu Avenue at the Clayton Road / Dixon Street intersection (Option 2) as the preferred option as shown in Table 0.1. A key benefit of the closure of Carinish Road (west) was increased Public Realm, providing greater pedestrian and cyclist priority as well as increasing safety. Introducing a right turn at Shandeanu Avenue addresses City of Monash (COM) concerns that the closure of Carinish Road (west) at Clayton Road would remove the opportunity for residents to turn right and travel south.

TABLE 0.1 CARINISH ROAD MCA SUMMARY

	Option 2 - Closed with Shandeanu Ave mods	Option 4 - Open with pedestrian priority
Connectivity		
Productivity		
Liveability		
Deliverability		
Total Score		

Key	
Better than base case	
Same/equal to base case	
Worse than base case	

Figure 0.1 displays the preferred option functional layout for closure of Carinish Road (west) and a right turn at Shandeanu Ave.

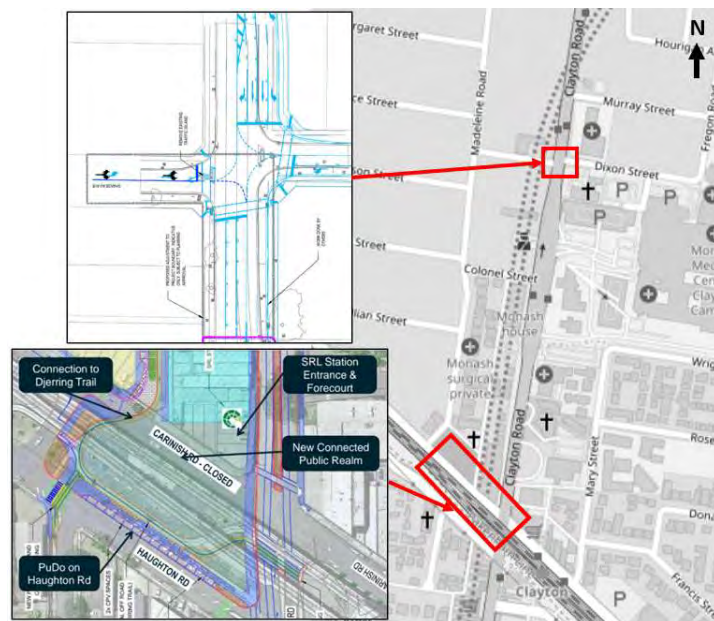


FIGURE 0.1 PREFERRED CARINISH ROAD AND SHANDEANU AVENUE/CLAYTON ROAD/DIXON STREET INTERSECTION LAYOUTS

**PuDo Location Assessment**

In addition to assessing Carinish Road, the location of the PuDo was assessed to identify if additional locations for PuDo at Clayton would better serve passengers and enable access from all locations. Five possible locations were assessed considering site suitability, vehicle accessibility, distance to SRL Station entry, multi-modal use and stakeholder impacts.

The assessment identified that the proposed location of PuDo requires circuitous access for vehicles from the north and east. Dispersing PuDo across multiple locations was assessed as providing greater choice for passengers to access the SRL Station. Alternative locations on Carinish Road east (northern verge) and Mary

Street were considered to provide the best outcome. It was recommended that the alternate locations operate in conjunction with the current proposed PuDo location on Haughton Road. Note, a separate assessment detailing the proposed locations of PuDo spaces across all SRL East stations is currently being undertaken.

**Indicative Outcomes: Observed Traffic Changes with Short Term Closure of Carinish Road**

In 2022, SRLA conducted traffic surveys (tube counts) across Clayton over the months of September, October, and November. These surveys captured traffic flow data prior to and during the short term closure of Carinish Road as part of the initial works for sewer relocation.

The surveys provide:

- A comparison of traffic volumes on the local road network before and after the closure of Carinish Road.
- Identification of traffic diversion behaviours caused by the Carinish Road closure.
- Verification of the traffic modelling that was previously undertaken for the closure of Carinish Road.

Analysis indicates that observed diversions and changes in traffic volumes are consistent with forecasts modelled in the SRLA East Traffic and Transport Impact Assessment (TTIA). Prince Charles St (south of Haughton Road) experienced the largest increases in traffic (800 to 1,100 daily vehicles, +55-58%).

All roads surveyed were operating within capacity during the course of the surveys. It is noted however that there was no right turn at Shandeanu Avenue when the survey was conducted. The proposed Shandeanu Avenue right turn movement to Clayton Road is expected to further mitigate the impact on the street network from the closure of Carinish Road for local residents.

**Traffic Modelling Assessment**

Traffic modelling packages were used to assess the impact of closing Carinish Road and the effects of providing an additional right turn movement at Shandeanu Avenue. Table 0.2 details traffic modelling used to assess the traffic impacts and diversions of traffic, as well as the key findings for each model.

**TABLE 0.2 TRAFFIC MODELLING SOFTWARE AND FINDINGS**

Model	Aspects assessed	Key Findings
<b>VISUM meso-level</b>	Wider traffic redistribution within the Clayton precinct.	<ul style="list-style-type: none"> <li>• Increase traffic on Shandeanu Avenue during both the morning and evening peak hours. Traffic distributed across multiple local roads, considered a minor issue.</li> <li>• Number of vehicles diverted to Shandeanu Avenue is relatively small, 50 in the morning and 120 in the evening peak hour.</li> </ul>
<b>VISSIM microsimulation</b>	Corridor and intersection performance.	<ul style="list-style-type: none"> <li>• Travel times for cars along Clayton Road increase by approximately 10 seconds.</li> <li>• Small increase in delays at Shandeanu intersection, max 11 seconds.</li> </ul>
<b>SIDRA Intersection</b>	Intersection operation, queue lengths and VISSIM verification.	<ul style="list-style-type: none"> <li>• The 95<sup>th</sup> percentile queue lengths on Shandeanu Avenue potentially overlap with kerbside parking and traffic passing areas due to the narrow width of the road and the queues encroaching onto parking bays.</li> </ul>

**Conclusions**

The assessment of Carinish Road options identified the following:



- The closure of Carinish Road (west) at Clayton Road to all traffic was the preferred layout to provide outcomes across a range of criteria.
- A right turn from Shandeanu Avenue at the Clayton Road / Dixon Street / Shandeanu Avenue intersection will provide a right turn for use by residents, mitigating impacts of closure of Carinish Road (west).
- Closure of Carinish Road (west) introduces an additional 1,100m<sup>2</sup> of contiguous and integrated public realm adjacent to the SRL Station and future place making opportunities, delivering pedestrian priority and increased safety.
- Dispersing PuDo further by adding alternate locations on Carinish Road east (northern verge) and Mary Street will provide greater choice for passengers and improves ease of access.
- The traffic modelling assessment of closure of Carinish Road and introducing a right turn at Shandeanu Avenue confirmed:
- Travel times on Clayton Road are not increased significantly with the Carinish Road closure and new right turn at Shandeanu Avenue.
- Local residents would be the main users of the new right turn with other local roads experiencing an increase in traffic as motorists access Shandeanu Avenue. Considering the low number of vehicles that would be re-routed, it is expected that these vehicles will be absorbed by multiple streets, resulting in no significant impact on the rest of the local street network.
- Forecast queuing on Shandeanu Avenue will likely require changes to parking restrictions (i.e. no stopping during peak periods which is expected to have minimal impact on public access to parking).

No further parking issues (outside of Shandeanu Avenue) have been foreseen on the surrounding street network however, should an issue be identified at a later date, further investigation should be considered at that time.

The proposed closure of Carinish Road (west) allows for a high level of pedestrian safety by removing vehicles from directly outside of the SRL Clayton Station entrance including pedestrian walking from the PuDo and bus interchange/stops. The introduction of the right turn at Shandeanu Avenue mitigates the closure of Carinish Road (west) by providing the right turn for use by residents with no significant impact to the local street network. All other movements can be undertaken within the local street network.

# 1 Introduction

The Suburban Rail Loop Authority (SRLA) has engaged AJM Joint Venture (AJM-JV) to undertake an assessment of the potential closure of Carinish Road (at Clayton Road) and all traffic and impacts on the surrounding street network. This is in direct response to the Environmental Performance Requirement EPR T6-2 Road transport design and operation:

2. Develop and implement street network designs for each affected street within the Project Land in consultation with the relevant road management authorities that includes:

c): Assessment of the potential closure of Carinish Road, Clayton and Coleman Parade, Glen Waverley. The designs ultimately adopted at each location must consider pedestrian safety and traffic movements in the surrounding street network. A range of options were investigated which included full and partial closure, changes to other street connections to Clayton Road and redistribution of Pick up and Drop off (PuDo) to improve access to the SRL Station.

This report summarises the outcome of the Carinish Road, Clayton traffic assessment and the development of the preferred option, including traffic modelling to detail the benefits and impacts of the solution.

## 1.1 SRL East Planning Approval

### 1.1.1 SRL EAST PLANNING SCHEME AMENDMENT AND INCORPORATED DOCUMENT

Planning Scheme Amendment GC197 was approved by the Minister for Environment and Climate Action in September 2022. The amendment applies to land in the municipalities of Bayside, Kingston, Monash and Whitehorse, which will be used for the development of the Suburban Rail Loop East (the project). The SRL East Incorporated Document authorises and regulates the construction and operation of the project generally in accordance with the SRL East Surface and Tunnel Plans (refer to additional information below).

The SRL East Incorporated Document for the construction and operation of the project has the effect of providing approval for the Project, following an assessment of the relevant planning scheme, in a streamlined and coordinated way.

### 1.1.2 SURFACE AND TUNNEL PLANS

The use and development of the Project Land for the purposes of the Project must be undertaken generally in accordance with the approved Surface and Tunnel Plans that were approved by the Minister for Environment and Climate Action in October 2022 as part of the SRL East Incorporated Document. The Surface and Tunnel Plans provide certainty to decision-makers and the community on the general configuration of the stations and location of tunnel portals, and may be amended with the approval of the Minister for Planning.

An application for approval of an amendment to the Surface and Tunnel Plans must be accompanied by a schedule explaining the proposed amendments and a written statement from SRLA explaining and supporting the proposed amendment, including:

- a. A description of the form and extent of any consultation undertaken with relevant councils, relevant government agencies and other stakeholders concerning the proposed amendment

- b. any written comments from relevant councils, relevant government agencies and other stakeholders
- c. a written response to comments from relevant councils, relevant government agencies and other stakeholders.

Figure 1-1 shows the approved Clayton Surface and Tunnel Plan, including an indicative closure of Carinish Road, Clayton, subject to traffic modelling that has been undertaken as part of this report.

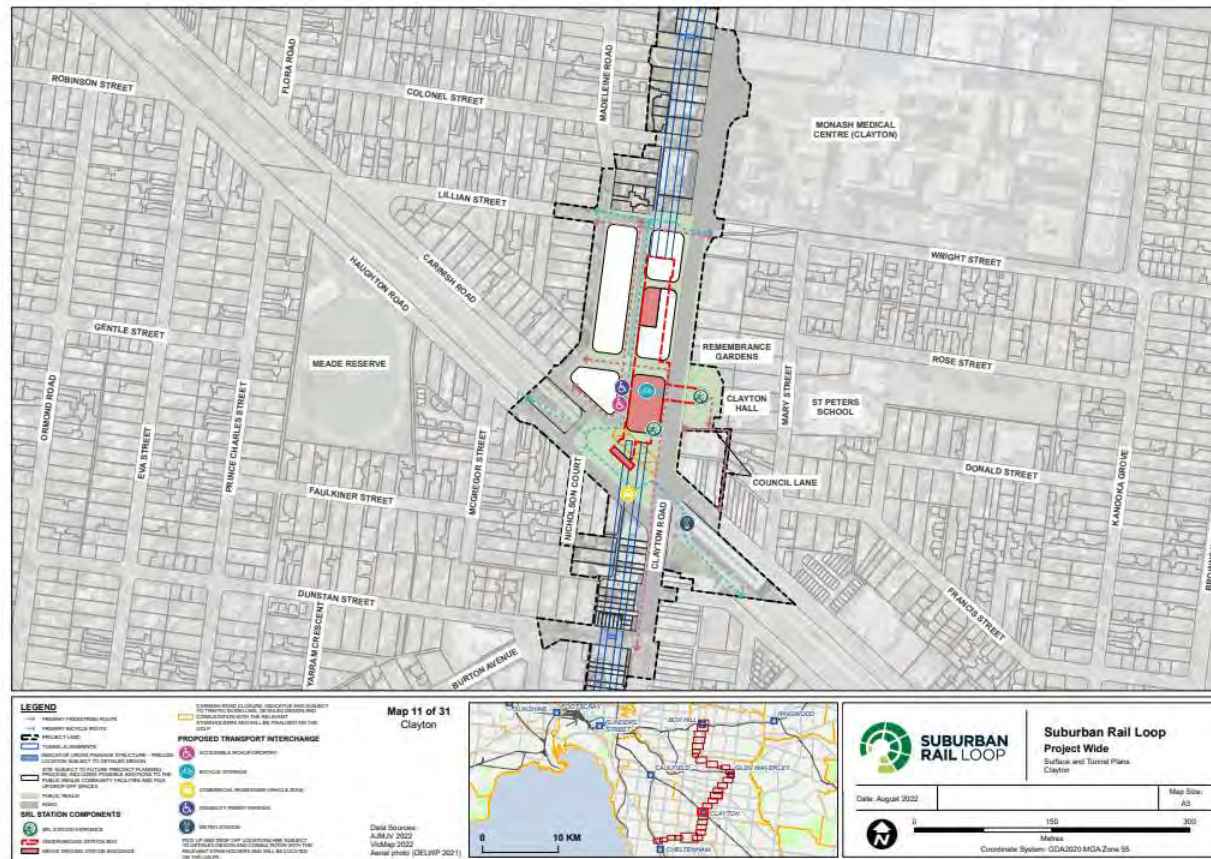


FIGURE 1.1 CLAYTON SURFACE AND TUNNEL PLAN



### 1.1.3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

The Environmental Management Framework (EMF), prepared as required by the Incorporated Document, was approved by the Minister for Environment and Climate Action in October 2022 following approval of the SRL East planning scheme amendment.

The EMF includes a set of Environmental Performance Requirements (EPRs) defining the environmental outcomes that must be achieved during the design, construction and operation of the Project (regardless of the design solutions adopted). The EPRs are intended to minimise impacts and the risk of harm to human health and environment to within reasonable limits having regard to contextual factors and the practical delivery of the Project. The Project must be delivered generally in accordance with the approved EMF (and EPRs).

The relevant EPR that is the basis of this Carinish Road, Clayton traffic assessment is EPR T6-2 Road transport design and operation:

2. Develop and implement street network designs for each affected street within the Project Land in consultation with the relevant road management authorities that includes:

c): Assessment of the potential closure of Carinish Road, Clayton and Coleman Parade, Glen Waverley. The designs ultimately adopted at each location must consider pedestrian safety and traffic movements in the surrounding street network.

### 1.1.4 URBAN DESIGN STRATEGY

The Urban Design Strategy (UDS) was approved by Minister for Environment and Climate Action in October 2022 following approval of the SRL East planning scheme amendment. The UDS includes an urban design vision, urban design principles and objectives and place specific requirements, including for Carinish Road.

Station environs that are attractive and comfortable to spend time in, delivering an enhanced public life for all members of the community. The station environs form a vibrant people-focused centre that feels welcoming for all ages and all members of the area's multi-cultural community. Public spaces build on the identifiable character of the community space located below the existing railway viaduct, and complement this recreation space with other space types that are comfortable and lively, encouraging people to spend time in Clayton's centre.

The excerpt below highlights the applicable requirements for Carinish Road, Clayton.

1(c) - Provide a new urban place that:

- i. Prioritises pedestrian movement
- iii. Creates an appropriate connection and setting for a new SRL station entrance
- iv. Provides a coherent, visually uncluttered and coordinated user experience
- v. Includes urban greening and shading to create an inviting place and to offer visual relief from surrounding built form and hard paved areas
- vi. Supports increased activity and improved passive surveillance with good visibility to the new SRL station entrance from Clayton Road
- vii. Is well-integrated with the community space below the viaduct, maintaining access, and supporting the continued use of the community space as an activated, well-lit and high amenity location

viii. Maintains and enhances north south pedestrian connectivity.



FIGURE 1.2 CLAYTON PLACE SPECIFIC UDS REQUIREMENT RELEVANT TO CARINISH ROAD

## 2 Station Reference Design

Carinish Road would be permanently closed between Clayton Road and Clayton Link Road as shown in Figure 2.1. This would greatly improve permeability for walking within the precinct area. A new public open space would allow greater pedestrian priority, especially at the intersections of Carinish Road and Haughton Road. A new internal access road footpath between Carinish Road to Lillian Street would enable east-west connectivity north of the SRL station at Clayton. The proposed upgrades to pedestrian infrastructure within the Project Land would adequately meet the greater pedestrian demand within the walking catchment of the SRL station and the existing station.

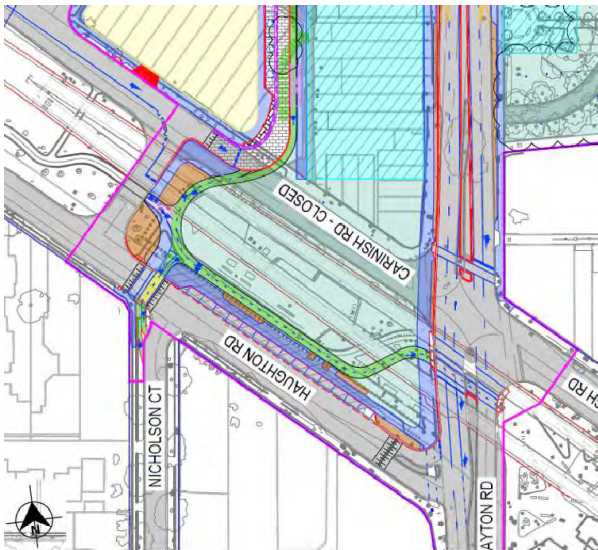


FIGURE 2.1 CARINISH ROAD REFERENCE DESIGN LAYOUT

### 2.1 Traffic Impact Summary

Carinish Road is set to undergo major changes with SRL as it would be permanently closed to provide a new pedestrian plaza, public realm and open space that would facilitate a direct interchange between the SRL station at Clayton and the existing Clayton railway station.

The Link Road connection under the rail viaduct between Carinish Road and Haughton Road has been assessed to determine the impact of the closure of Carinish Road. Figure 2.2 shows the location of the Link Road in the No SRL and With SRL case, and Figure 2.3 to Figure 2.6 outlines the typical travel speed on the network in the Clayton area. Existing traffic conditions for comparison with the 2041 SRL scenario with the closure of Carinish Road are further detailed in Section 3.3.

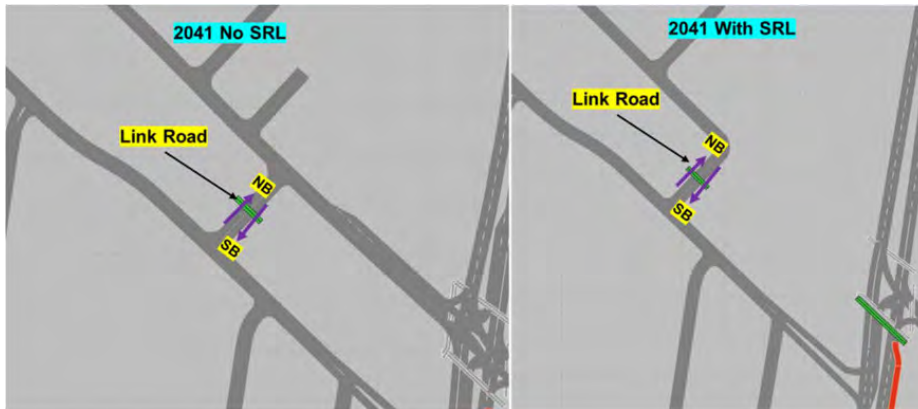


FIGURE 2.2 LINK ROAD LOCATION AND NETWORK LAYOUT WITH AND WITHOUT SRL

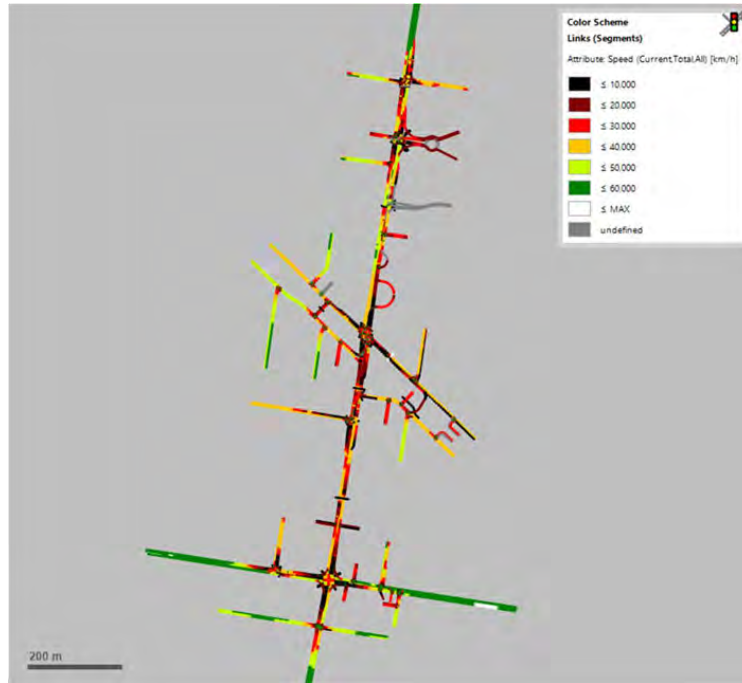


FIGURE 2.1 LINK ROAD PERFORMANCE (TRAVEL SPEED) 2041 NO SRL AM

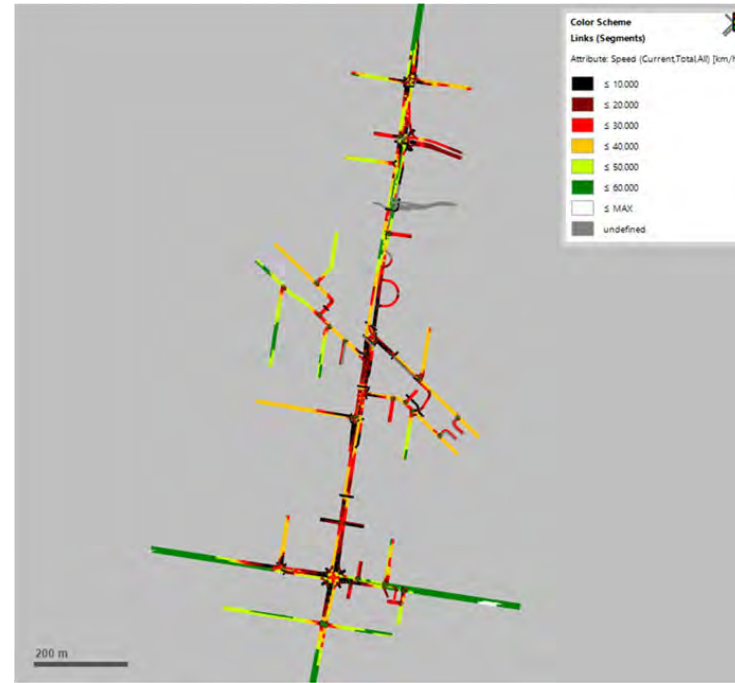


FIGURE 2.2 LINK ROAD PERFORMANCE (TRAVEL SPEED) 2041 WITH SRL AM

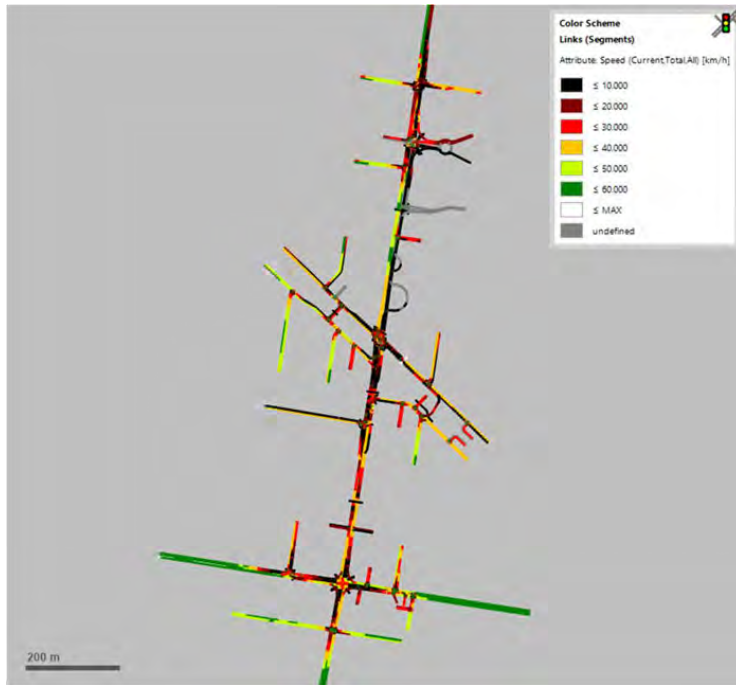


FIGURE 2.3 LINK ROAD PERFORMANCE (TRAVEL SPEED) 2041 NO SRL PM

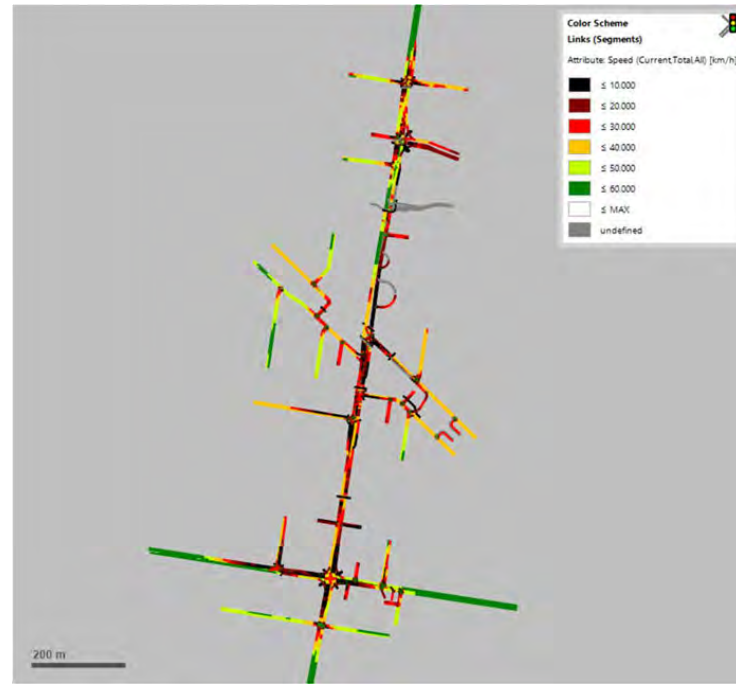


FIGURE 2.4 LINK ROAD PERFORMANCE (TRAVEL SPEED) 2041 WITH SRL PM

Table 2.1 summarises the total movements of the Link Road during peak hours with and without SRL.

**TABLE 2.1 LINK ROAD TOTAL TRAFFIC VOLUME VS NO SRL**

Road Name	2041 No SRL		2041 With SRL	
	AM (08:00-09:00)	PM (17:15-18:15)	AM (08:00-09:00)	PM (17:15-18:15)
Link Road NB	199	145	136	188
Link Road SB	131	203	42	82

Note that the right turn movement proposed as part of the Carinish Road assessment is not implemented in these models. The Link Road volumes suggest that there would not be a significant increase in traffic volumes, in particular roads like Prince Charles Street when accounting for the implementation of the Shandeanu Avenue right turn.

The 2041 With SRL scenario shows a decrease in total traffic using the Link Road SB. This is as traffic queues from Haughton Road back through the Link Road. This is considered to be latent demand (people who cannot undertake their desired journey) due to congestion which results in lower traffic numbers with SRL particularly in the PM peak. The latent demand is mainly from zones East and West of Carinish Road.

The closure of Carinish Road will have a positive impact on travel times for buses traveling northbound on Clayton Road during the afternoon peak. As a result of reduced traffic volumes, these buses are anticipated to experience time-saving of nearly three minutes.

The new SRL Clayton Station and the closure of Carinish Road will necessitate changes in the routing of trips throughout the network. While these changes are anticipated to improve typical travel times on Clayton Road, it would also result in an increase of traffic volumes on Haughton Road and Madeleine Road. Other local roads (such as Prince Charles Street) in the network will also see additional re-routing but to a lesser extent. The impact of these additional volumes is not expected to be significant and like Madeleine Road, would not exceed the environmental capacity threshold and be capable of absorbing these trips.

Travel times and intersection delays would either remain or substantially improve once the Project was operating. However, the eastern approach of the Carinish Road / Clayton Road intersection and the western approach to the Clayton Road / Dunstan Street intersection would experience delays as a result.

## 3 Background and Existing Conditions

### 3.1 Existing Road Networks

Clayton Road is a declared VicRoads managed arterial street, forming part of the larger Doncaster-Mordialloc arterial route, and provides a key north-south connection between the M1 and Mordialloc. Clayton Road runs parallel to the proposed SRL station precinct.

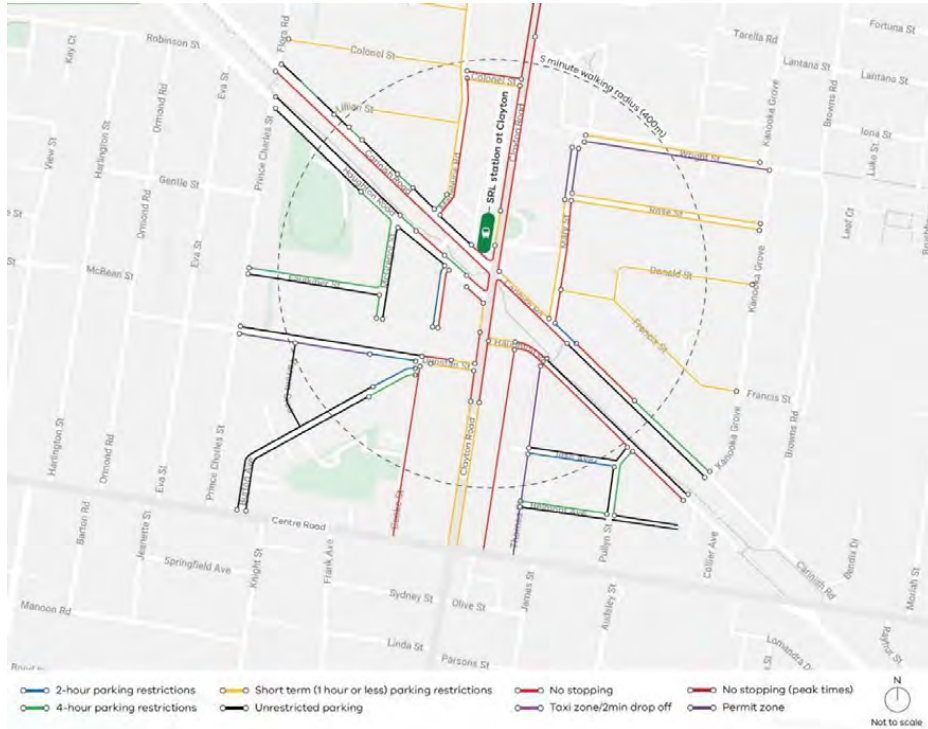
Carinish Road is predominately a residential street with small area of retail around Clayton Road and the MMRN Clayton Station however does link to a commercial/light industrial precinct to the west bounded by Carinish Road, Milgate Street, Colin Road and North Road. Due to this Carinish Road is a secondary route, as the precinct has closer access to the arterial road network via North Road used by heavy vehicles.

Carinish Road to the east of Clayton Road is also the location of the Clayton Station Bus Interchange with buses utilising a northbound bus only right turn on Clayton Road into Haughton Road east and linking back to Carinish Road via a bus only link to the east of the MMRN Clayton Station.

Haughton Road west is a local street with on-street parking (2P) in both the westbound direction (3 spaces) and in the eastbound direction (21 spaces) and is restricted to a left-in and left-out movement at Clayton Road. Vehicles are able to connect between Carinish Road and Haughton Road by utilising a link road below the rail viaduct.

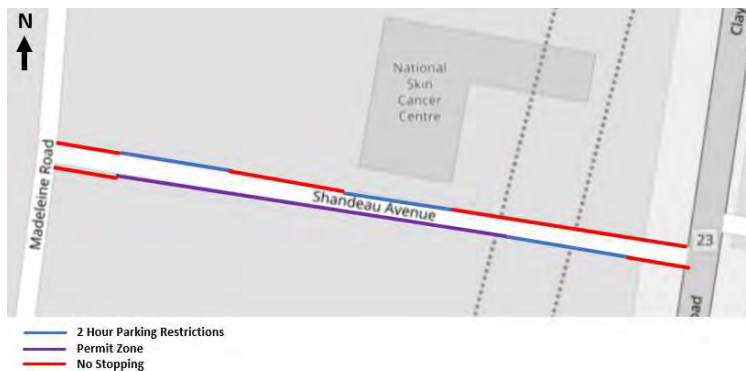


On-street parking restrictions in the SRL station at Clayton Study Area are shown in Figure 3.1



**FIGURE 3.1 ON-STREET PARKING AND PARKING RESTRICTION – SRL STATION AT CLAYTON STUDY AREA**

Shandeanu Avenue is a local street that runs east-west between Madeleine Road and Clayton Road. A small pocket of medium density residential housing on the southern side, however the majority of the street is flanked by non-residential land uses, including medical centre and church facilities, all with off-street car parking provided. The street has a heavy vehicle ban in place. At the Clayton Road intersection, Shandeanu Avenue currently provides for a signalised left out to the north, left in from the south and right in from the north. Shandeanu Avenue currently has parking restrictions as shown in Figure 3.2 to allow vehicles to pass in both directions.



**FIGURE 3.2 ON-STREET PARKING AND PARKING RESTRICTION – SHANDEAU AVENUE**

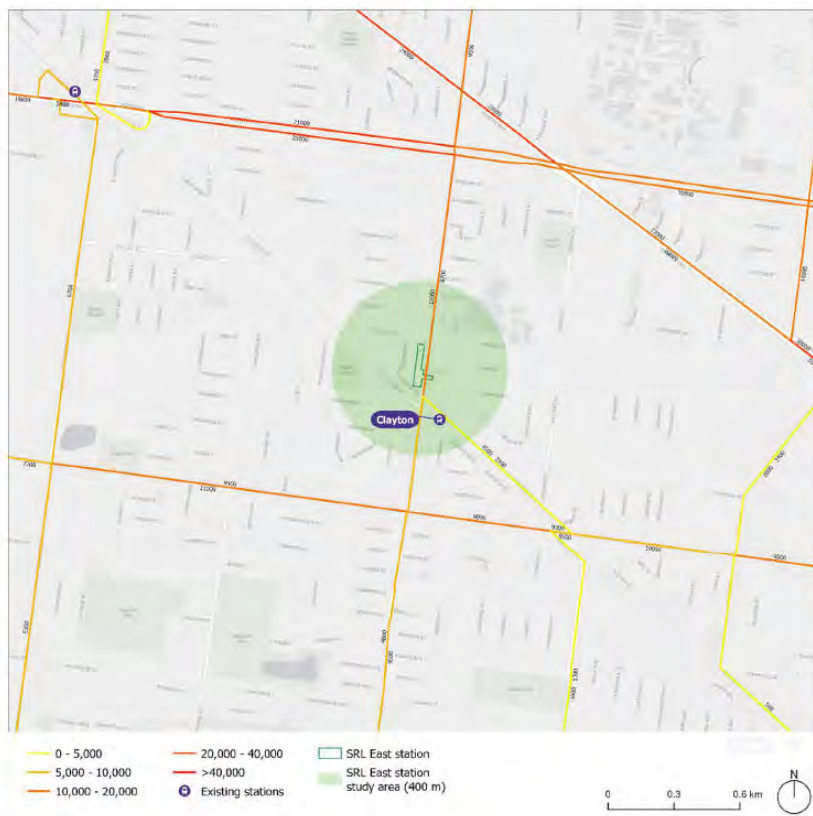
The residential pocket bounded by Carinish Road, Clayton Road, North Road and Colin Road currently has restrictions on trucks. This is in place to ensure that heavy vehicles from the commercial/light industrial precinct do not traverse via residential streets.

### 3.2 Existing traffic volumes

While the existing Clayton railway station has high frequency rail services and integrated bus services, the SRL station at Clayton Study Area has a high dependency on private vehicles for trips with a mode share in 2018 of 88 per cent and only 12 per cent of trips carried out by public and active transport. As a result, the main arterial roads are car-dominated. The resulting traffic congestion impacts on the performance of the bus (in mixed traffic sections).

AADT traffic volumes (sourced from VicRoads Open Data) are shown in Figure 3.3. To understand peak traffic volumes on key roads in the SRL station at Clayton Study Area, traffic surveys were undertaken in March 2021 with the results summarised in Table 3.1. It should be noted that these traffic surveys were affected by COVID-19 lockdown restrictions.

The intersection of Clayton Road and Centre Road has a considerably high traffic volume moving through the intersection, with approximately 3,100 vehicles in the AM peak and 3,500 vehicles in the PM peak.



**FIGURE 3.3 CLAYTON – ANNUAL AVERAGE DAILY TRAFFIC VOLUMES (SOURCE: VICROADS OPEN DATA)**

**TABLE 3.1 TOTAL TRAFFIC VOLUMES THROUGH INTERSECTIONS – CLAYTON, 2021**

Road / Intersection	Traffic volume	
	AM peak	PM peak
Clayton Road / Centre Road	3100	3500
Clayton Road / Dunstan Road	1600	2000
Clayton Road / Haughton Road	1700	2000
Clayton Road / Carinish Road	2300	2600
Clayton Road / Monash Medical	2000	2100

During the AM peak on Clayton Road, heavy vehicles comprise 6 to 8 per cent of vehicles travelling northbound. In the PM peak 5 to 7 per cent of the southbound vehicles are heavy vehicles.

The performance of the key intersections for the 2021 Base year is summarised in Table 3.2. The results indicate that all intersections are performing satisfactorily

**TABLE 3.2 INTERSECTION PERFORMANCE – 2021 BASE YEAR – LEVEL OF SERVICE (LOS)**

Intersection	Approach	AM peak (8 am to 9 am)	PM peak (5:15 pm to 6:15 pm)
Carinish Road/Clayton Road	South	B	B
	East	D	C
	North	B	C
	West	D	D
Clayton Road/Haughton Road (North)	South	A	C
	North	A	A
	West	B	D
Clayton Road/Haughton Road (South)	South	A	A
	East	D	D
	North	A	B
Clayton Road/Dunstan Street	South	B	B
	North	A	A
	West	C	C
Clayton Road/Centre Road	South	C	C
	East	B	C
	North	C	C
	West	C	D
Centre Road/Cooke Street	East	A	B
	North	C	C
	West	A	A
Carinish Road/Mary Street	East	A	A
	North	A	B
	West	A	A
Clayton Road/Colonel Street	South	A	A
	North	A	A
	West	A	A
Clayton Road/Monash Medical Entrance	South	A	A
	East	B	B
	North	A	A
	West	A	C
Clayton Road/Shandeanu Avenue/Dixon Street	South	A	A
	East	A	A
	North	A	A

Intersection	Approach	AM peak (8 am to 9 am)	PM peak (5:15 pm to 6:15 pm)
	West	A	A

Source: Clayton VISSIM

There are no other bus lanes (except the bus-only bypass under the existing rail line, between Carinish Road and Houghton Road), so bus services are subject to the same delay as general traffic.

Travel times for key routes through the Clayton precinct in the 2021 Base year are detailed in Figure 3.4 which shows the travel time routes. Clayton Road has delays during the AM and PM peak hours. The travel time correlates to average speed of around 35 to 40 per cent of the 60 km/h posted speed limit for northbound and southbound vehicles during the AM and PM peak hours.



FIGURE 3.4 CLAYTON TRAVEL TIME ROUTES SOURCE: CLAYTON VISSIM

### 3.3 Traffic Surveys with Carinish Road Closure

SRLA commissioned traffic surveys (tube counts) that were conducted in 15 locations throughout Clayton from 27 September to 24 October 2022, with supplementary surveys being undertaken from 23 November to 29 November 2022.

The surveys allowed for:

- A comparison of traffic volumes on the local road network before and after the closure of Carinish Road.
- Indication of travel behaviours during the recent closure of Carinish Road.

- Verification of the traffic modelling that was previously undertaken for the closure of Carinish Road. Carinish Road was closed after the first week of surveys from 4 October to 11 November 2022 and would provide a preview of the impact to the surrounding road network when SRL works permanently close Carinish Road. It is acknowledged that there was a rostered day off for construction workers during this period however, this date was still within a “collectable” survey period based on VicRoads guidelines and it is unlikely that the rostered day off would have materially affected the results.

Figure 3.5 shows the locations of the surveys within the Clayton Precinct and Table 3.3 summarises the traffic volumes captured from the surveys:

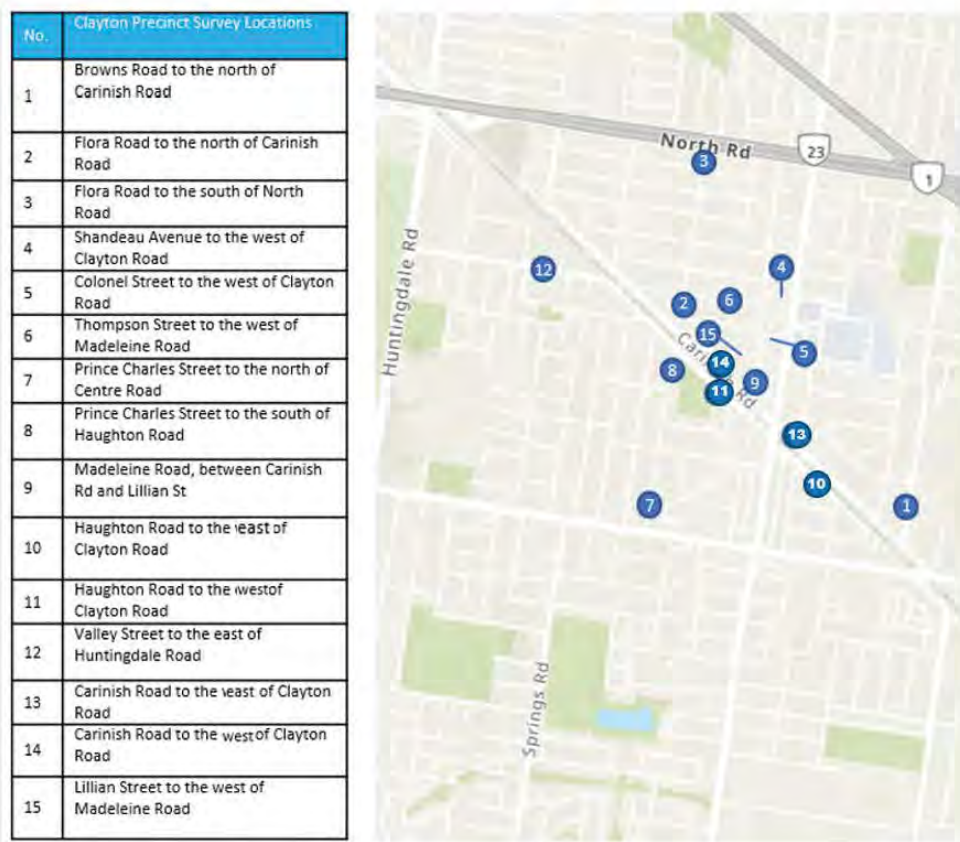


FIGURE 3.5 TRAFFIC SURVEY LOCATIONS AROUND CLAYTON PRECINCT

**TABLE 3.3 TRAFFIC VOLUMES AROUND CLAYTON PRECINCT**

No.	Road	Location	Daily Volume (2 way ADT, Carinish Road open, 1 week)	Daily Volume (2 way AADT, Carinish Road closed, average over 3 weeks)	Volume change	Volume Change (%)	Estimated Environmental Capacity (vehicles per day)
1	Browns Road	North of Carinish Road	5,250	6,100	850	16%	3,000 – 7,000
2	Flora Road	North of Carinish Road	1,300	1,050	-250	-19%	2,000 – 3,000
3		South of Carinish Road	No Data	2,600	-	-	2,000 – 3,000
4	Shandeanu Avenue	West of Clayton Road	1,350	1,750	400	30%	2,000 – 3,000
5	Colonel Street	West of Clayton Road	900	1,500	600	67%	2,000 – 3,000
6	Thompson Street	West of Madeleine Road	250	300	50	20%	2,000 – 3,000
7	Prince Charles Street	North of Centre Road	1,450	2,250	800	55%	2,000 – 3,000
8		South of Haughton Road	1,900	3,000	1,100	58%	2,000 – 3,000
9	Madeleine Road	Between Carinish Road and Lillian Street	2,150	2,600	450	21%	2,000 – 3,000
10	Haughton Road	East of Clayton Road	600	850	250	42%	3,000 – 7,000
11		West of Clayton Road	3,900	4,200	300	8%	3,000 – 7,000
12	Valley Street	East of Huntingdale Road	No Data	2,850	-	-	2,400 – 3,170
13	Carinish Road	East of Clayton Road	4,550	2,850	-1,700	-37%	4,000 – 8,000
14		West of Clayton Road	7,200	3,200	-4,000	-56%	4,000 – 8,000
15	Lillian Street	West of Madeleine Road	200	250	50	25%	2,000 – 3,000

The closure of Carinish Road has led to a consistent redistribution of traffic to the surrounding network, in line with the forecasts modelled in the SRLA East Traffic and Transport Impact Assessment (TTIA). Prince Charles Street experienced the highest increase of traffic diverted (between 800 to 1,100 daily vehicles on both ends of the street) from Carinish Road, mostly in the southbound direction, while Shandeanu Avenue had a modest increase in comparison (+400 daily vehicles). Despite the increase of traffic volumes overall the numbers were within the estimated environmental capacity for all roads. It is noted however that there was no right turn at Shandeanu Avenue when the survey was conducted. The introduction of the proposed Shandeanu Avenue right turn movement to Clayton Road is expected to further reduce the expected impacts on the street network from the closure of Carinish Road for local residents.

## 4 Stakeholder Consultation

Throughout the development of the options for Carinish Road, there has been multiple engagement opportunities held with key stakeholders including the City of Monash and the Urban Design Advisory Panel (UDAP). This is in accordance with the requirements of EPR T6-2 that states street network designs must be developed in consultation with the relevant road management authorities.

The Council meetings have been undertaken to ensure that Council are updated regularly on progress and ensure input and feedback at each stage. SRLA have taken the approach of being forthcoming in sharing the data collected as part of this traffic assessment with Council in an open and transparent manner to enable the Monash City Council to analyse and provide meaningful feedback into the assessment.

The key dates and purpose of this consultation are detailed below:

- 12 December 2022 - Meeting with City of Monash – to align on short listed options.
- 24 January 2023 – UDAP Meeting – to gain feedback regarding the shortlisted options, particularly Option 4.
- 6 February 2023 –SRLA received a proposal/mitigation from City of Monash.
  - The key elements of the option included:
    - Retaining Carinish Road with the PUDO located there;
    - Extending the station forecourt into Houghton Road; and
    - A relocated or new southern ground floor entrance to the station.
  - Following review, SRLA did not consider this proposal as a suitable mitigation, for the key reasons set out below.
    - Technically, the relocation of the main station entrance per the proposed arrangement/location has the following disadvantages (as assessed in detail by SRLA/AJM during Concept Design phase):
      - Additional Gate Line - Moving the southern entrance any further south drives the need for a second gate line – a single concourse level gate line (for the southern and eastern entrances) is not possible. An additional gate line would add to staffing costs.
      - Loss of Public Realm - The additional gate line cannot be located underground due to the presence of existing rail viaduct substructure. The result is a loss of ground level area, circa 400m<sup>2</sup>, to accommodate a new ground level gate line and staffing rooms.
      - Wayfinding - Compromised wayfinding at concourse level as result of mixed exiting and interchanging passengers travelling south through a common corridor.
      - Construction Risk - Significant increase in below ground works under the rail viaducts.
      - Flooding - The area south of Carinish Road is subject to flooding, so a new station entrance here would require, ramping to increase levels, flood gates, additional underground storage or a combination of these.

- The proposed station entrance configuration is different to the arrangement/location as shown on the approved Surface and Tunnel Plans (in accordance with the SRL East Incorporated Document). Change to the main station entrance location poses approvals and thus delivery risks to SRL East Rail and Infrastructure, irrespective of the merits and technical challenges.
- With the exclusion of the station entrance location, the proposal is largely comparable/similar to Option 5, which was deemed a non-suitable option for further pursual in detailed analysis.
- 15 February 2023 – Meeting with City of Monash – to provide an update on the outcome of the MCA assessment and the preferred option.
- 13 April 2023 – Meeting with City of Monash – to provide an update on the preferred option and work to date including traffic modelling.
- 11 July 2023 – Meeting with City of Monash – to further discuss the preferred option and comments on Revision A of this report.

It is anticipated that stakeholder consultation regarding the requirements of EPR T6 (2) will be ongoing and additional meetings with Council and UDAP will be undertaken to discuss the results of this assessment.



# 5 Carinish Road Option Assessment Summary

## 5.1 Process

Following the Minister’s Assessment and IAC findings from the Environment Effects Statement (EES) process, the City of Monash held a Council Meeting on 27 September 2022 which in Item 1.6 Attachment 2 outlined their position below:

*“No closure of Carinish Road unless appropriate mitigation provided. Unless the adverse impacts on local streets and accessibility are properly mitigated, Carinish Road should remain open in construction and operation and the station box shifted northward, if required, to accommodate this.”*

To address the findings and taking into consideration Council’s position, SRLA undertook the process shown in Figure 5.1.



FIGURE 5.1 DESIGN DEVELOPMENT PROCESS

## 5.2 Long List of Options

Eight potential options in addition to the Baseline were identified during the initial option development. These options were:

- 0. Baseline – Carinish Road closed
- 1. Reinstate Carinish Road in current configuration

2. Carinish Road closed with Shandeanu Avenue modifications
3. Carinish Road shared zone
4. Carinish Road open with pedestrian priority
5. Haughton Road closed
6. New Carinish Road / Haughton Road intersection
7. Lillian Street connection
8. Carinish Road realignment.

**5.2.1 BASELINE – CARINISH ROAD CLOSED**

As displayed in Figure 5.2, Carinish Road (west) is to be closed between Clayton Road in the east and a new street (Station Street) to the west. Carinish Road will operate one-way eastbound between the rail underpass and Station Street. The closed section of Carinish Road will be converted to public realm. Vehicular access to the precinct will be via a new street (Station Street) accessible via Carinish Road from the west or Haughton Road from the east. Accessible permit parking and accessible PuDo/CPV spaces will be located on the northern side of Haughton Road and the western side of Station Street.



**FIGURE 5.2 BASELINE – CARINISH ROAD CLOSED LAYOUT**

Key advantages / opportunities of the Baseline are:

- Contiguous and integrated public realm with the station surrounds. Additional 1,100m2 of public space.
- Improved Clayton Road performance due to removal of intersection leg.
- Deter potential rat running between North Road and Clayton Road.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed.

Key constraints / issues of the Baseline are:

- Restricted PuDo access from Clayton Road for either arrival or departure.

- Redistribution of local traffic and increased flows on some local residential streets. Estimated an additional 500 vehicles per day use Madeleine Road.
- Limited Right Turn movements from existing residential pocket.
- Convoluted access for emergency services to SRL Station.

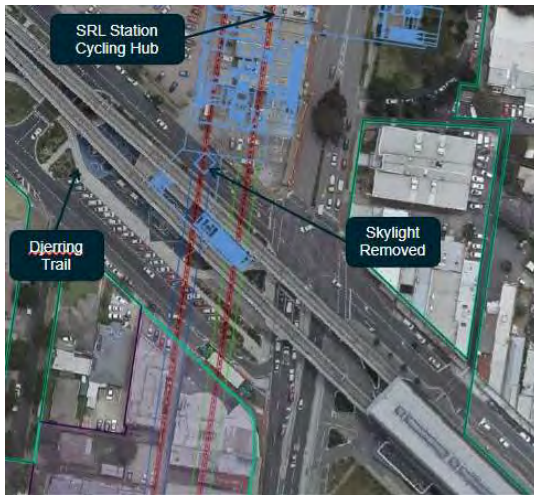
Cost:

- Baseline per funding submission (\$\$).

### 5.2.2 OPTION 1 – REINSTATE CARINISH ROAD IN CURRENT CONFIGURATION

As displayed in Figure 5.3, the existing roads and connectivity would remain in their existing configurations at Rail Day One, with opportunities to stage implementations and road closures in the future subject to movement demand changes.

Carinish Road would remain open for two-way traffic and to retain full directional vehicle movements at the intersection with Clayton Road.



**FIGURE 5.3 OPTION 1 – REINSTATE CARINISH ROAD IN CURRENT CONFIGURATION LAYOUT**

Key advantages / opportunities of Option 1 are:

- Maintenance of existing local access to surrounding local streets.
- Supported by Local Council.
- Improved access to PuDo with opportunity to locate some on Carinish Road.
- Improved access for emergency services to SRL Station.

Key constraints / issues of Option 1 are:

- Loss of future public realm / open space of ~1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.

- Less efficient connection of SRL Station cycling facilities to Djerring Trail and doesn't prioritise the north/south connectivity.
- Requires removal of skylight and associated impact to wayfinding within SRL Station (potential other options).
- Reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Reduced Clayton Road performance due to reinstatement of intersection leg.
- Does not prioritise pedestrian movements or amenity (non-compliance to UDS). Breaks link between north south precinct.

Cost:

- Lower than Baseline (\$).

### 5.2.3 OPTION 2 – CARINISH ROAD CLOSED WITH SHANDEAU AVENUE MODIFICATIONS

Carinish Road (west) is to be closed between Clayton Road in the east and a new street (Station Street) to the west. The closed section of Carinish Road will be converted to public realm. Accessible permit parking and accessible PuDo/CPV spaces will be located on the northern side of Haughton Road and the western side of Station Street.

As displayed in Figure 5.4, the signalised intersection of Shandea Avenue would be modified to allow vehicles to turn right from Shandea Avenue and head south along Clayton Road.



**FIGURE 5.4 OPTION 2 – CARINISH ROAD CLOSED WITH SHANDEAU AVENUE MODIFICATIONS LAYOUT**

Key advantages / opportunities of Option 2 are:

- Improved right turn movements from existing residential pocket. Can be implemented early on so that improvements are realised during the construction period.
- Contiguous and integrated public realm with the station surrounds. Additional 1,100m<sup>2</sup> of public space.

- Maintain Clayton Road performance due to removal of intersection leg.
- Maintain pedestrian safety via reduced number of traffic lanes to be crossed.

Key constraints / issues of Option 2 are:

- Restricted PuDo access from Clayton Road for either arrival or departure.
- Some redistribution of local traffic and increased flows on some local residential streets and reductions on other local residential streets.
- Convoluted access for emergency services to SRL Station.
- Potential parking modifications on Shandeanu Avenue to facilitate intersection upgrade.

Cost:

- Baseline + Intersection Modifications(\$\$\$).

#### 5.2.4 OPTION 3 – CARINISH ROAD SHARED ZONE

As displayed in Figure 5.5, Carinish Road (west) would be converted to a shared zone between Clayton Road in the east and a new street (Station Street) to the west.

Accessible permit parking and accessible PuDo/CPV spaces would be located on the northern side of Haughton Road and the western side of Station Street.

Shared zone could operate two-way or one-way eastbound.

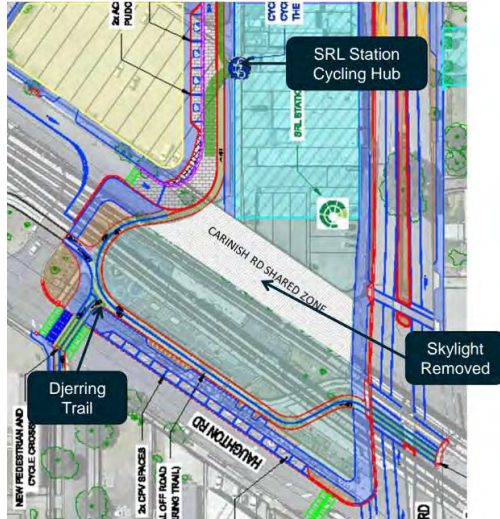


FIGURE 5.5 OPTION 3 – CARINISH ROAD SHARED ZONE LAYOUT

Key advantages / opportunities of Option 3 are:

- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Improved access to PuDo with opportunity to locate some on Carinish Road.

- Improved access for emergency services to SRL Station.

Key constraints / issues of Option 3 are:

- Compromised scenario that has limited benefit for pedestrians or motorists. Shared zone has effective capacity of ~1000 vehicles/day, and would likely not be approved by DTP due to not meeting the warrants for traffic volumes. PuDo volumes need to be considered.
- Less convenient environment for pedestrians, with reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Loss of future public realm/open space of <1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Poorer connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Reduced Clayton Road performance due to reinstatement of intersection leg.

Cost:

- Similar to Baseline (\$\$).

#### 5.2.5 OPTION 4 – CARINISH ROAD OPEN WITH PEDESTRIAN PRIORITY

As displayed in Figure 5.6, Carinish Road (west) would remain open to traffic, but with a reduced cross-section between Clayton Road in the east and a new street (Station Street) to the west. A wide pedestrian crossing facility could be provided.

Accessible permit parking and accessible PuDo/CPV spaces would be located on the northern side of Haughton Road and the western side of Station Street.

Carinish Road could operate two-way or one-way eastbound.

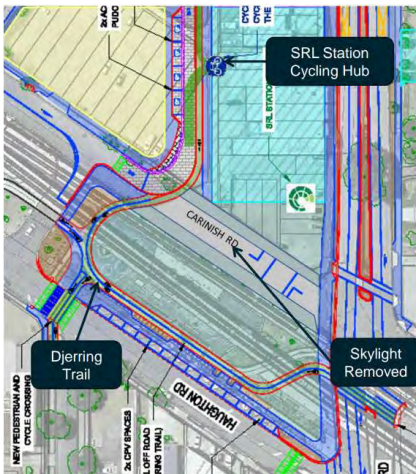


FIGURE 5.6 OPTION 4 – CARINISH ROAD OPEN WITH PEDESTRIAN PRIORITY LAYOUT

Key advantages / opportunities of Option 4 are:

- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Potential to stage closure of Carinish Road as the precinct evolves.
- Improved access to PuDo with opportunity to locate some on Carinish Road.
- Improved access for emergency services to SRL Station.

Key constraints / issues of Option 4 are:

- Less convenient environment for pedestrians, with reduced pedestrian safety via additional number of traffic lanes to be crossed.
- Loss of future public realm / open space of <1,100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Reduced Clayton Road performance due to reinstatement of intersection leg with potential for queuing issues associated with pedestrian crossing.

Cost:

- Similar to Baseline (\$\$).

### 5.2.6 OPTION 5 – HAUGHTON ROAD CLOSED

As displayed in Figure 5.7, Carinish Road would allow for two-way traffic along its length and full directional turning movements at its intersection with Clayton Road.

Haughton Road (west) would be closed between Clayton Road in the east and Nicholson Court to the west. The closed section of Haughton Road would be converted to public realm.

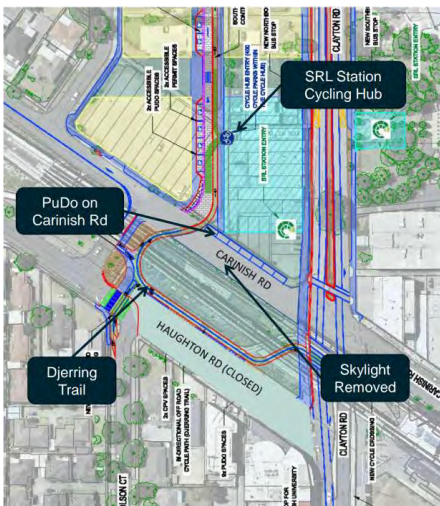


FIGURE 5.7 OPTION 5 – HAUGHTON ROAD CLOSED LAYOUT

Key advantages / opportunities of Option 5 are:

- Aligned with Council Clayton Precinct Plan 2020.
- Maintenance of existing local access to surrounding local streets and reduced redistribution to local streets.
- Provides PuDo parking in proximity to station.
- Improved access for emergency services to SRL Station.
- Provides comparable sized provision of public realm/open space.

Key constraints / issues of Option 5 are:

- Restricted PuDo access from Clayton Road for either arrival or departure.
- Public realm/open space not connected to SRL Station.
- Reduced priority for connection of SRL Station cycling facilities to Djerring Trail.
- Requires removal of skylight and associated impact to wayfinding within SRL Station.
- Reduced Clayton Road performance due to reinstatement of intersection leg, however, a left-in / left-out intersection leg is removed from Clayton Road at Haughton Road.
- Potentially reduced loss of service access for businesses on Haughton Road, however service access still maintained through rear laneway access.

Cost:

- Higher than Baseline (\$\$\$).

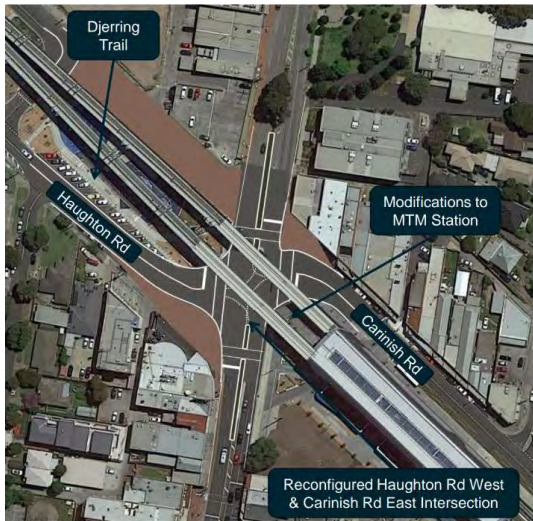
#### 5.2.7 OPTION 6 – NEW CARINISH / HAUGHTON ROAD INTERSECTION

As displayed in Figure 5.8, Carinish Road east would be connected to Haughton Road west via a new signalised intersection at Clayton Road.

Carinish Road (west) would be closed to vehicular traffic and the space converted to public realm, as per the reference design.

Connection into the station precinct would be via Station Street, as per the reference design.





**FIGURE 5.8 OPTION 6 – NEW CARINISH ROAD / HAUGHTON ROAD INTERSECTION LAYOUT**

Key advantages / opportunities of Option 6 are:

- Maintenance of existing local access to surrounding local streets.
- Improved access for emergency services to SRL Station.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed.
- Large provision of connected open space / public realm.
- Connection of SRL Station cycling facilities to Djerring Trail.

Key constraints / issues of Option 6 are:

- Restricted PuDo access on either arrival or departure.
- Substantial impact to Djerring Trail users crossing Clayton Road.
- Reduced Clayton Road performance due to reinstatement of intersection leg.
- Additional disruption on east side of Clayton Road at MTM Station.
- Severs the North/South connection between major precinct elements hospital to activity centre.
- Impact to bus stops on Clayton Road southbound.

Cost:

- Significantly higher than Baseline (\$\$\$\$).

### 5.2.8 OPTION 7 – LILIAN STREET CONNECTION

As displayed in Figure 5.9, a new connection from Lilian Street to Clayton Road would be provided for general traffic.



**FIGURE 5.9 OPTION 7 – LILIAN STREET CONNECTION LAYOUT**

Key advantages / opportunities of Option 7 are:

- Improved PuDo access.
- Improved local access from streets to west.
- Maintains public realm / open space near Station entrance.
- Improved access for emergency services to SRL Station.

Key constraints / issues of the Option 7 are:

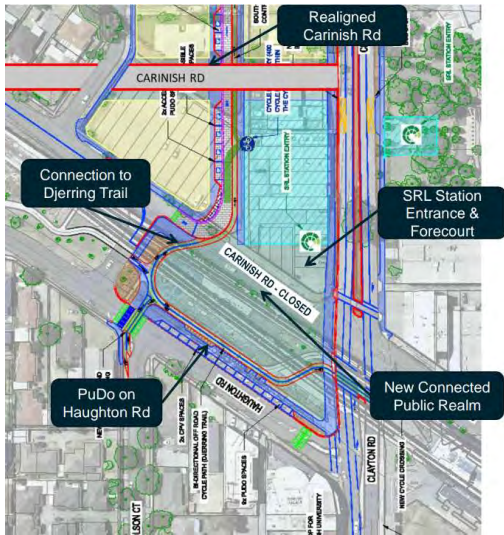
- Not technically feasible - Steep incline with grades of ~10% between laneway and Clayton Road non-compliant.
- Loss of DDA Access at northern end of Station site.
- May sever important east west-cycle and pedestrian link.
- Potential concerns from residents due to redistribution of traffic to local streets.
- Reduced Clayton Road performance due to new intersection.
- Potential visual impact to northern residential neighbours.

Cost:

- Higher than Baseline cost (\$\$\$).

### 5.2.9 OPTION 8 – CARINISH ROAD REALIGNMENT

As displayed in Figure 5.10, realignment of Carinish Road from a point west of Madeleine Road and a connection to Clayton Road in the vicinity of the Remembrance Gardens.



**FIGURE 5.10 OPTION 8 – CARINISH ROAD REALIGNMENT LAYOUT**

Key advantages / opportunities of Option 8 are:

- Maintains public realm / open space south of Station entrance.
- Improved pedestrian safety via reduced number of traffic lanes to be crossed from south.
- Improved PuDo access.
- Improved local access from streets to west.

Key constraints / issues of Option 8 are:

- Additional property acquisitions Works outside of SRL East Project boundary.
- Loss of public realm north of Station building.
- Reduced Clayton Road performance due to new intersection.
- Loss of skylights at Concourse.
- Will divide the precinct to north & south of new Carinish Road.

Cost:

- Higher than baseline cost (\$\$\$\$).

### 5.3 Long List of Options Initial Assessment

An initial assessment of the long list of options was undertaken. The assessment is shown below in Table 5.1.

**TABLE 5.1 LONG LIST OF OPTIONS INITIAL ASSESSMENT**

Option	Connectivity				Liveability			Cost	Discussion / Status
	Local Road Access	PuDo	Ped. & Cycle Access & Safety	Clayton Road Performance	Public Open Space	Station Wayfinding	Urban Design Strategy		
Baseline – Carinish Rd Closed	✗	✗	✓	✓	✓	✓	✓	\$\$	Investigate other options relative to baseline
1 – Reinstate Carinish Rd in Current Configuration	✓	✓	✗	✗	✗	✗	✗	\$	Dismiss. Significant impact to Station Precinct & Safety
2 – Carinish Rd Closed with Shandeanu Ave Mods	—	✗	✓	✓	✓	✓	✓	\$\$\$	Investigate Further
3 – Carinish Rd Shared Zone	✓	✓	✗	✗	—	✗	—	\$	Dismiss. Volumes not within Shared Zone Limits
4 – Carinish Rd Open w/ Pedestrian Priority	✓	✓	—	✗	—	✗	—	\$	Investigate Further. UDS and early UDAP engagement
5 – Haughton Rd Closed	✓	✗	—	✗	—	✗	✗	\$\$\$	Dismiss. High cost with minimal benefits
6 – New Carinish / Haughton Intersection	✓	—	✗	✗	✓	✓	✗	\$\$\$\$	Dismiss. Significant impact to Djerring Trail
7 – Lillian Street Connection	✓	—	✗	—	✓	✓	✗	\$\$\$	Dismiss. Not technically feasible due to grades
8 – Carinish Road Realignment	✓	✓	—	✗	—	✗	—	\$\$\$\$	Dismiss. Further property acquisition for minimal benefits

## 5.4 Long List of Options Recommendations and Next Steps

Following the initial assessment of the long list of options, it was recommended that the following options be short listed:

- Baseline – Carinish Road closed.
- Option 2 – Carinish Road closed with Shandeanu Avenue modifications.
- Option 4 – Carinish Road open with pedestrian priority.

The following next steps were recommended:

- Option 4 to be further developed and preferred layout confirmed prior to the MCA.
- Baseline and Option 2 have been previously developed and did not require further design work at this stage.
- Review and assessment of the proposed PuDo location on Haughton Road and alternate locations to identify if access could be improved.

## 5.5 Short List of Options

### 5.5.1 BASELINE - CARINISH ROAD CLOSED

Refer to Section 5.2.1 for detail of the baseline

### 5.5.2 OPTION 2 - CARINISH ROAD CLOSED WITH SHANDEAU AVENUE MODIFICATIONS

Refer to Section 5.2.3 for detail of the baseline

### 5.5.3 OPTION 4 - CARINISH ROAD OPEN WITH PEDESTRIAN PRIORITY

Following the short listing of Option 4, further investigation was undertaken to consider the ideal layout. This included:

- Traffic access:
  - a) Local access including the right turn onto Clayton Road from the residential pocket
  - b) PuDo access.
  - c) Strategic road network.
- UDS requirements for:
  - d) Provision of public realm near station entrance (forecourt).
  - e) UDS requirement for prioritising pedestrian movement.
- Pedestrian and cycling safety near new high activity area.

A summary of the investigation is provided in Appendix A.

Following the investigation, Option 4 included a one-way eastbound traffic lane on Carinish Road allowing for the right turn from Carinish Road to Clayton Road towards the south as displayed in Figure 5.11. This was the only turning movement not provided in the baseline and seeks to minimise potential traffic volumes by limiting vehicle access/movements

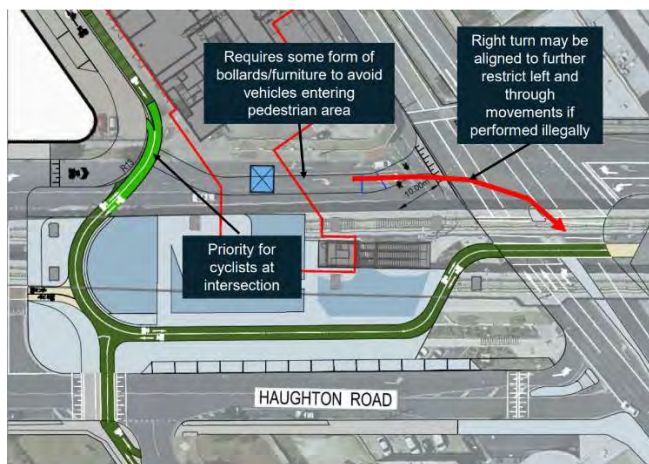


FIGURE 5.11 OPTION 4 – CARINISH ROAD OPEN ONE-WAY EASTBOUND

## 5.6 Multi-Criteria Analysis (MCA) Assessment of Short List of Options

Option 2 and Option 4 were assessed against the Baseline as part of the MCA of the short list of options for Carinish Road. A summary of the MCA is displayed in Table 5.2 shows that Option 2 was the preferred option over the Baseline and Option 4.

Option 2 was assessed as being an improvement on the Baseline due to:

- Providing improved connections and linkage to the south/east (by car only).
- Reduced travel time for vehicle trips originating to the west of Clayton Road seeking to access destinations to the south along Clayton Road.
- Implementation of the right turn is an advantage for local residents - reduced travel time for local residents and simpler trip.
- Improved wayfinding for vehicle trips originating within the station precinct and to the west of Clayton Road seeking to access destinations to the south along Clayton Road via Shandeanu Avenue.

Option 4 was assessed as performing worse than the Baseline due to:

- Requires protection to avoid errant vehicles entering pedestrian areas
- High volume of pedestrians, cyclists and some bus passengers must cross the traffic lane.
- Potential for unsafe and traffic disruptive practices such as the possibility of people stopping very near station and dropping off.
- Limits the ability to provide the public realm set out in the Urban Design Strategy. Road creates barrier within the public realm between the station forecourt and recreational space.

**TABLE 5.2 MCA SUMMARY**

	Option 2 - Closed with Shandeanu Ave mods	Option 4 - Open with pedestrian priority
Connectivity		
Productivity		
Liveability		
Deliverability		
Total Score		

Key	
Better than base case	
Same/equal to base case	
Worse than base case	

## 5.7 Carinish Road Assessment Recommendation

Option 2, introduction of a right turn at Shandeanu Avenue for residents was recommended as the preferred option following the MCA for inclusion in the Reference Design.

The following next steps were recommended:

- Review and assessment of the proposed PuDo location on Houghton Road and alternate locations to identify if access could be improved which is summarised in Section 5.8.

## 5.8 PuDo Location Assessment

In addition to assessing Carinish Road options, the location of the PuDo were assessed to identify if additional locations for PuDo at Clayton would better serve passengers and enable access from all locations.

The assessment included:

- Site suitability (i.e. current use and ease of conversion).
- Vehicle accessibility.
- Distance to SRL station entry.
- Multi-modal use.
- Stakeholder impacts.

### 5.8.1 CURRENT SRL PUDO PROPOSAL AND EXISTING MTM PUDO

MTM currently has 2 PuDo bays located on Carinish Road east and SRL have proposed for PuDo to be located on the northern verge of Houghton Road west with DDA bays in the new Station Street as displayed in Figure 5.12

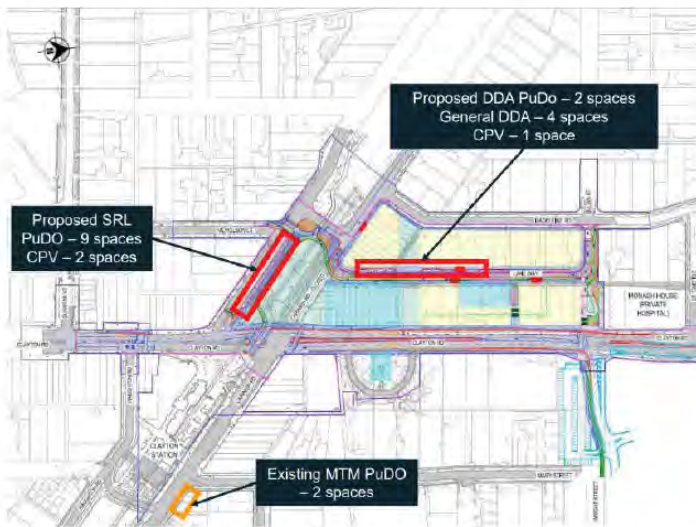


FIGURE 5.12 CURRENT SRL PUDO PROPOSAL AND EXISTING MTM PUDO

### 5.8.2 PUDO LOCATION ASSESSMENT

Five potential sites were assessed for the PuDo as displayed in Figure 5.13 with the summary of the assessment displayed in Table 5.3.



FIGURE 5.13 ASSESSMENT PU DO LOCATIONS

TABLE 5.3 ASSESSMENT OF PU DO LOCATIONS

Location	Current Use	Proposed PuDo Use	Pros	Cons
1. Haughton Road West – southern verge	2P (8am-6pm Mon-Sat)	Converted to AM and PM Peak PuDo 2 bays minimum	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Opposite the proposed PuDo on the northern verge</li> <li>Identified as a potential location for future PuDo expansion for 2051</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Limited spaces due to private driveways</li> <li>May be issue with proximity to residential properties, businesses and Nikotsaras Club</li> </ul>
2. Clayton Road East – northern verge	15 mins (all day) – 1P (8am-7pm M-F & 8am-1pm Sat) 2 mins – 4P (shared with RRB)	Converted to AM and PM Peak PuDo 7 bays west of Mary St 5 bays east of Mary St	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Can be used for SRL, MTM and bus interchange</li> <li>Identified as a potential location for future PuDo expansion for 2051</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in 15mins and/or 1P by approximately 1 hour in the AM and 2 hours in the PM</li> <li>2 mins, 15 mins and 4P parking bays are outside the EES boundary</li> </ul>
3. Mary Street – western verge	5 mins (8-9am & 3-4pm SD) – 1P (8am-6pm M-F & 8am-1pm Sat)	1P converted to AM and PM Peak PuDo 7 bays	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Majority of parking is 1P between Clayton Hall and Carinish Road</li> <li>5 min parking could be extended through 1P between 6-8am and 4-6pm</li> <li>Access to SRL via laneway next to Clayton Hall</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Narrow residential street</li> <li>Proximity to school PuDo</li> <li>Outside the EES boundary</li> </ul>
4. Carinish Road East – southern verge	No limit	Converted to AM and PM Peak PuDo 9 bays	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Used as park n ride overflow</li> </ul>	<ul style="list-style-type: none"> <li>Distance from SRL station</li> <li>Potential stakeholder issue if Community Centre patrons use parking</li> <li>Greater than 200m from the SRL station entry and outside EES boundary</li> </ul>
5. Clayton Road	No standing kerbside traffic lane	In-lane parking bays during AM and PM Peak Limited	<ul style="list-style-type: none"> <li>Adjacent to SRL station building</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Requires relocation of station box to accommodate indented parking bays</li> <li>Kerbside lane utilised by multiple bus routes and includes bus stops</li> <li>Indented bays may increase gradient for ped/cycle links</li> </ul>
6. Remembrance Gardens	SRL station eastern entry public plaza/Clayton Hall access	AM and PM Peak PuDo within Gardens on access lane Limited	<ul style="list-style-type: none"> <li>Adjacent to the SRL station eastern entry</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Potential conflict between pedestrians and vehicles</li> <li>May not be available subject to Clayton Hall use/events</li> <li>Could be perceived further reduction of park/memorial</li> </ul>



### 5.8.3 PUDO LOCATION ASSESSMENT SUMMARY

The existing location of PuDo requires circuitous access for vehicles from north and east which alternative locations on Carinish Road east (northern verge) and Mary Street may address. Dispersing PuDo across multiple locations provides greater choice for passengers to access the station and will assist in providing for the 2051 requirement of 18 parking spaces (total includes the 9 parking spaces provided at Rail Day One).

It was noted that Carinish Road east (northern verge) is partially outside and Mary Street is entirely outside the EES Project Land boundary.

### 5.8.4 PUDO LOCATION RECOMMENDATION

It was recommended that the alternate locations on Carinish Road east (northern verge) and Mary St assessed through the MCA operating in conjunction with Haughton Road. These locations were included in each of the Carinish Road short listed options.

Additional PuDo locations to be investigated further on northern verge of Carinish Road east and on Mary Street for ease of access from all directions of travel.

## 6 Preferred Solution

Figure 6.1 displays the preferred option from the assessment, Carinish Road (west) is to be closed between Clayton Road in the east and the new street (Station Street) to the west converted to public realm

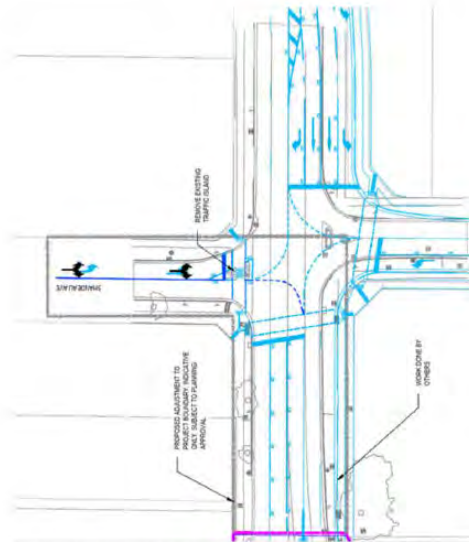


**FIGURE 6.1 PREFERRED CARINISH ROAD OPTION**

The following sections detail design changes and safety implications of the preferred option.

### 6.1 Shandeanu Avenue Right Turn

Following the MCA, Option 2 for the closure of Carinish Road (west) with a modification of Shandeanu Avenue was adopted as the preferred option. As displayed in Figure 6.2, the current left turn only lane will be converted to a combined left and right turn lane on the western leg of the Shandeanu Avenue/Clayton Road/Dixon Street intersection.



**FIGURE 6.2 PREFERRED SHANDEAU AVENUE/CLAYTON ROAD/DIXON STREET INTERSECTION LAYOUT**

## 6.2 Pedestrian Safety

The closure of Carinish Road (west) between Clayton Road and the new street (Station Street) introduces an additional 1,100m<sup>2</sup> of contiguous and integrated public realm with the station surrounds and place making opportunities.

The introduction of the additional public realm allows for improved pedestrian safety by providing for approximately 1,340 pedestrians per hour generated by rail in 2041 and approximately 2,540 pedestrians per hour by 2056 in the AM Peak. Overall pedestrian volumes are expected to be higher as these volumes do not include bus and taxi only passengers, pedestrians using the public realm in general as a thoroughfare or to visit or work in a nearby business. The volumes do not include rail-to-rail transfers who pass below Carinish Road as part of the paid area connection.

Pedestrians will have a reduced number of traffic lanes to cross by the closure of Carinish Road (west). This includes pedestrians not having to cross any traffic lanes between the PuDo on Houghton Road and the SRL Clayton Station entrance.

It is noted that a proposal for Houghton Road between Clayton Road and the Link Road to improve pedestrian connectivity to the Clayton Activity Centre has been developed. This option is currently at a concept design stage and requires further design development.

There are no pedestrian connections impacted by the modifications to Shandeu Avenue.

## 6.3 PuDo Location

Dispersing PuDo further by adding alternate locations on Carinish Road east (northern verge) and Mary Street will provide greater choice for passengers and improves ease of access. These locations are proposed to operate in conjunction with the PuDo located on Houghton Road with passengers able to access the SRL Clayton Station at entrances either side of Clayton Road. Note, a separate assessment detailing the proposed locations of PuDo spaces across all SRL East stations is currently being undertaken.

## 7 Traffic Modelling

### 7.1 Traffic Modelling Assessment

Traffic modelling was used to assess the impact of closing Carinish Road and the effects of providing an additional right turn movement at Shandeanu Avenue. Table 7.1 details traffic modelling used to assess the traffic impacts and diversions of traffic, as well as the key findings for each model.

**TABLE 7.1 TRAFFIC MODELLING SOFTWARE USED IN ASSESSMENTS**

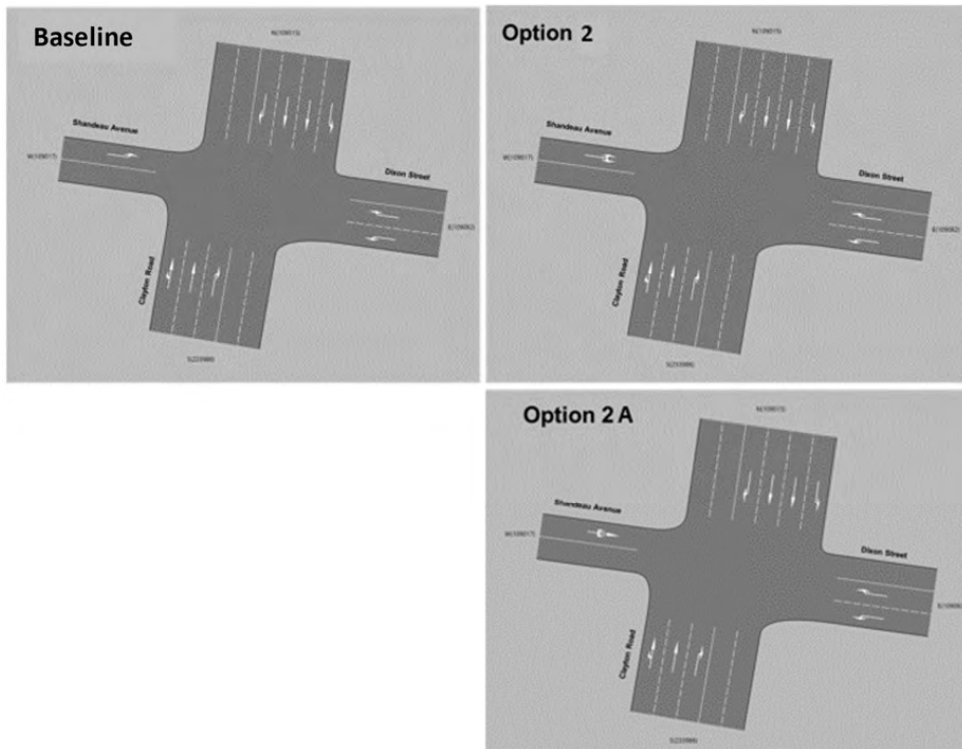
Model	Considered in assessment	Description of modelling
<b>VISUM meso-level</b>	Documented in Section 7.2 <ul style="list-style-type: none"> <li>Changes in traffic volumes.</li> <li>Input to VISSIM model.</li> </ul>	Considers wider area traffic redistribution to capture traffic re-assignment impacts as a result of Carinish Road Closure and provision of a right turn from Shandeanu Avenue (Option 2). Provides an assessment of the wider impacts of additional traffic on roads in the area. Provides updates to the VISSIM corridor model and how traffic demand alters for routes not captured or represented in the model.
<b>VISSIM microsimulation</b>	Document in Section 7.3 <ul style="list-style-type: none"> <li>Corridor and intersection performance</li> <li>Travel times</li> </ul>	Simulation of individual vehicles to understand operational impacts of network and traffic volume changes along corridors and interaction of vehicles between successive intersections. Used to assess travel time along Clayton Road and level of service and queuing at individual intersections
<b>SIDRA Intersection</b>	Documented in Section 7.4 <ul style="list-style-type: none"> <li>Detailed intersection operation, queue lengths</li> </ul>	Used to assess the operation of Clayton Road / Shandeanu Avenue / Dixon Street intersection, to assist in determining intersection capacity, signal timings and queue lengths.

### 7.2 VISUM Modelling

As part of the Shandeanu Avenue right turn investigation Options 2 and 2A were tested in VISUM by introducing the right turn and through movement on Shandeanu Avenue as shown in Table 7.2. The updated geometry of these options is provided in Figure 7.1.

**TABLE 7.2 SHANDEANU AVENUE OPTIONS TESTED**

No	Location	Description	Year 2041		
			Baseline	Option 2	Option 2A
1	Clayton Road / Dixon Street / Shandeanu Avenue Intersection	Shandeanu Avenue left turn	✓	✓	✓
2		Shandeanu Avenue right turn movement	✗	✓	✓
3		Shandeanu Avenue through movement	✗	✗	✓



**FIGURE 7.1 CLAYTON ROAD/DIXON STREET/SHANDEAU AVENUE INTERSECTION GEOMETRY**

Based on the VISUM modelling carried out for Option 2, no traffic used the Shandeanu Avenue through movement to Dixon Street. This is logical as this movement only allows vehicular access between a predominately residential area and medical facilities on Dixon Street. Consequently, Option 2A is not considered further within the analysis that follows.

### 7.2.1 DEMAND GENERATION

The standard procedure for deriving demand involves recalculating matrices in the Victorian Integrated Transport Model (VITM) with the introduction of the right-turn. This would then subsequently be adopted to derive peak hour demands in the SRL VISUM mesoscopic model to ultimately feed into the VISSIM microsimulation model.

An alternative method has been adopted in this modelling exercise whereby the right-turn was first introduced in the SRL VISUM model, with the outputs from here then directly inputted into the VISSIM model. This was done by way of reviewing a select link analysis from the VISUM modelling and applying it as an origin-destination (OD) pair as additional trips in the AM and PM peak hour VISSIM model for Clayton.

Figure 7.2 and Figure 7.3 shows the Shandeanu Avenue select link plots for the Baseline and Option 2 respectively. The plots detail where vehicles on the Shandeanu Avenue eastbound are expected to travel to during the AM and PM peaks.

During the AM peak, traffic volumes on Shandeanu Avenue are low in the Baseline with only one vehicle expected to turn left onto Clayton Road. With a right turn movement provided traffic volumes are expected to increase to approximately 50 vehicles, all would be expected to turn right from Shandeanu Avenue.

During the PM peak, traffic volumes on Shandean Avenue are higher than the AM peak hour, with around 5 vehicles turning left onto Clayton Road. With a right turn movement provided, traffic volumes are forecast to increase to approximately 117 vehicles, all forecast to turn right out from Shandean Avenue. The increase in right turners in both peak periods disperse quickly throughout the surrounding road network, with any impact to residents effectively imperceptible.

In both periods the models show that the small number of left turners that were present in the Baseline no longer use this route when the right turn is added; they exit the residential area west of Clayton Road via routes that separate them from right turning traffic.

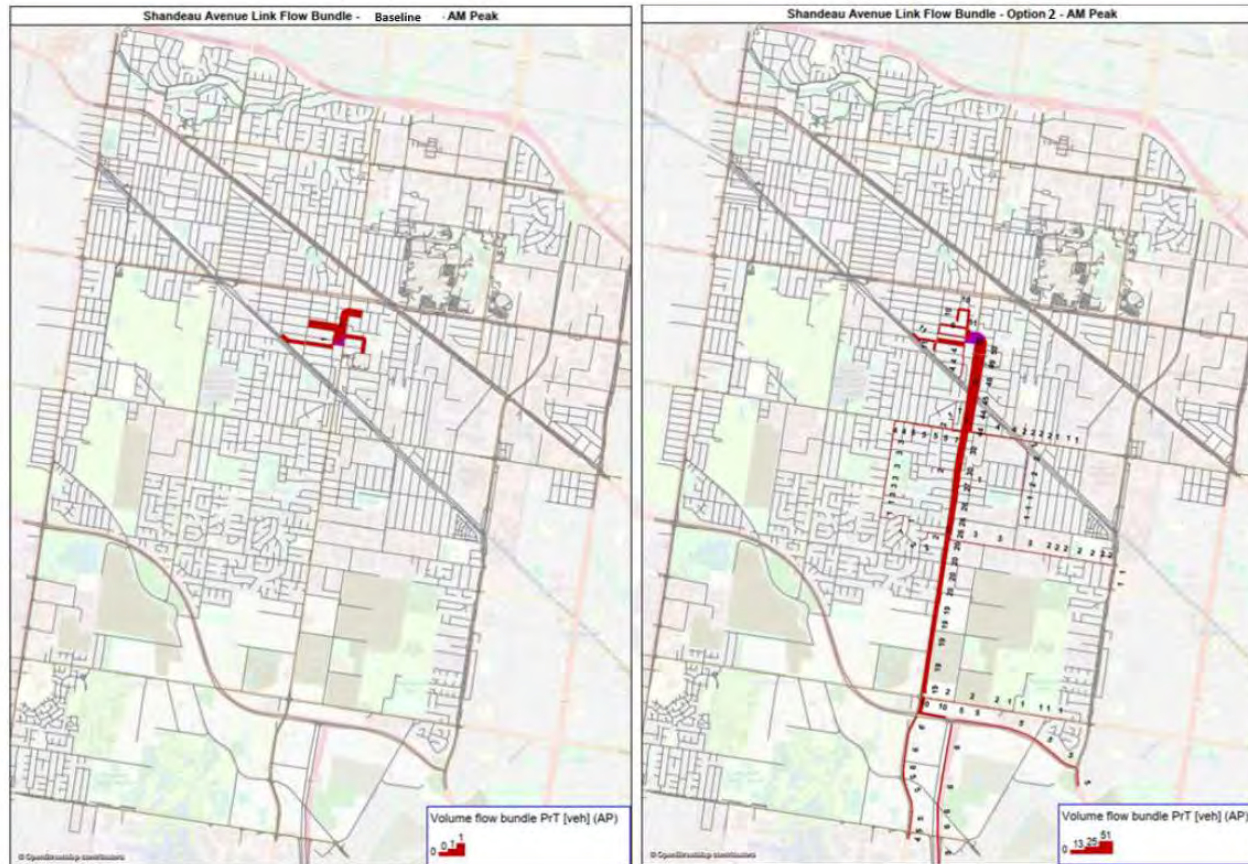


FIGURE 7.2 SHANDEAU AVENUE LINK FLOW BUNDLE PLOTS – BASELINE VS OPTION 2 – AM

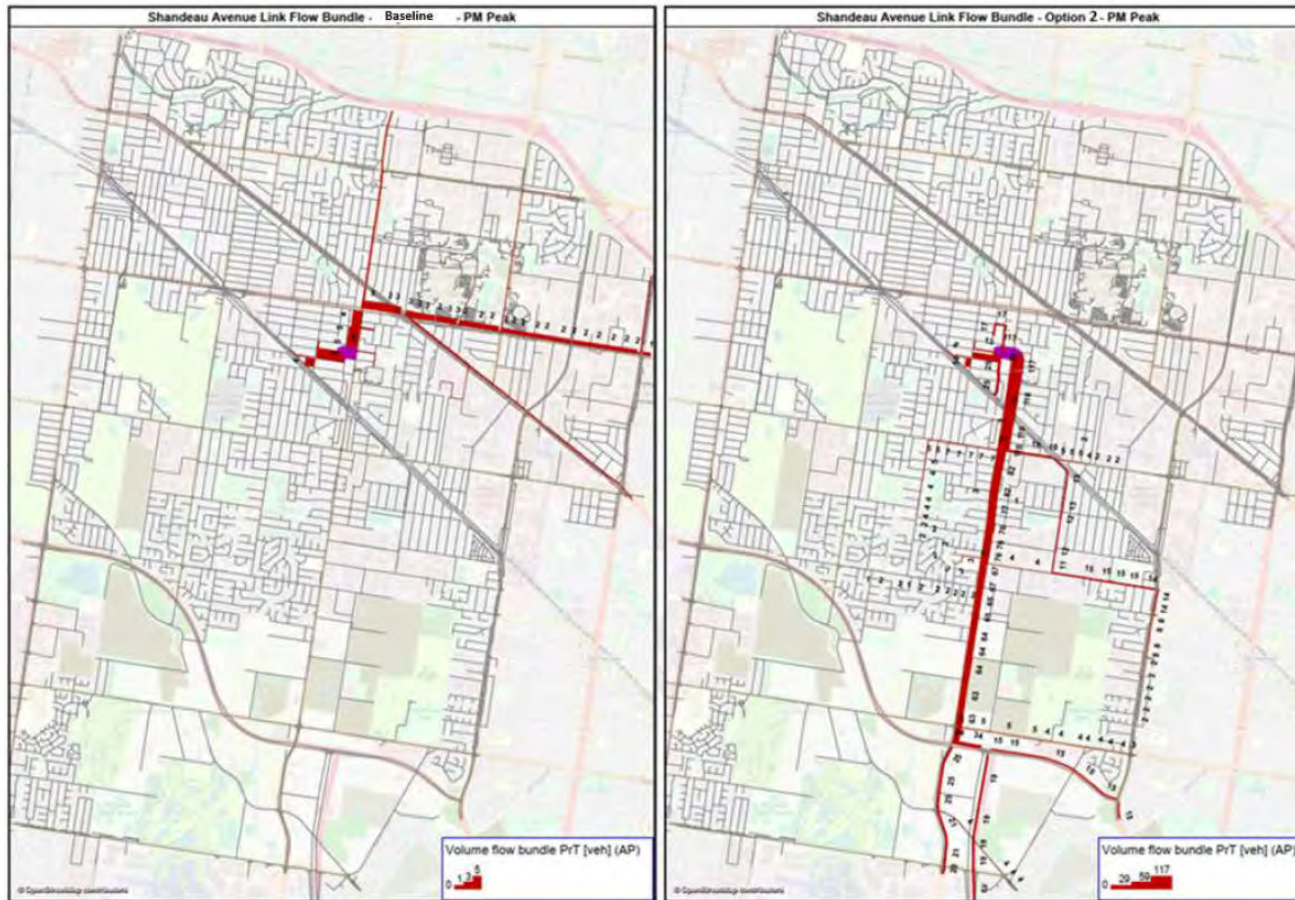


FIGURE 7.3 SHANDEAU AVENUE LINK FLOW BUNDLE PLOTS – BASELINE VS OPTION 2 – PM



**Residential Exit Routes Analysis**

Select links have been produced to analyse the traffic on links that exit the area enclosed by the Cranbourne-Pakenham Railway Line, North Road and Clayton Road. This analysis demonstrates the relative magnitude of traffic using each exit route.

Table 7.3 shows the number of vehicles exiting by each route in three scenarios: No SRL, Baseline and Option 2 with the right-turn at Shandeanu Avenue. This displays how routing out of this area changes firstly when Carinish Road is closed to traffic and then what happens when a right turn is permitted at the Clayton Road / Dixon Street / Shandeanu Avenue intersection.

Note, Table 7.3 and the tables found in Appendix C are intended to show different data sets. Table 7.3 shows the demand flows only generated by residents leaving the area enclosed by the Cranbourne-Pakenham Railway Line, North Road and Clayton Road, while the tables found in Appendix C is an extract from the model for demand flows across the broader network.

**TABLE 7.3 SUMMARY OF LOCAL TRAFFIC EXIT ROUTES**

Time Period	Scenario	Road Name					Total Exiting
		Shandeanu Avenue	Colonel Street	Carinish Road	Houghton Road (east and west)	Milgate St / Colin Rd / Flora Rd / Banksia St	
AM	No SRL	13	31	129	42	225	<b>440</b>
	Baseline	2	40	-	141	267	<b>450</b>
	Option 2	50	32	-	127	242	<b>451</b>
PM	No SRL	33	110	361	59	265	<b>828</b>
	Baseline	17	178	-	318	346	<b>859</b>
	Option 2	122	127	-	311	301	<b>861</b>

The table shows the total number of vehicles exiting the area is consistent between scenarios, suggesting no rat-running activity when Carinish Road is closed, or when a right-turn is allowed at Shandeanu Avenue.

The relative volumes of vehicles using each exit route differs between scenarios. When Carinish Road is closed, traffic that previously used this route re-distributes to Houghton Road and the collection of roads exiting to North Road. Shandeanu Avenue sees an increase in traffic when SRL East is opened as a result. When a right turn is provided from Shandeanu Avenue, there is an increase expected of up to 120 vehicles per hour (PM Peak) on Shandeanu Avenue. The extra traffic using this exit is re-routed from other roads fairly evenly with no one exit route seeing a substantial decrease as a result.

The right turn at Shandeanu Avenue enables another option for turning south on to Clayton Road for residents and eliminates the need for drivers to make seemingly dangerous and illogical turns to access Clayton Road southbound, whilst reducing delay. This is demonstrated by the use of a route that goes via Colonel Street, left on to Clayton, then immediately right into the Monash Medical Centre and then u-turning back to left turn on to Clayton Road southbound. This is a movement carried out in the Baseline model and shows a demand for right turns from the residential area and that other available routes are less attractive. The right turn at Shandeanu Avenue caters for this demand, removing the need for u-turning on Clayton Road.

With the Carinish Road closure, it is evident from Figure 7.4 that there are minor increases in traffic along Madeleine Road, Shandeanu Avenue, Thompson Street (eastbound) and Flora Road. Subsequently, there are minor decreases in traffic along Clayton Road, Carinish Road and Colonel Street. It should be noted that in both the AM and PM peak periods, Prince Charles Street (south of Faulkner Street) and Faulkner Street experience

increases in traffic when travelling away from Clayton Station, due to some redistributed traffic from Carinish Road utilising this corridor as an alternate route.

All volumes will remain within the theoretical estimated environmental capacity as shown in Table 3.3 and expected to have no impact on the residential amenity of the street network. For a list of volume changes across all relevant roads within the local network, refer to Appendix C.

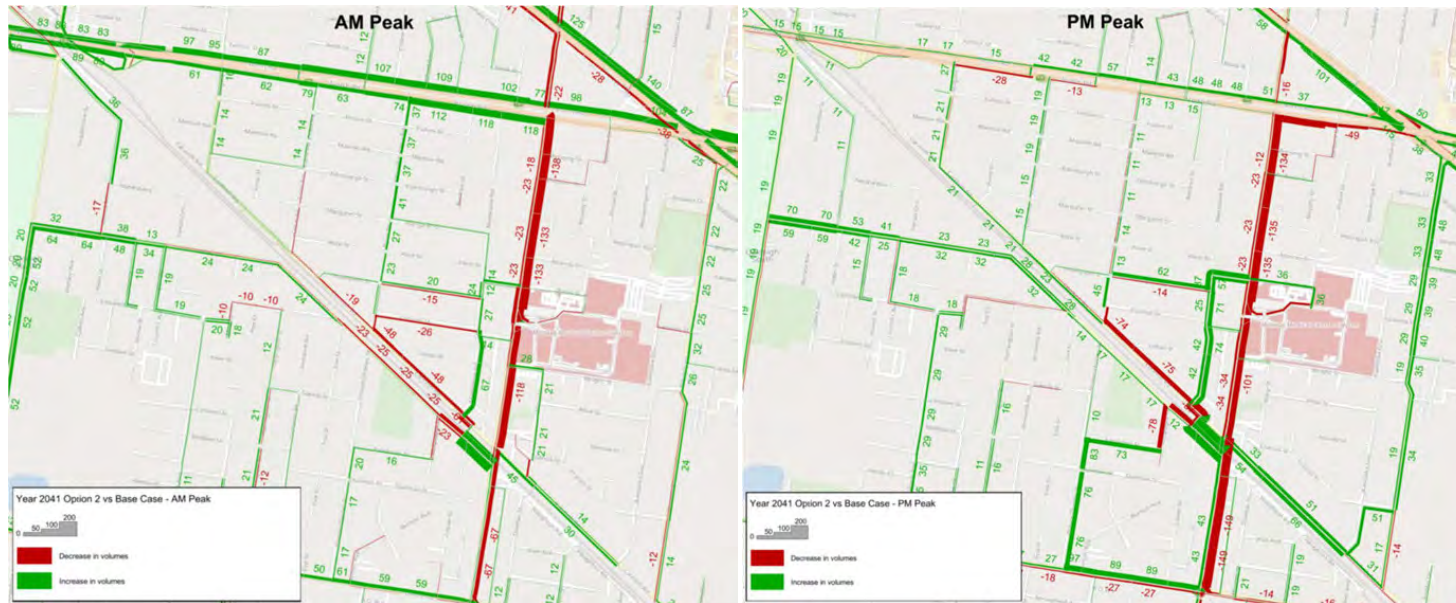


FIGURE 7.4 VOLUME CHANGE PLOTS – NO SRL VS. OPTION 2 (VOLUME PER HOUR)

## 7.3 VISSIM Modelling

### 7.3.1 MODEL DEVELOPMENT

The model adopted to serve as the base for this sensitivity was the *2041 Project Case Clayton VISSIM Model - Updated Monash Hospital Sensitivity*, with the model extents shown in Figure 7.7. This model was chosen because it best reflects the traffic generation and network conditions induced with respect to the proposed southern access point off Clayton Rd for the Monash Medical Centre. Former models previously omitted future demand to/from the proposed southern access point. Moreover, it also features the Clayton Road / Dixon Street / Shandeanu Avenue intersection in its "as-built" layout.



**FIGURE 7.7 CLAYTON VISSIM MODEL EXTENTS (2041 PROJECT CASE VISSIM MODEL – UPDATED MONASH HOSPITAL SENSITIVITY)**

The development of the VISSIM model for this right-turn sensitivity scenario involved updating vehicle demands based on the VISUM modelling to represent traffic rerouting to Shandeanu Avenue. Amendments to the Clayton VISSIM model network and operations include the following:

- Introduction of right-turn traffic demand from Shandeanu Avenue from the CLA-MON-SSY VISUM model (as explained in Section 7.2.1);
- Modifying the permitted movements out of Shandeanu Avenue to now include a shared left-right movement from a single lane;
- Amending the traffic signal phasing arrangements at the Clayton Road / Dixon Street / Shandeanu Avenue intersection to reflect the introduction of a right-turn movement; and

- Amending the signal timings of the intersection to accommodate an increase in departing traffic volumes from Shandeanu Avenue as a result of the introduced right-turn movement.

These amendments constitute the Option 2 scenario.

- The following assumptions and limitations are noted in developing this right-turn sensitivity scenario VISSIM model:
- Queuing constraints on Shandeanu Avenue have not been specified in this model, so that the model outputs can provide indicative values on expected demand queue lengths;
- The right-turning demand out of Shandeanu Avenue has been derived from the Monash-Clayton-Southern Stabling Yard VISUM model;
- No change to existing signalised pedestrian crossing arrangements; and
- Signal timings and phasing arrangements are preliminary and it is recommended they be subject to optimisation by a SCATS engineer to achieve a balance between yielding a sufficient green corridor along Clayton Road while managing right-turning traffic demand across all legs.

### 7.3.2 MODEL LAYOUT AND SIGNAL PHASING

Figure 7.8 shows a screenshot from the 2041 VISSIM model of the road layout and lane assignment of the existing signalised intersection (Baseline with no right-turn) and Option 2 (introduction of right-turn).



**FIGURE 7.8 CLAYTON VISSIM MODEL LAYOUT AT THE CLAYTON RD / DIXON ST / SHANDEAU INTERSECTION**

The signal phasing arrangements developed to incorporate a right-turn movement out of Shandeanu Avenue are shown in Figure 7.9. This features one additional phase compared to the signal phasing arrangements for the 2041 Baseline. The signals will rest on Phase A (the pivot phase) until a demand is detected on either the east leg (Dixon St), west leg (Shandeanu Avenue) or right-turn detectors on Clayton Road, at which point the signals will switch to an appropriate alternative phase. Further details on the development and application of signal timings and phases for the Clayton SRL VISSIM model can be read in the *Clayton Application Report*.

### 7.3.3 MODEL RESULTS

This section compares the results of the 2041 Baseline and 2041 Option 2 VISSIM model scenarios. Specifically, results of the induced delay, average queue lengths, level of service (LoS) and travel times at the Clayton Rd / Dixon St / Shandeanu Avenue intersection are discussed.

Consistent with the reporting of outputs in the SRL East EES, the results presented herein are representative of one-hour peak periods. For Clayton these are:

- AM Peak Hour: 8:00AM – 9:00AM
- PM Peak Hour: 5:30PM – 6:30PM

#### 7.3.4 AM PEAK RESULTS

An additional 45 vehicles (approximately) to the west approach across the peak hour are expected to utilise Shandeanu Avenue to perform a right-turn. The results suggest that this will have an overall minor impact on Clayton Road, and specifically the Clayton Road / Dixon Street / Shandeanu Avenue intersection in the AM peak.

##### **AM Peak Travel Times**

Travel times for the AM peak for general traffic and buses are presented in Table 7.7.

General traffic travel times along Clayton Road remain virtually unchanged. An increase of 4 seconds and 7 seconds in the northbound and southbound directions respectively is observed in the 2041 Option 2 scenario. The closure of Carinish Road is not expected to not encounter any significant travel time increases within the network.

Bus travel times experience a slight increase in the 2041 Option 2 scenario. This is seen;

- a) Along the northbound direction of Clayton Road; and
- b) For bus routes which require to cross or merge with southbound traffic.

With respect to a), the additional right phase time now assigned to Shandeanu Avenue is increasing the delay buses are encountering at the south approach of the Clayton Road / Dixon Street / Shandeanu Avenue intersection.

With respect to b), the increase in southbound through traffic along Clayton Road added from Shandeanu Avenue is increasing the green through time along Clayton Road southbound, thereby forcing buses to dwell longer for an appropriate headway gap to merge into the traffic stream.

The increase in travel times do not exceed an average of 60 seconds and is not deemed significant in the context of the bus routes timetabled trip time.

##### **AM Peak Average Delay, Level of Service, Queues**

With respect to the north and south approaches of Clayton Road, Table 7.5 shows that the average level of service remains unchanged and at an acceptable performance level in the 2041 Option 2 scenario. This includes the right-turn level of service from the north and south approach, which at a level of service D, also remains unchanged despite the reduced frequency of actuation across the hour.

The east (Dixon Street) and west (Shandeanu Avenue) legs of the intersection experience a slight decrease in performance, but still fall to an acceptable level for a peak period assessment. Average delays on the east leg increase by 7 seconds and sees the LoS degrade from C to D. However, given the delays reported are averages, this decrease is deemed to be negligible.

There was an increase of approximately 11 seconds on Shandeanu Avenue in the 2041 Option 2 scenario. This is expected given the additional demand this leg is now attracting due to the new right-turn and whereby vehicles are required to share the traffic lane with left-turning vehicles as well. The delay triggers are decrease

in level of service from C to D, however over the 1-hour period, the average queue lengths remain short, not exceeding 10m.

### 7.3.5 PM PEAK RESULTS

An additional 120 vehicles (approximately) to the west approach across the peak hour are expected to utilise Shandeanu Avenue to perform a right-turn.

However, the impacts do not yield congested traffic conditions and the network is seen to be able to manage the additional demand and operate within the capacity of the roads.

#### PM Peak Travel Times

Travel times for the PM peak for general traffic and buses are presented in Table 7.8.

General traffic travel times along Clayton Road see a slight average increase of 8 seconds and 19 seconds per vehicle in the northbound and southbound directions respectively for the 2041 Option 2 scenario. Given these are averages and that the increase in travel time would be imperceivable to a commuter, this is acceptable.

Bus travel times experience a slight increase in the 2041 Option 2 scenario. This is seen;

1. Along the southbound direction of Clayton Road; and
2. For bus routes which require to cross or merge with southbound traffic.

With respect to #1, the additional right phase time now assigned to Shandeanu Avenue is increasing the delay buses are encountering at the north approach of the Clayton Road / Dixon Street / Shandeanu Avenue intersection. This general increase in travel time flows onto segments further south of the Clayton Road / Dixon Street / Shandeanu Avenue intersection (southbound direction). It is noted that the changes to the signal phasing impact southbound flow as coordination could be potentially lost. As the Clayton Road / Dixon Street / Shandeanu Avenue intersection is at the northern extent of the model, there are no effect in the northbound direction however there is greater impact on southbound at multiple intersections.

With respect to #2, the increase in right-turning traffic from Shandeanu Avenue is increasing the delay on northbound traffic along Clayton Road for buses caught in general traffic platoons.

The increase in travel times do not exceed an average of 60 seconds and is not deemed significant in the context of the bus routes timetabled trip time.

#### PM Peak Average Delay, Level of Service, Queues

With respect to the north and south approaches of Clayton Road, Table 7.6 shows that the average level of service changes from A to C and A to B respectively in the 2041 Option 2 scenario. This is largely driven by the change in level of service for specifically the through northbound movements which are being inhibited by the increased green time now being allocated to release right (and left) turning vehicles from Shandeanu Ave. The southbound vehicles are being affected in a similar way, but to a lesser extent due to lower volumes in the PM peak (counter-peak direction).

Table 7.4 is an extract from the Department of Transport and Planning (DTP) Transport Modelling Guidelines (Volume 5), outlining average delay figures that correspond to a level of service grade. DTP Transport Modelling Guidelines stipulate that *future year deliver should allow for an experience that is no worse than a level of service E*. Furthermore, the decrease in level of service with respect to the north and south approaches of Clayton Road are deemed to be well within the acceptable range, as outlined in the DTP Transport Modelling Guidelines (Volume 5).

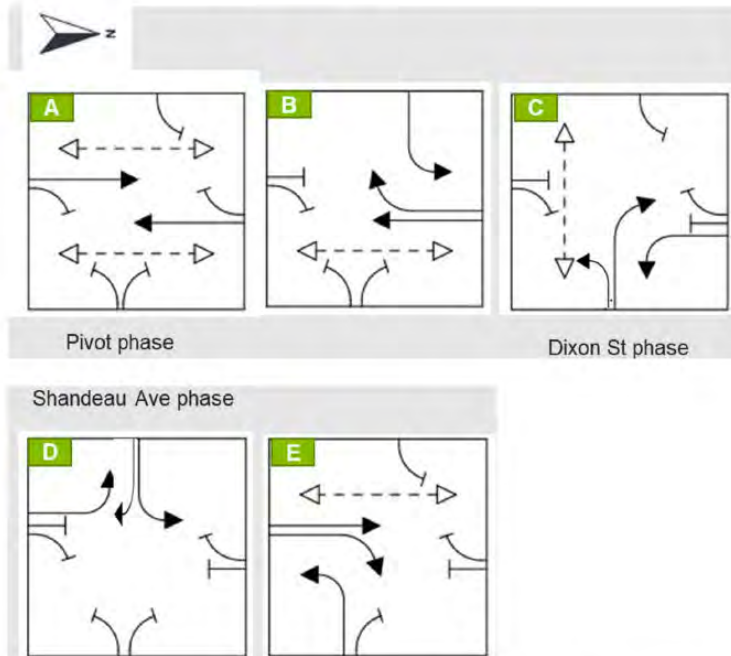
**TABLE 7.4 LEVEL OF SERVICE GRADES – INTERSECTION PERFORMANCE MEASURES BASED ON PER PERSON DELAY**

Level of Service grade	Average delay per person (s)	
	Signalised intersections	Sign controlled intersections
A	< 10	< 10
B	10 < 20	10 < 15
C	20 < 35	15 < 25
D	35 < 55	25 < 35
E	55 < 80	35 < 50
F	80 +	50 +

Source: Department of Transport and Planning – Transport Modelling Guidelines Volume 5: Intersection Modelling (2020), Table 36

The right-turn level of service from the north and south approach, which at a level of service D, remains unchanged despite the reduced frequency of actuation across the hour. The east (Dixon Street) and west (Shandeanu Avenue) legs of the intersection remain virtually unaffected. Average delays on the east leg increase by 2 seconds and sees the LoS degrade from C to D. The delays reported are averages and hence this decrease is deemed to be negligible.

Similarly, Shandeanu Avenue sees little to no change in average delays, with the results indicating an overall decrease in delays of approximately 3 seconds in the 2041 Option 2 scenario. This result may seem at odds with the increase in traffic movements, however, it is likely explained by the traffic signal logic attempting to clear what it detects is a slightly higher demand for that leg. As a result, it is likely providing a green time close to the maximum green time specified for that phase. The average queue length is for the right turn movement is seen to be the longest at approximately 11m.



**FIGURE 7.9 2041 OPTION 2 MODELLED SIGNAL PHASING ARRANGEMENTS FOR THE CLAYTON RD / DIXON ST / SHANDEAU AVE INTERSECTION**



**TABLE 7.1 AM PEAK – 2041 BASELINE VS 2041 OPTION-2 - DELAY, LEVEL OF SERVICE AND AVERAGE QUEUE LENGTHS**

Intersection Name	Approach Name	Movement Name	2041 Baseline Updated					2041 Project Case Option Two										
			Avg. Delay (s)	Avg. Queue (m)	Max. Queue (m)	LoS	Tot. Vehicles	Approach Delay (s)	Approach Avg. Queue (m)	Approach LoS	Avg. Delay (s)	Avg. Queue (m)	Max. Queue (m)	LoS	Tot. Vehicles	Approach Delay (s)	Approach Avg. Queue (m)	Approach LoS
Clayton Rd / Shandean Ave / Dixon St	South	Left	10	13	100	B	42	16	13	B	11	8	93	A	42	19	15	B
		Thru	9	13	100	A	671				11	16	95	B	676			
		Right	44	13	100	D	169				51	16	95	D	173			
	East	Left	26	2	19	C	42	30	2	C	29	3	26	C	42	37	3	D
		Thru	-	-	-	-	-				-	-	-	-	-			
		Right	37	3	16	O	26				42	3	26	D	26			
	North	Left	6	13	96	A	155	12	15	B	9	23	148	A	156	18	23	B
		Thru	11	13	96	B	1,109				17	23	148	B	1,116			
		Right	48	13	96	D	74				46	23	148	D	73			
	West	Left	34	2	19	C	46	34	2	C	38	7	33	D	46	45	7	D
		Thru	-	-	-	-	-				-	-	-	-	-			
		Right	-	-	-	-	-				52	7	33	D	45			
<b>Overall</b>			-	<b>10</b>	<b>100</b>	-	<b>2,334</b>	<b>14</b>	-	<b>B</b>	-	<b>13</b>	<b>148</b>	-	<b>2,394</b>	<b>20</b>	-	<b>B</b>

**TABLE 7.2 PM PEAK – 2041 BASELINE VS 2041 OPTION-2 - DELAY, LEVEL OF SERVICE AND AVERAGE QUEUE LENGTHS**

Intersection Name	Approach Name	Movement Name	2041 Baseline Updated					2041 Project Case Option Two										
			Avg. Delay (s)	Avg. Queue (m)	Max. Queue (m)	LoS	Tot. Vehicles	Approach Delay (s)	Approach Avg. Queue (m)	Approach LoS	Avg. Delay (s)	Avg. Queue (m)	Max. Queue (m)	LoS	Tot. Vehicles	Approach Delay (s)	Approach Avg. Queue (m)	Approach LoS
Clayton Rd / Shandean Ave / Dixon St	South	Left	9	7	106	A	97	10	7	A	13	6	82	B	98	15	10	B
		Thru	8	7	106	A	695				14	10	82	B	695			
		Right	45	7	106	D	40				46	10	82	D	40			
	East	Left	31	7	54	C	122	33	7	C	30	8	57	C	120	35	8	D
		Thru	-	-	-	-	-				-	-	-	-	-			
		Right	36	7	54	D	70				44	8	57	D	68			
	North	Left	7	9	72	A	30	9	9	A	13	22	141	B	30	20	22	C
		Thru	8	9	72	A	1,068				20	22	141	B	1,061			
		Right	52	9	72	D	23				48	22	141	D	23			
	West	Left	45	3	26	D	48	45	3	D	33	11	64	C	49	42	11	D
		Thru	-	-	-	-	-				-	-	-	-	-			
		Right	-	-	-	-	-				45	11	64	D	116			
<b>Overall</b>			-	<b>7</b>	<b>106</b>	-	<b>2,193</b>	<b>12</b>	-	<b>B</b>	-	<b>13</b>	<b>141</b>	-	<b>2,300</b>	<b>21</b>	-	<b>C</b>

TABLE 7.3 AM PEAK – 2041 BASELINE VS 2041 OPTION 2 – GENERAL TRAFFIC AND BUS TRAVEL TIME

Route	Direction	Section Starts	Section Ends	2041 Baseline Updated (Monash Hospital Sensitivity), seconds per vehicle	2041 Baseline Option 2 (Monash Hospital Sensitivity), seconds per vehicle
Clayton Rd General Traffic Travel Times	Northbound	Linda Street	Centre Road	51	55
		Centre Road	POS at No 373	26	25
		POS at No 373	Dunstan Street	28	31
		Dunstan Street	Haughton Road	9	9
		Haughton Road	Carinish Road	29	28
		Carinish Road	POS at No 275	30	32
		POS at No 275	Monash Medical Centre	19	14
		Monash Medical Centre	Dixon Street	17	19
	<b>Northbound Total</b>			<b>210</b>	<b>214</b>
	Southbound	Dixon Street	Monash Medical Centre	19	18
		Monash Medical Centre	POS at No 275	13	12
		POS at No 275	Carinish Road	55	54
		Carinish Road	Haughton Road	22	24
		Haughton Road	Dunstan Street	8	9
		Dunstan Street	POS at No. 373	27	24
POS No. 373		Centre Road	39	50	
Centre Road		Parson Street	21	21	
<b>Southbound Total</b>			<b>205</b>	<b>212</b>	
Clayton Rd Bus Travel Times	Northbound	Centre Road	Dixon St	254	289
	Southbound	Dixon Street	Centre Road	367	363
	Northbound & Southbound	Centre Road	Centre via Clayton MTM Bus Interchange	378	427

TABLE 7.4 PM PEAK – 2041 BASELINE VS 2041 OPTION 2 – GENERAL TRAFFIC AND BUS TRAVEL TIME

Route	Direction	Section Starts	Section Ends	2041 Baseline Updated (Monash Hospital Sensitivity), seconds per vehicle	2041 Baseline Option 2 (Monash Hospital Sensitivity), seconds per vehicle
Clayton Rd General Traffic Travel Times	Northbound	Linda Street	Centre Road	60	63
		Centre Road	POS at No 373	26	25
		POS at No 373	Dunstan Street	36	37
		Dunstan Street	Haughton Road	9	10
		Haughton Road	Carinish Road	23	21
		Carinish Road	POS at No 275	32	31
		POS at No 275	Monash Medical Centre	16	17
		Monash Medical Centre	Dixon Street	15	21
	<b>Northbound Total</b>			<b>217</b>	<b>225</b>
	Southbound	Dixon Street	Monash Medical Centre	16	18
		Monash Medical Centre	POS at No 275	13	20
		POS at No 275	Carinish Road	65	83
		Carinish Road	Haughton Road	24	23
		Haughton Road	Dunstan Street	8	8
		Dunstan Street	POS at No. 373	27	39
POS No. 373		Centre Road	70	91	
Centre Road		Parson Street	21	22	
<b>Southbound Total</b>			<b>244</b>	<b>305</b>	
Clayton Rd Bus Travel Times	Northbound	Centre Road	Dixon St	262	270
	Southbound	Dixon Street	Centre Road	428	484
	Northbound & Southbound	Centre Road	Centre via Clayton MTM Bus Interchange	449	484

## 7.4 SIDRA Analysis

As a follow-up to the VISSIM modelling, a high-level SIDRA analysis was undertaken for the Shandeanu Avenue intersection with and without the signalised right turn to Clayton Road. It is important to note that the model is not calibrated and isolated from the network, so the outputs would be less robust than the VISSIM microsimulation models which have coordinated signal phasing. The main purpose of the SIDRA model is to provide an outlook on the potential impacts to on-street parking on Shandeanu Avenue.

The following key assumptions were used in the SIDRA modelling:

- Traffic volumes are based off the VISSIM model and uses a peak flow period of 30 minutes.
- The Baseline and Baseline with Option 2 are modelled for the PM peak in 2041.
- Network layout (lane width) for the intersection is modelled based on the information available from design drawings.
- Lane storage and approach distances are determined from the latest aerial imagery of the site.
- Traffic signal phasing for the left and right turn option is taken from Figure 7.1. The phasing for the left turn only configuration is operated using the same phasing set but with one less phase (Phase D). The proposed phasing (Figure 7.1) is based on the current configuration for the intersection (SCATS Site 1836), only with Phases B and E swapped and Phase D omitted (given the current left turn only arrangement). Refer to Figure 7.11 for the current configuration extracted from the SCATS OpSheet (phase diagrams rotated with north at top of page).
- Signal cycle times use 90 and 150 seconds as the lower and upper limits respectively with 2 second increments. This is in line with the current signal phase at the Monash Medical Centre, which also uses 90 second cycle times.
- Signal coordination is set as favourable for the Clayton Road southern and northern approaches to align with the Monash Medical Centre / Clayton Road intersection located 100m south from the Clayton Road / Shandeanu Avenue intersection.
- Pedestrian volumes are using default values of 50 ped/hr due to lack of movement data. Sensitivity testing with 200 ped/hr was tested and outputs showed that the model was not very reactive to the higher pedestrian volumes, with little to no changes to the LoS, delay, queue lengths and travel time.
- All other parameters are set to default and determined by the software.

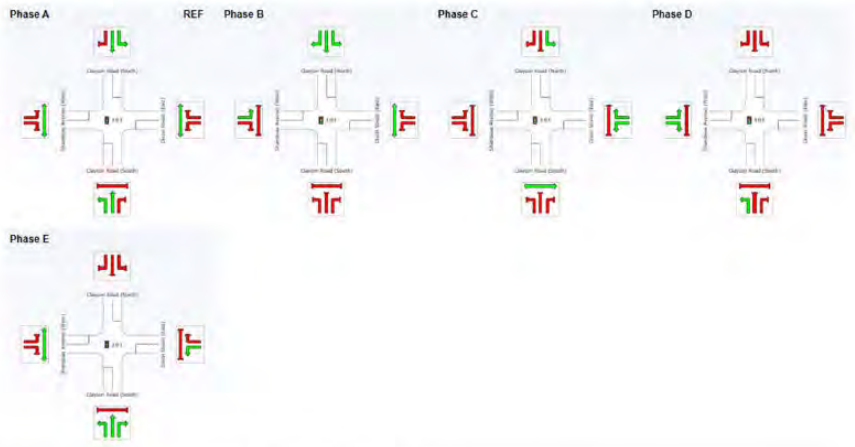


FIGURE 7.1 PROPOSED PHASING LAYOUT

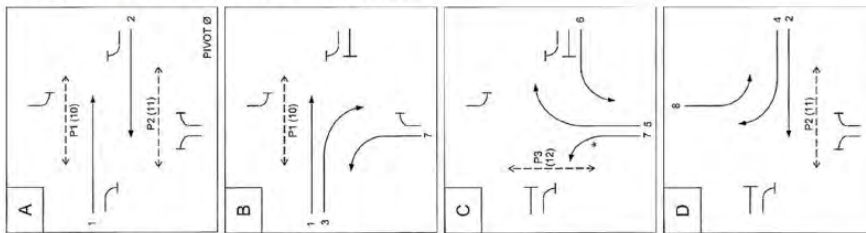


FIGURE 7.112 CURRENT PHASING LAYOUT

The intersection results for both options are presented in Table 7.11. Table 7.9 shows the intersection utilisation (Degree of Saturation) targets outlined in the DTP Transport Modelling Guidelines (Volume 5) for both signalised and unsignalised intersections. The guidelines also state that any Degree of Saturation (DoS) above 0.80 suggests that the intersection experiences a scale of congestion that requires attention and should be viewed as a prospective site for monitoring over time. Based on the results outlined in Table 7.10, none of the approaches in either option exhibit a DoS that is greater than the acceptable maximum of 0.85 (Table 7.9). Additionally, none of the approaches in either option yield a level of service (LoS) worse than E, meaning all approaches perform at an acceptable level as per DTP requirements listed in Table 7.4.

TABLE 7.5 DEGREE OF SATURATION (DOS) – INTERSECTION UTILISATION TARGETS

	Intersection Utilisation	
	Signalised intersections	Sign controlled intersections
Desirable	0.90	0.80
Maximum	0.95	0.85

Source: Department of Transport and Planning – Transport Modelling Guidelines Volume 5: Intersection Modelling (2020), Table 39

**TABLE 7.6 INTERSECTION PERFORMANCE RESULTS FOR SHANDEAU AVENUE / CLAYTON ROAD / DIXON STREET (2041 AM PEAK PERIOD)**

Scenario	Degree of Saturation (DoS)	Average Delay (sec/veh)	Level of Service (LOS)	95 <sup>th</sup> Percentile Queue Length (m)
<b>Baseline, existing design with SRL (left-in left-out at Shandeanu Avenue)</b>				
<b>Clayton Road (south approach)</b>	0.68	16	B	55
Left turn	0.37	14	B	43
Through movement	0.37	8	A	44
Right turn	0.68	47	D	55
<b>Dixon Street</b>	0.11	33	C	9
Left turn	0.07	27	C	9
Right turn	0.11	43	D	8
<b>Clayton Road (north approach)</b>	0.67	17	B	138
Left turn	0.13	10	B	17
Through movement	0.67	16	B	138
Right turn	0.39	48	D	24
<b>Shandeanu Avenue</b>	0.24	46	D	14
Left turn	0.24	46	D	14
<b>Option 2 – Shandeanu Avenue modifications (existing + right turn to Clayton Road)</b>				
<b>Clayton Road (south approach)</b>	0.83	36	D	115
Left turn	0.70	37	D	115
Through movement	0.70	31	C	115
Right turn	0.83	57	E	66
<b>Dixon Street</b>	0.12	34	C	10
Left turn	0.11	26	C	10
Right turn	0.12	47	D	8
<b>Clayton Road (north approach)</b>	0.80	26	C	191
Left turn	0.15	15	B	24
Through movement	0.80	27	C	185
Right turn	0.16	35	D	20
<b>Shandeanu Avenue</b>	0.64	36	D	21
Left turn	0.64	36	D	21
Right turn	0.64	36	D	21

**TABLE 7.7 INTERSECTION PERFORMANCE RESULTS FOR SHANDEAU AVENUE / CLAYTON ROAD / DIXON STREET (2041 PM PEAK PERIOD)**

Scenario	Degree of Saturation (DoS)	Average Delay (sec/veh)	Level of Service (LOS)	95 <sup>th</sup> Percentile Queue Length (m)
<b>Baseline, existing design with SRL (left-in left-out at Shandea Avenue)</b>				
Clayton Road (south approach)	0.38	9	A	39
Left turn	0.38	11	B	39
Through movement	0.38	6	A	39
Right turn	0.35	52	D	13
Dixon Street	0.31	38	D	33
Left turn	0.28	34	C	33
Right turn	0.31	44	D	22
Clayton Road (north approach)	0.52	12	B	109
Left turn	0.02	8	A	2
Through movement	0.52	11	B	109
Right turn	0.20	51	D	8
Shandea Avenue	0.41	51	D	16
Left turn	0.41	51	D	16
<b>Option 2 – Shandea Avenue modifications (existing + right turn to Clayton Road)</b>				
Clayton Road (south approach)	0.75	32	C	123
Left turn	0.75	35	D	123
Through movement	0.75	30	C	123
Right turn	0.35	52	D	13
Dixon Street	0.38	32	C	25
Left turn	0.38	25	C	25
Right turn	0.31	44	D	22
Clayton Road (north approach)	0.77	26	C	167
Left turn	0.03	14	B	4
Through movement	0.77	26	C	167
Right turn	0.08	40	D	7
Shandea Avenue	0.72	48	D	51
Left turn	0.72	48	D	51
Right turn	0.72	48	D	51

The SIDRA outputs indicate:

- Shandeanu Avenue is expected to have an increase in volume with the new right turn lane in Option 2 while maintaining LOS D and having similar average delays. All approaches in both scenarios operate within operational capacity and does not exceed LOS D in both scenarios.
- The added traffic signalling phase that accommodates the right turn movement on Shandeanu Avenue in Option 2 is expected to impact the queue lengths on both approaches on Clayton Road.
- The 95th percentile queue lengths for all approaches in both scenarios are within acceptable levels.
- It is noted that the 95th percentile queue length of 51m in Option 2 is less than half of the entire length of the road (110m) and that existing parking starts at around the same distance from Clayton Road. Parking on the northern side of Shandeanu Avenue further west towards Madeleine Road will need to be restricted (i.e. no stopping during peak periods), to prevent any potential congestion and conflicts. The Baseline does not have this issue as the 95th percentile queues are well clear of existing parking arrangements at 16m.

## 7.5 Comparison of VISSIM and SIDRA Outputs

The results from SIDRA are isolated to the intersection only and are compared with the VISSIM outputs which were coordinated with nearby intersections around the site area.

A comparison has been made between the VISSIM and SIDRA outputs, primarily on the queue lengths for the two scenarios in Table 7.12. Despite the difference from the outputs, it provides a reasonable indication of the range for typical queue lengths at the intersection.

**TABLE 7.8 VISSIM AND SIDRA COMPARISON, 2041 PM PEAK QUEUE LENGTHS**

Scenario	VISSIM Max Queue Length (m)	SIDRA Max Queue Length (m), 95 <sup>th</sup> Percentile queue in brackets
<b>Existing design with SRL (Left-in left-out at Shandeanu Avenue)</b>		
Clayton Road (South approach)	106	41 (39)
Dixon Street	54	35 (33)
Clayton Road (North approach)	72	115 (109)
Shandeanu Avenue	26	17 (16)
<b>Option 2 – Shandeanu Avenue modifications (existing + right turn to Clayton Road)</b>		
Clayton Road (South approach)	82	130 (123)
Dixon Street	57	27 (25)
Clayton Road (North approach)	141	176 (167)
Shandeanu Avenue	64	54 (51)

The results from the VISSIM and SIDRA models vary in terms of trends, due to SIDRA using the more conservative 30-minute peak flow factor, unlike the VISSIM profile which instead used the 60-minute peak flow factor.

Despite the differences in modelling methodologies, the queue lengths for Shandeanu Avenue appears to follow a trend with increased queue lengths when the right turn lane is introduced in both SIDRA and VISSIM. This could introduce an overlap with existing on street parking and implications for passing vehicles on occasion due to the width. of Shandeanu Avenue requiring either the removal of on street parking or introduction of restricted parking (i.e. no stopping during peak periods which is expected to have minimal impact on parking demand).



## 8 Conclusion

The assessment of Carinish Road options identified the following:

- The closure of Carinish Road (west) at Clayton Road to all traffic was the preferred layout to provide outcomes across a range of criteria.
- A right turn from Shandeanu Avenue at the Clayton Road / Dixon Street / Shandeanu Avenue intersection will provide a right turn for use by residents, mitigating impacts of closure of Carinish Road (west).
- Closure of Carinish Road (west) introduces an additional 1,100m<sup>2</sup> of contiguous and integrated public realm adjacent to the SRL Station and future place making opportunities, delivering pedestrian priority and increased safety.
- Dispersing PuDo further by adding alternate locations on Carinish Road east (northern verge) and Mary Street will provide greater choice for passengers and improves ease of access. Note, a separate assessment detailing the proposed locations of PuDo spaces across all SRL East stations is currently being undertaken.
- The traffic modelling assessment of closure of Carinish Road and introducing a right turn at Shandeanu Avenue confirmed:
- Travel times on Clayton Road are not increased significantly with the Carinish Road closure and new right turn at Shandeanu Avenue.
- Local residents would be the main users of the new right turn with other local roads experiencing an increase in traffic as motorists access Shandeanu Avenue. Considering the low number of vehicles that would be re-routed, it is expected the vehicles can be absorbed by multiple streets, resulting in no significant impact on the rest of the local street network.
- Forecast queuing on Shandeanu Avenue will likely require changes to parking restrictions (i.e. no stopping during peak periods which is expected to have minimal impact on parking demand).

No further parking issues (outside of Shandeanu Avenue) have been foreseen on the surrounding street network, however should an issue be identified at a later date, further investigation should be considered at that time.

The proposed closure of Carinish Road (west) allows for a high level of pedestrian safety by removing vehicles from directly outside of the SRL Clayton Station entrance including pedestrian walking from the PuDo and bus interchange/stops. The introduction of the right turn at Shandeanu Avenue mitigates the closure of Carinish Road (west) by providing the right turn for use by residents with no significant impact to the local street network. All other movements can be undertaken within the local street network.



## Appendix A

# Carinish Rd Assessment Summary

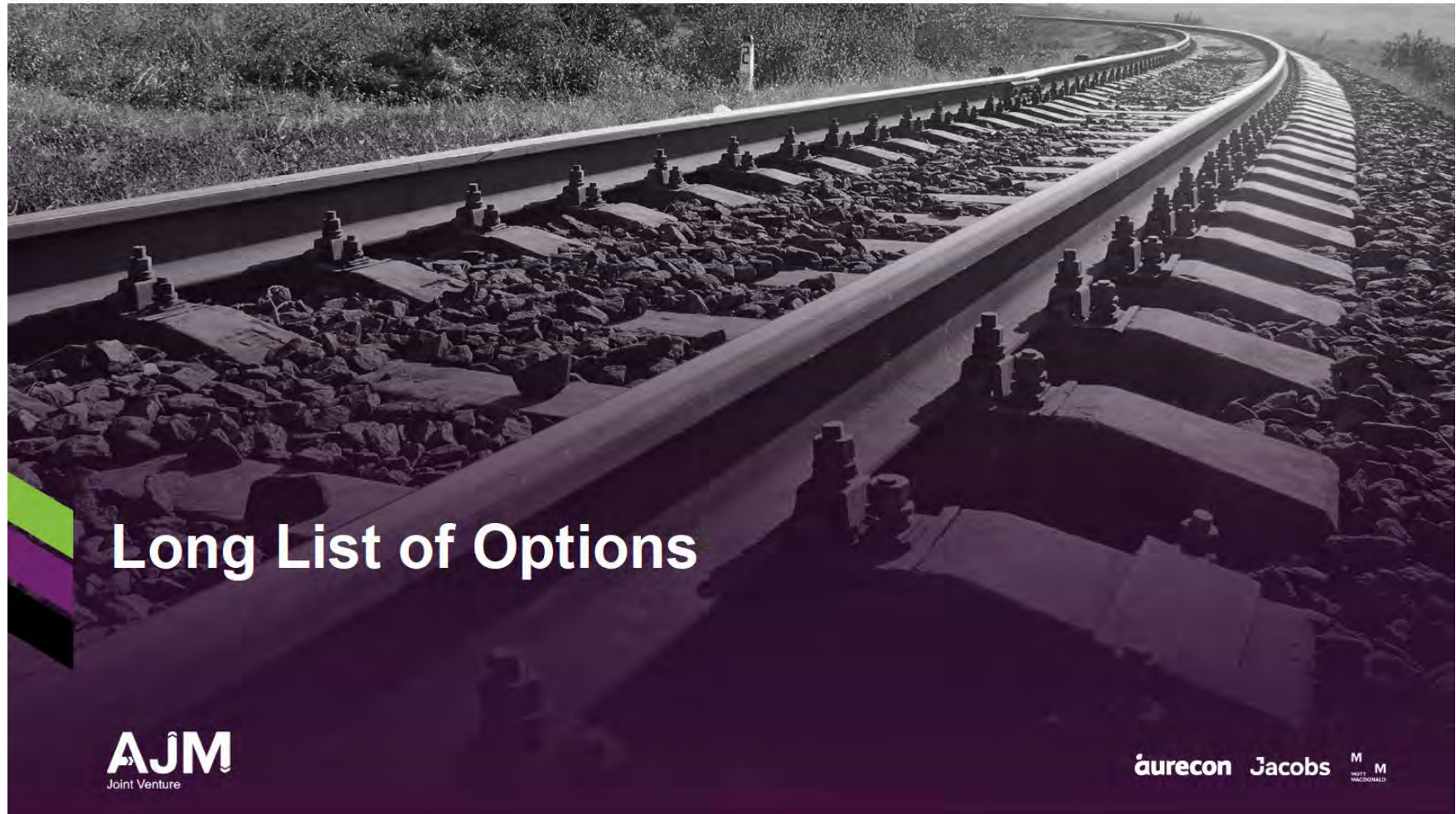




**Suburban Rail Loop (SRL)  
Carinish Road Assessment  
Summary Pack**

AJM Surface Transport





# Long List of Options

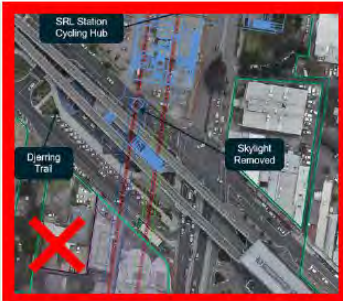
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**aurecon** **Jacobs** **M** **M**  
MOTT MACDONALD

## Long List of Options



**Baseline – Carinish Rd Closed**



**Option 1 – Reinstate Carinish Rd in Current Configuration**



**Option 2 – Carinish Rd Closed w/ Shandeanu Ave Mods**



**Option 3 – Carinish Rd Shared Zone**



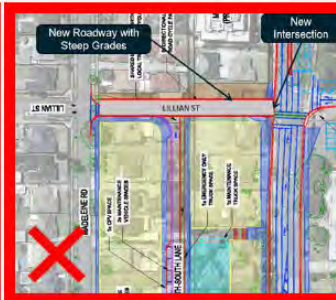
**Option 4 – Carinish Rd Open with Significant Pedestrian Priority**



**Option 5 – Haughton Rd Closed**



**Option 6 – New Carinish / Haughton Intersection**



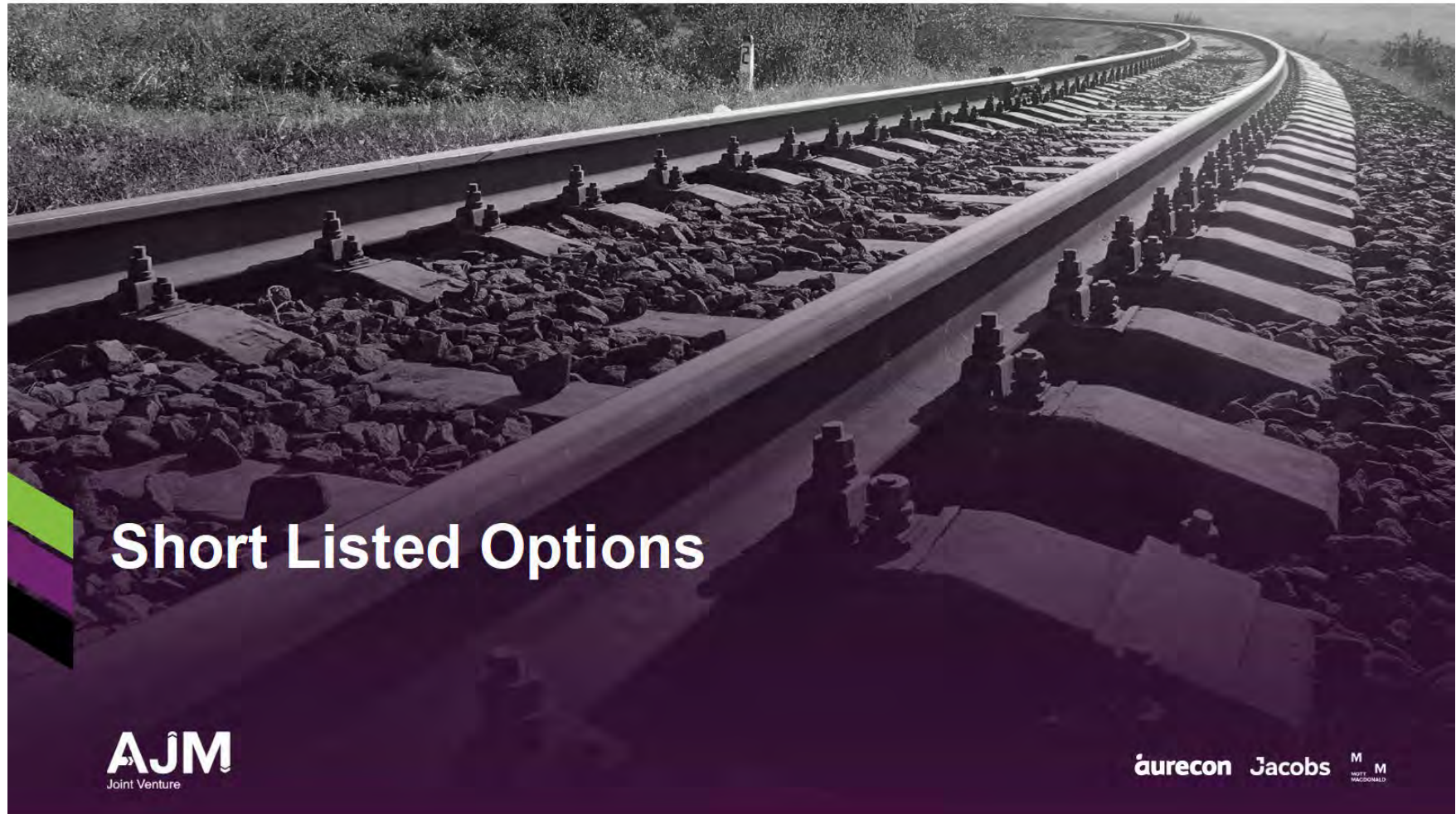
**Option 7 – Lillian St Connection**



**Option 8 – Carinish Rd Realignment**

More detail of each option is provided in Appendix A.







## Baseline – Carinish Rd Closed

### Key Advantages / Opportunities

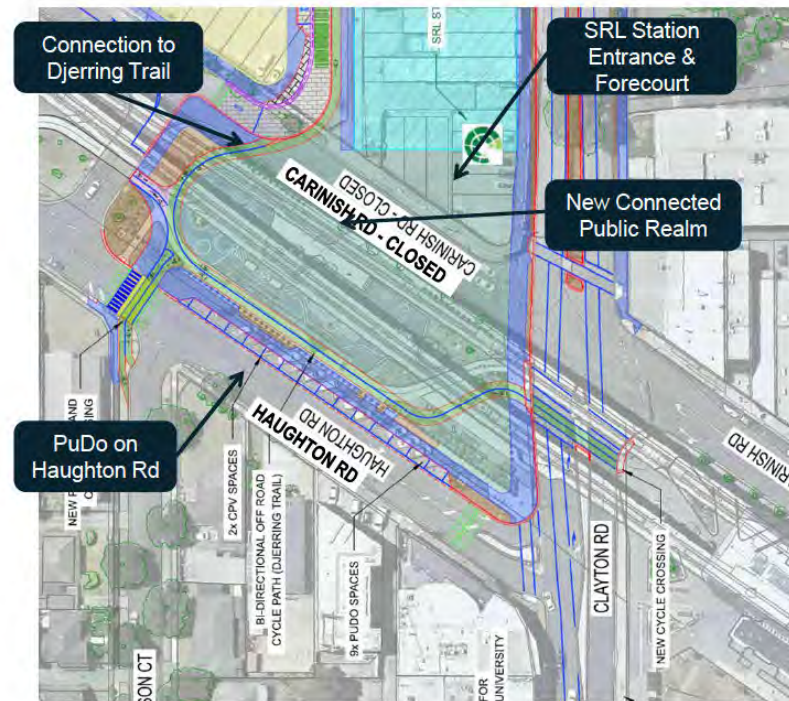
- Contiguous and integrated **public realm** with the station surrounds. Additional 1100m<sup>2</sup> of public space
- Improved **Clayton Road Performance** due to removal of intersection leg.
- Deter potential rat running between North Rd and Clayton Rd.
- Improved **pedestrian safety** via reduced number of traffic lanes to be crossed

### Key Constraints / Issues

- Restricted **PuDo access** from Clayton Road for either arrival or departure
- **Redistribution** of local traffic and increased flows on some local residential streets. Estimated an additional 500 vehicles per day use Madeleine St
- Limited **Right Turn** movements from existing residential pocket.
- Convoluted access for **emergency services** to SRL Station

### Cost

- Baseline per funding submission (\$\$)





## Option 2 – Carinish Rd Closed with Shandeau Ave Modifications

### Key Advantages / Opportunities

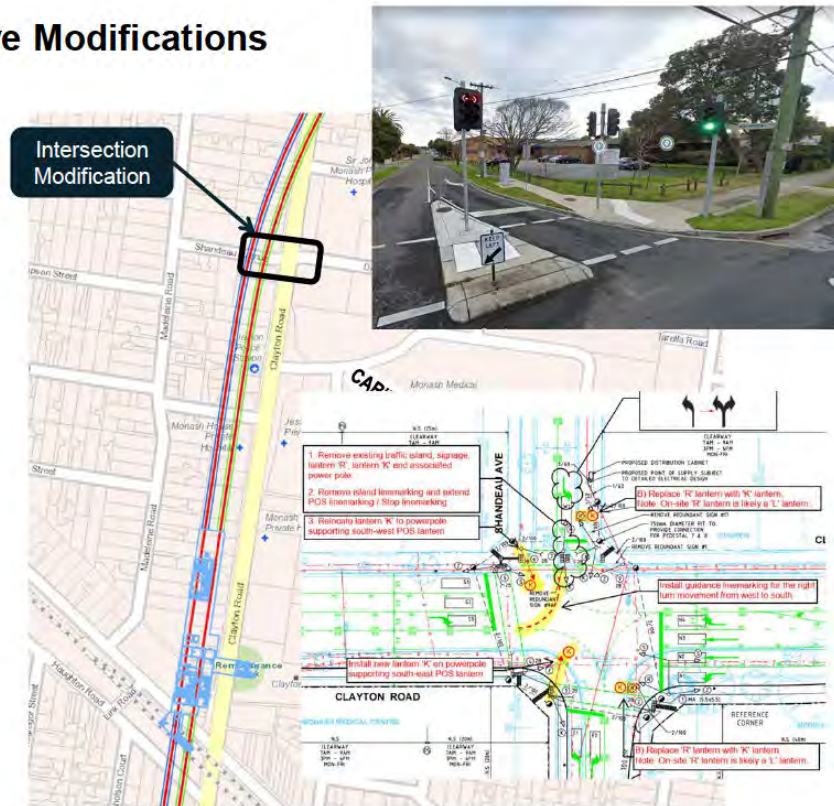
- Improved **Right Turn** movements from existing residential pocket
- Contiguous and integrated **public realm** with the station surrounds. Additional 1100m<sup>2</sup> of public space
- Improved **Clayton Road Performance** due to removal of intersection leg.
- Improved **pedestrian safety** via reduced number of traffic lanes to be crossed

### Key Constraints / Issues

- Restricted **PuDo access** from Clayton Road for either arrival or departure
- Some **redistribution** of local traffic and increased flows on some local residential streets.
- Convoluted access for emergency services to SRL Station
- **Restriction of parking** on Shandeau Avenue to facilitate intersection upgrade

### Cost

- Baseline + Intersection Modifications (\$\$\$)







## Option 4 – Carinish Rd Modified Cross Section

### Key Advantages / Opportunities

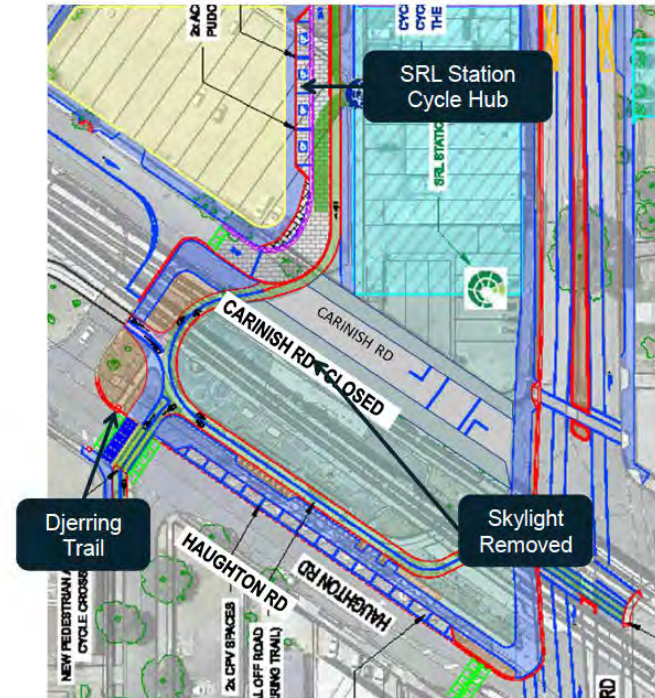
- Maintenance of **existing local access** to surrounding local streets and reduced redistribution to local streets.
- Potential to stage closure of Carinish Rd as Precinct evolves.
- Improved access to **PuDo** with opportunity to located some on Carinish Rd.
- Improved access for **emergency services** to SRL Station.

### Key Constraints / Issues

- Less convenient environment for pedestrians, with reduced **pedestrian safety** via additional number of traffic lanes to be crossed.
- Loss of future public realm / open space of <1100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Connection of SRL Station cycling facilities to Djerring Trail
- Requires removal of **skylight** and associated impact to **wayfinding** within SRL Station
- Reduced **Clayton Road performance** due to reinstatement of intersection leg with potential for queuing issues associated with pedestrian crossing.

### Cost

- Similar to Baseline (\$\$)





## Short Listed Options – Next Steps

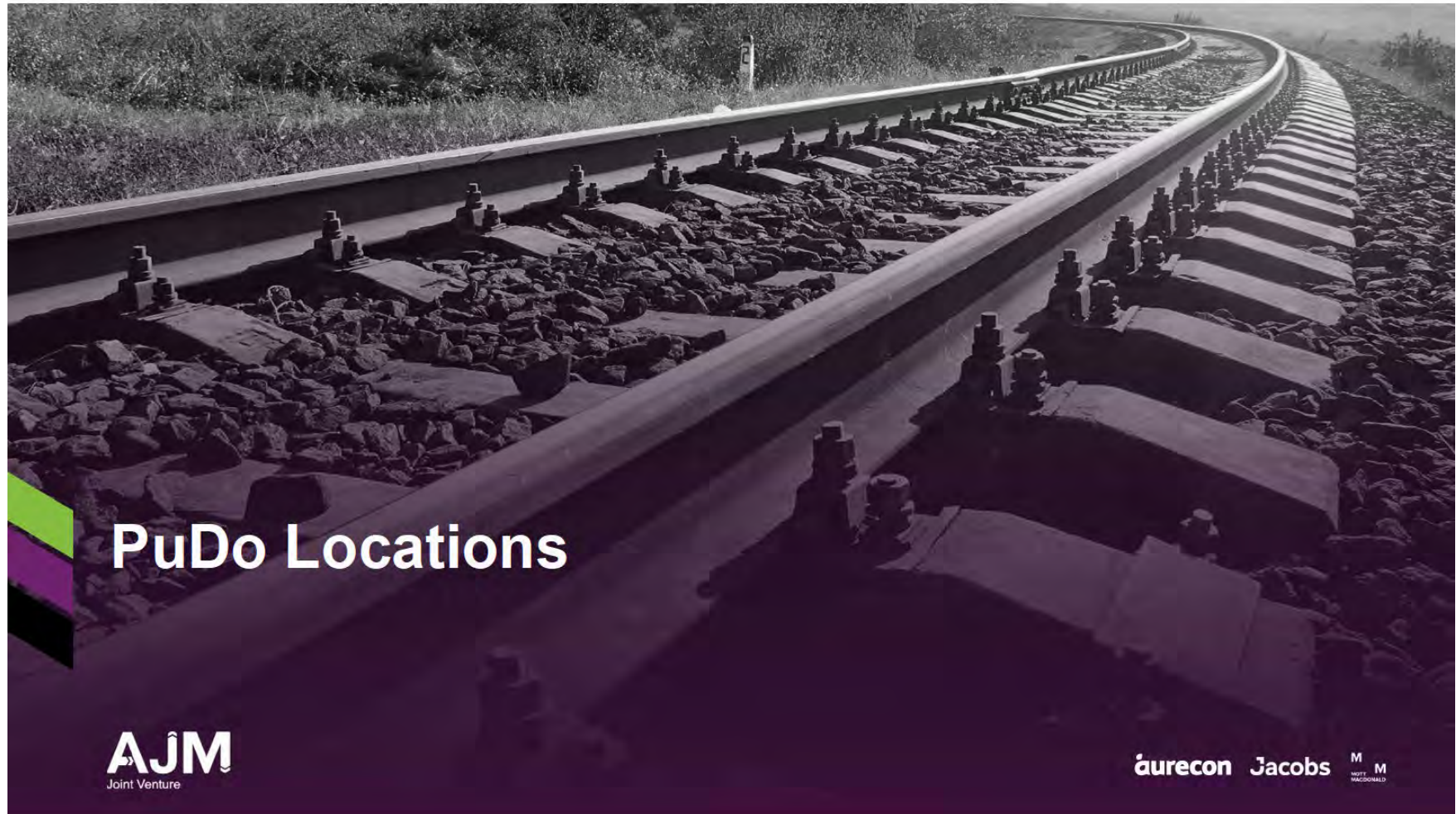
### Option 4

- To be further developed and preferred layout confirmed prior to the MCA
  - Baseline and Option 2 have been previously developed and did not require further design work at this stage

### PuDo Location/s

- Review and assessment of the proposed location on Haughton Road and alternate locations to identify if access could be improved







## **PuDo Locations**

Assess if additional locations for PuDo at Clayton would better serve passengers and enable access from all locations

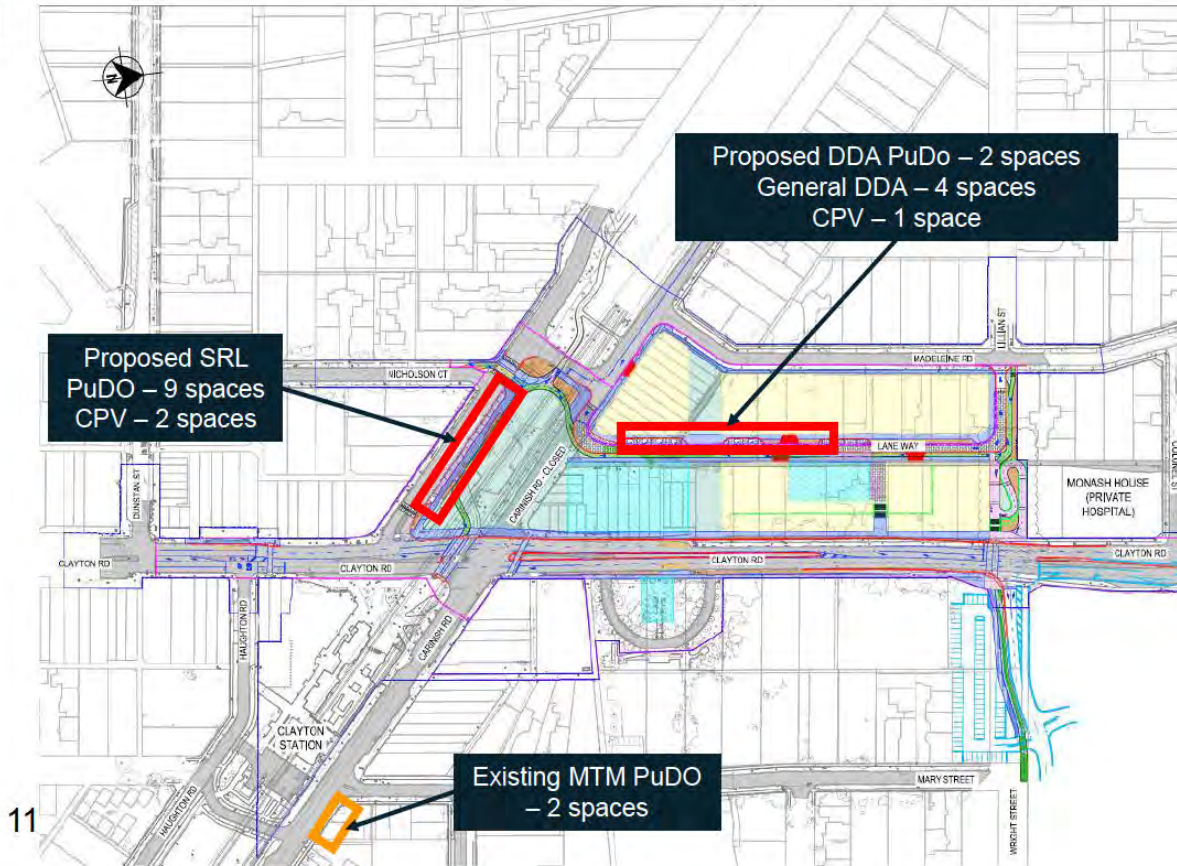
Assessment includes:

- Site suitability (i.e. current use and ease of conversion)
- Vehicle accessibility
- Distance to SRL station entry
- Multi-modal use
- Stakeholder impacts





### Current SRL PuDo proposal and existing MTM PuDo



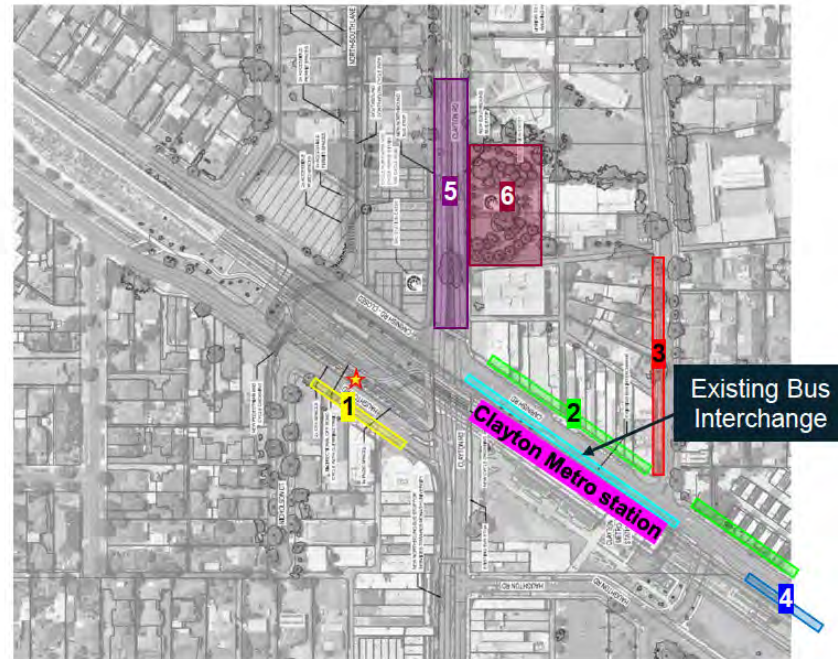
- MTM currently has 2 PuDo bays located on Carinish Road East
- SRL proposed PuDo is Houghton Road West (northern verge) with DDA bays in the new Station Street

11



### PuDo Locations Assessed

1. Haughton Road West – southern verge
2. Carinish Road East – northern verge
3. Mary Street – western verge
4. Carinish Road East – southern verge
5. Clayton Road
6. Remembrance Gardens



## PuDo Locations – Pros and Cons

Location	Current Use	Proposed PuDo Use	Pros	Cons
1. Houghton Road West – southern verge	2P (8am-6pm Mon-Sat)	Converted to AM and PM Peak PuDo  2 bays minimum	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Opposite the proposed PuDo on the northern verge</li> <li>Identified as a potential location for future PuDo expansion for 2051</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Limited spaces due to private driveways</li> <li>May be issue with proximity to residential properties, businesses and Nikotsaras Club</li> </ul>
2. Clayton Road East – northern verge	15 mins (all day) – 1P (8am-7pm M-F & 8am-1pm Sat) 2 mins – 4P (shared with RRB)	Converted to AM and PM Peak PuDo  7 bays west of Mary St 5 bays east of Mary St	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Can be used for SRL, MTM and bus interchange</li> <li>Identified as a potential location for future PuDo expansion for 2051</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Reduction in 15mins and/or 1P by approximately 1 hour in the AM and 2 hours in the PM</li> <li>2 mins, 15 mins and 4P parking bays are outside the EES boundary</li> </ul>
3. Mary Street – western verge	5 mins (8-9am & 3-4pm SD) – 1P (8am-6pm M-F & 8am-1pm Sat)	1P converted to AM and PM Peak PuDo  7 bays	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Majority of parking is 1P between Clayton Hall and Carinish Road</li> <li>5 min parking could be extended through 1P between 6-8am and 4-6pm</li> <li>Access to SRL via laneway next to Clayton Hall</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Narrow residential street</li> <li>Proximity to school PuDo</li> <li>Outside the EES boundary</li> </ul>
4. Carinish Road East – southern verge	No limit	Converted to AM and PM Peak PuDo  9 bays	<ul style="list-style-type: none"> <li>Requires resigning only</li> <li>Used as park n ride overflow</li> </ul>	<ul style="list-style-type: none"> <li>Distance from SRL station</li> <li>Potential stakeholder issue if Community Centre patrons use parking</li> <li>Greater than 200m from the SRL station entry and outside EES boundary</li> </ul>
5. Clayton Road	No standing kerbside traffic lane	In-lane parking bays during AM and PM Peak  Limited	<ul style="list-style-type: none"> <li>Adjacent to SRL station building</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Requires relocation of station box to accommodate indented parking bays</li> <li>Kerbside lane utilised by multiple bus routes and includes bus stops</li> <li>Indented bays may increase gradient for ped/cycle links</li> </ul>
6. Remembrance Gardens	SRL station eastern entry public plaza/Clayton Hall access	AM and PM Peak PuDo within Gardens on access lane  Limited	<ul style="list-style-type: none"> <li>Adjacent to the SRL station eastern entry</li> <li>Within 200m of the SRL station entry</li> </ul>	<ul style="list-style-type: none"> <li>Potential conflict between pedestrians and vehicles</li> <li>May not be available subject to Clayton Hall use/events</li> <li>Could be perceived further reduction of park/memorial</li> </ul>



**PuDo access with Carinish Rd and Mary St**

**Carinish Rd users**

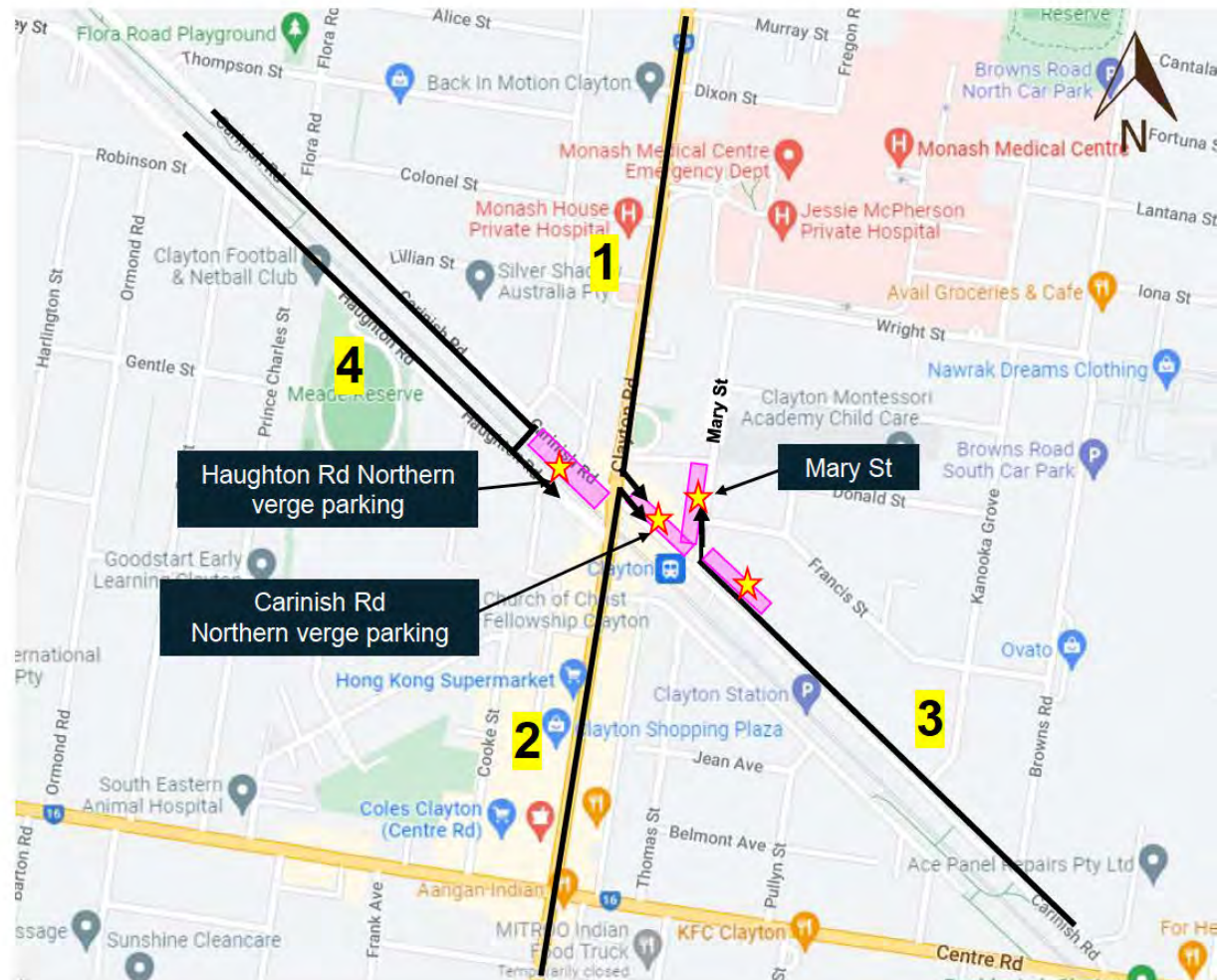
- 1. Vehicles from north of Clayton Road
- 2. Vehicles from south of Clayton Road

**Mary St users**

- 3. Vehicles from east on Carinish Road

**Houghton Rd users**

- 4. Vehicles from west on Carinish Road and Houghton Road







## Summary/Recommendations

### Summary

- Existing location of PuDo requires circuitous access for vehicles from north and east
- Alternative locations on Carinish Road East (northern verge) and Mary Street address access issues
  - Noted that Carinish Road East (northern verge) is partially and Mary Street is entirely outside the EES boundary
- Dispersing PuDo across multiple locations will assist in providing for the 2051 requirement of 18 parking spaces (total includes the 9 parking spaces provided at Rail Day One)
- Dispersing PuDo provides greater choice for passengers to access the station

### Recommendation

- Assess alternate locations on Carinish Road East (northern verge) and Mary St through the MCA. Included in each of the Carinish Road short listed options





## Option 4 – Option Development

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**aurecon** **Jacobs** **M M**  
McDONALD



## Option 4 – Option Development

- Following the short listing of Option 4, further investigation was required to consider the ideal layout. This included:
  - Traffic access:
    - Local access including the right turn onto Clayton Road from the residential pocket
    - PuDo access
    - Strategic road network
  - UDS requirements for:
    - Provision of public realm near station entrance (forecourt)
    - UDS requirement for prioritising pedestrian movement
  - Pedestrian and cycling safety near new high activity area



## **Option 4 – Access**

### **Three priorities for access:**

- Local access (i.e. residents and local businesses)
- PuDo access
- Strategic road network access

### **How access was assessed:**

- Do alternate movements exist
- Who requires the movement
- Regularity of access (i.e. local access is all day, PuDo usually during peaks)



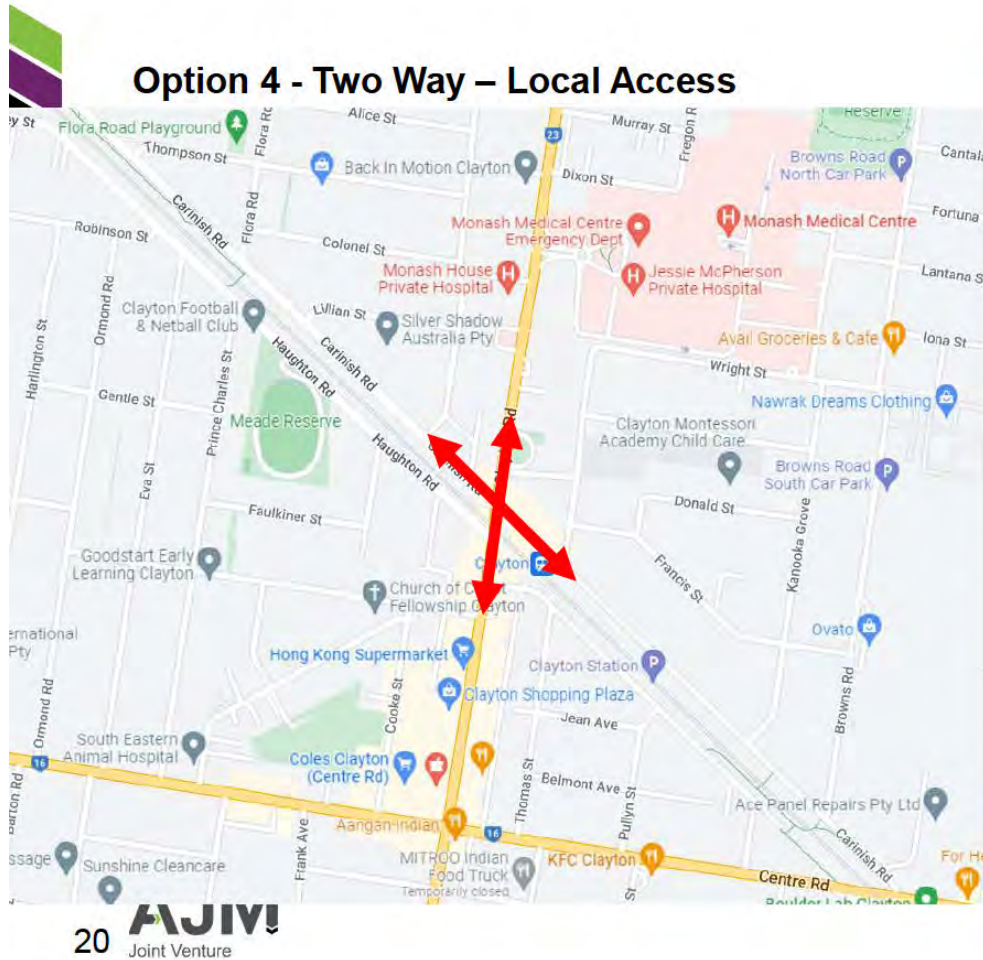
	L	T	R
Carinish Road West (to be closed)	Haughton Colonel Shandeanu	Haughton - left/right	
Carinish Road East		Right then left at Colonel or Shandeanu	
Clayton Road North			Shandeanu
Clayton Road South	Haughton Colonel Shandeanu		

- green = no change
- text = alternatives available for movements
- Black = no alternative

- Right turn from Carinish Road West to Clayton Road southbound currently has no alternate alignment for local vehicle access
- All other impacted movements have alternatives available
- Local catchment west of Clayton Road and north of the MTM has multiple alternate access points including Colonel Street and Shandeanu Avenue
- Haughton Road to the south of Carinish Road provides an alternate for two movements less than 60m away

19 **AJIVI**  
Joint Venture

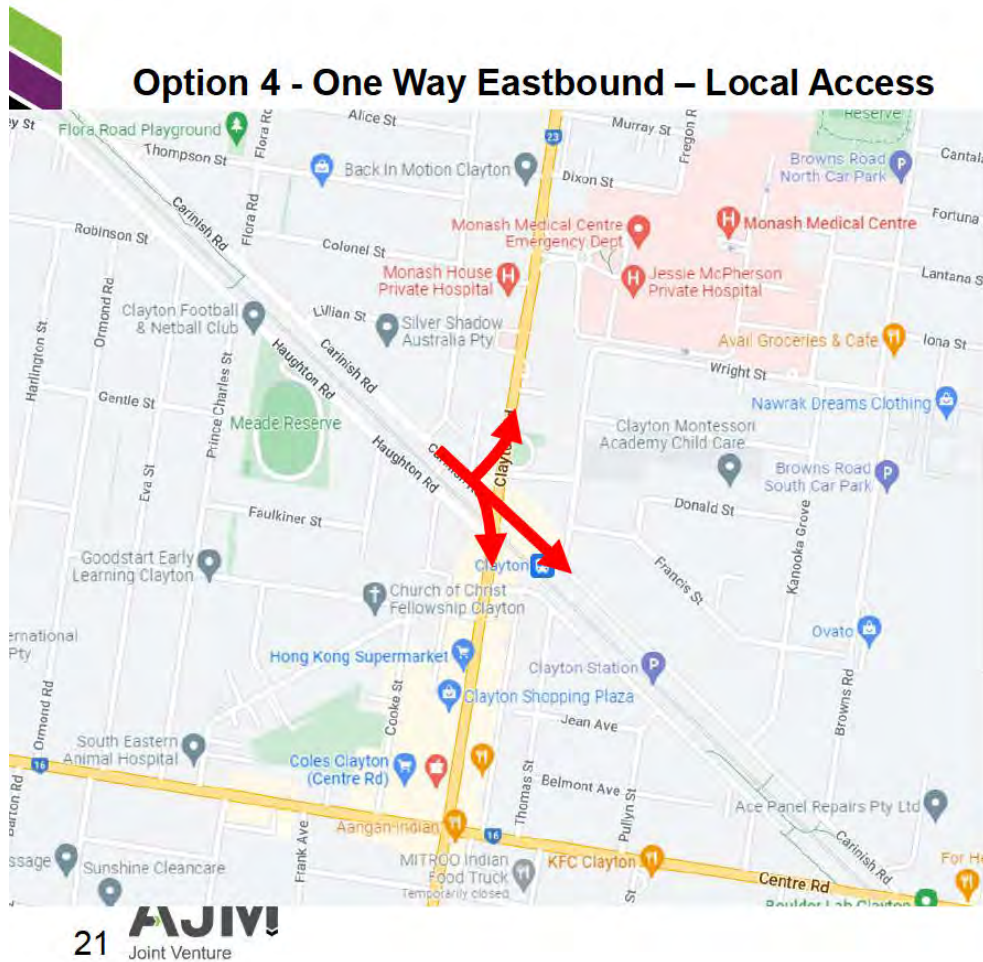
**aurecon Jacobs** M M  
WOTT MACDONALD



	L	T	R
Carinish Road West (to be closed)	Haughton Colonel Shandeanu	Haughton - left/right	
Carinish Road East		Right then left at Colonel or Shandeanu	
Clayton Road North			Shandeanu
Clayton Road South	Haughton Colonel Shandeanu		

- green = no change
- text = alternatives available for movements
- Black = no alternative

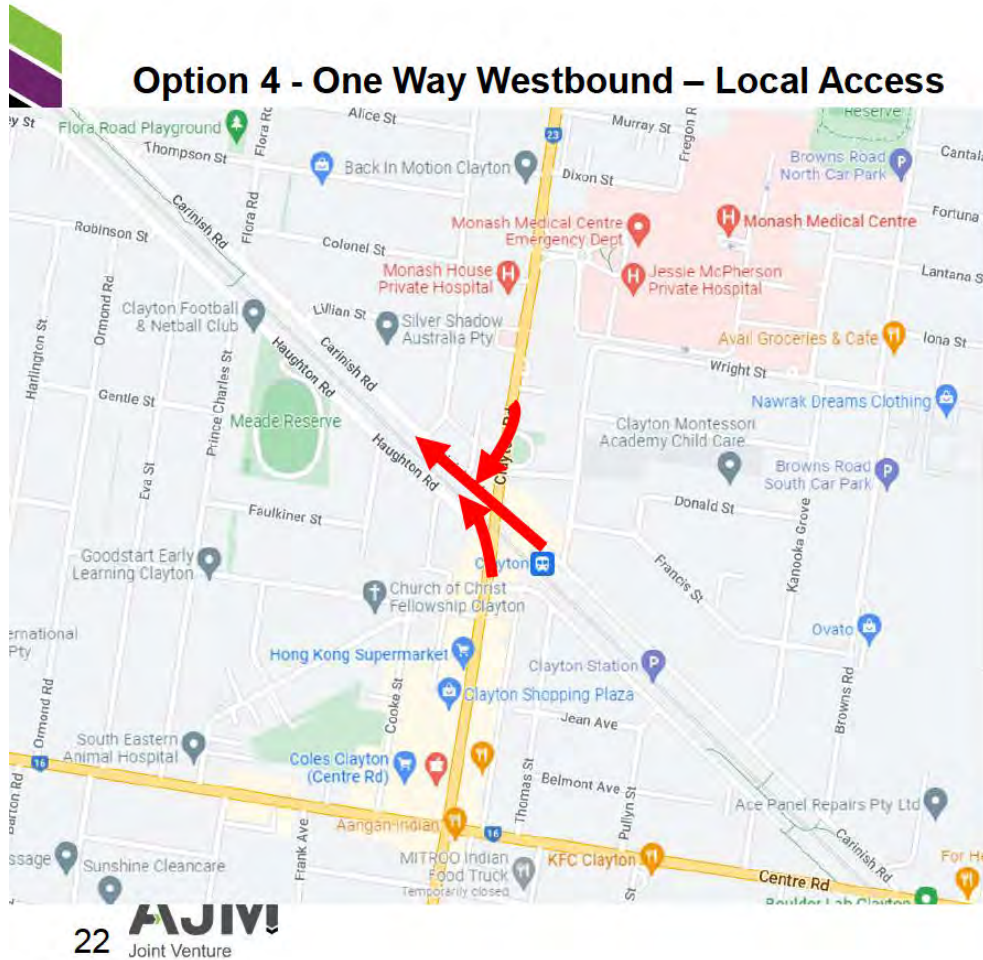
- Similar to existing intersection arrangement
- All movements possible with alternate movements remain
- Clayton Road North turn right from a right and through lane
- Clayton Road West right, through and left movements are from a single lane, no dedicated right turn lane



	L	T	R
Carinish Road West (to be closed)	Haughton Colonel Shandeanu	Haughton - left/right	
Carinish Road East		Right then left at Colonel or Shandeanu	
Clayton Road North			Shandeanu
Clayton Road South	Haughton Colonel Shandeanu		

- green = no change
- text = alternatives available for movements
- Black = no alternative

- Right turn from Carinish Road West to Clayton Road southbound is accommodated
- Left and through movement from Carinish Road West have alternate movements. **Does the intersection require a left turn and through?**
- Local catchment west of Clayton Road and north of the MTM has multiple alternate access points including Colonel Street and Shandeanu Avenue
- Haughton Road to the south of Carinish Road provides an alternate for two movements less than 60m away



	L	T	R
Carinish Road West (to be closed)	Haughton Colonel Shandeanu	Haughton - left/right	
Carinish Road East		Right then left at Colonel or Shandeanu	
Clayton Road North			Shandeanu
Clayton Road South	Haughton Colonel Shandeanu		

- green = no change
- text = alternatives available for movements
- Black = no alternative

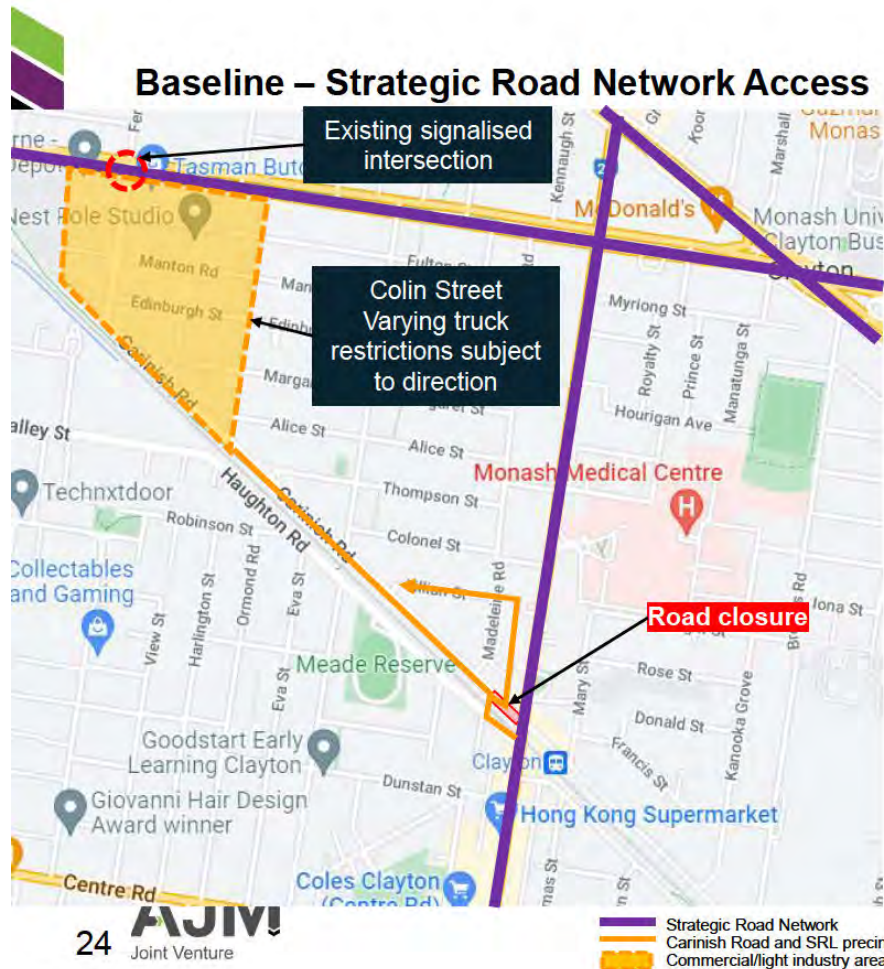
- Does not address right turn from Carinish Road West to Clayton Road southbound for local vehicle access
- Would require an alternate right turn at Shandeanu Avenue
- Clayton Road North turn right from a right and through lane
- Haughton Road to the south of Carinish Road provides an alternate left turn in from the south less than 60m away





	Base line	Carinish Open	Alternate solution
Carinish Road West (to be closed)	Access Road under viaduct	Not required	Not required
Carinish Road East	Right then left at Colonel or Shandeanu then Madeleine	Loop via Carinish Road West and Haughton	Additional PuDo on Carinish Road East or Mary Street
Clayton Road North	Shandeanu then Madeleine	Loop via Carinish Road West and Haughton	Additional PuDo on Carinish Road East or Mary Street
Clayton Road South	Dunstan Colonel Shandeanu	Loop via Carinish Road West and Haughton	Additional PuDo on Haughton Road southern side, Carinish Road East or Mary Street

- green = provides access
- red = not required
- PuDo is predominantly accessed during AM and PM peak with lower demand during the off peak and weekends
- Alternate options are available for vehicles to access the PuDo
- Demand to access the PuDo via Carinish Road should be weighed against the impacts to the direct precinct area
- Additional PuDo locations would reduce the need to access via Carinish Road West



- Closure of Carinish Road does not impact the strategic road network
- Multiple access points for access from the local street network
- Noted that truck access has been impacted by the closure of Carinish Road
- Alternate options exist including trucks reducing reliance on Carinish Road
- Trucks are able to enter and exit the existing commercial/light industrial area via North Road/Milgate Street signalised intersection using the non-restricted truck street network
- Trucks for the direct SRLA precinct (i.e. maintenance and service trucks) will utilise Station Street and return via Lillian Street (westbound direction only) to Carinish Road as per Reference Design



## Option 4 – Access Summary

- Right hand turn from Carinish Road into Clayton Road southbound is the only movement with no alternative
- Primary access is for local vehicles (i.e. residential)
- PuDo access can be addressed by providing additional parking on Carinish Road and Mary Street
- Strategic road network is unchanged and truck access has alternate access



## Option 4 – Urban Design

### Defining Shared Zones

- A shared zone is an area shared by vehicles and pedestrians.
- All Shared Zones in Victoria must display signage and a speed limit of 10 km/hr or 20km/h
- Shared zones must have clearly different coloured and textured surface treatments from the surrounding roads, and be constructed without kerbs – this enhances the sense of equality between pedestrians and vehicles.
- Drivers must give way to pedestrians at all times (VIC Road Rules).
- The street environment of a Shared Zone must ensure that the drivers and pedestrians are made aware that they are entering a location that has different driving conditions.

<https://www.google.com/maps/@37.8492297,144.9911925,3a,75y,89.26h,93.93t/data=!3m6!1e1!3m4!1sNIQx09Vvypmxeq3i674A!2e0!7116384!8!192>

[https://www.google.com/maps/@33.8141548,151.1693327,3a,75y,351.99h,83.45t/data=!3m6!1e1!3m4!1sMUzNjWwYUJAZRME5fm\\_wGA!2e0!7116384!8!192](https://www.google.com/maps/@33.8141548,151.1693327,3a,75y,351.99h,83.45t/data=!3m6!1e1!3m4!1sMUzNjWwYUJAZRME5fm_wGA!2e0!7116384!8!192)

Precedent: Greville Street, Prahran, VIC



Precedent: Canopy Lane Cove (Birdwood Lane), NSW





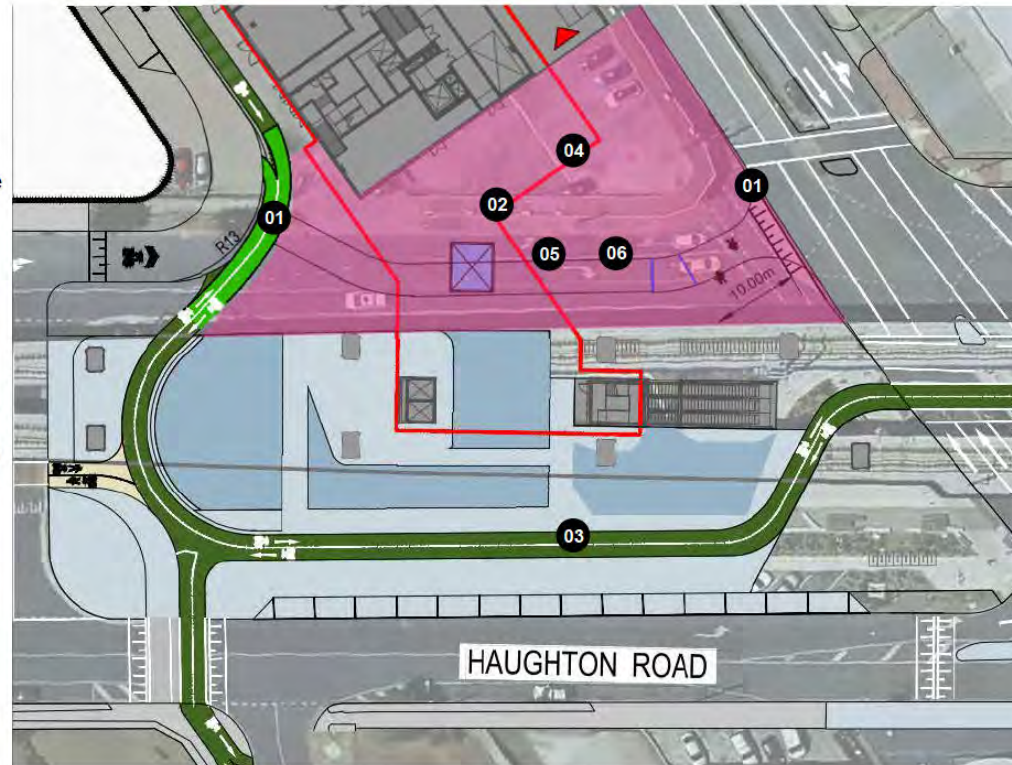
## Option 4 – Urban Design

### Pros

- 01 Configuration of roads could allow for future closure, to open space up for local events.
- 02 Treatment of a shared space, with continuous paving, no kerbs (yellow extents), will make the space feel more open and equitable.
- 03 No impact to alignment of Djerring Trail.

### Cons

- 04 Station Forecourt area is reduced (approximately 1000sqm PS&TR requirement)
- 05 Road creates physical and visual barrier within the public realm between the station forecourt and recreational space.
- 06 Likely requirements for traffic management / hostile vehicle mitigation bollards/elements along road alignment – reinforcing physical/visual barrier.



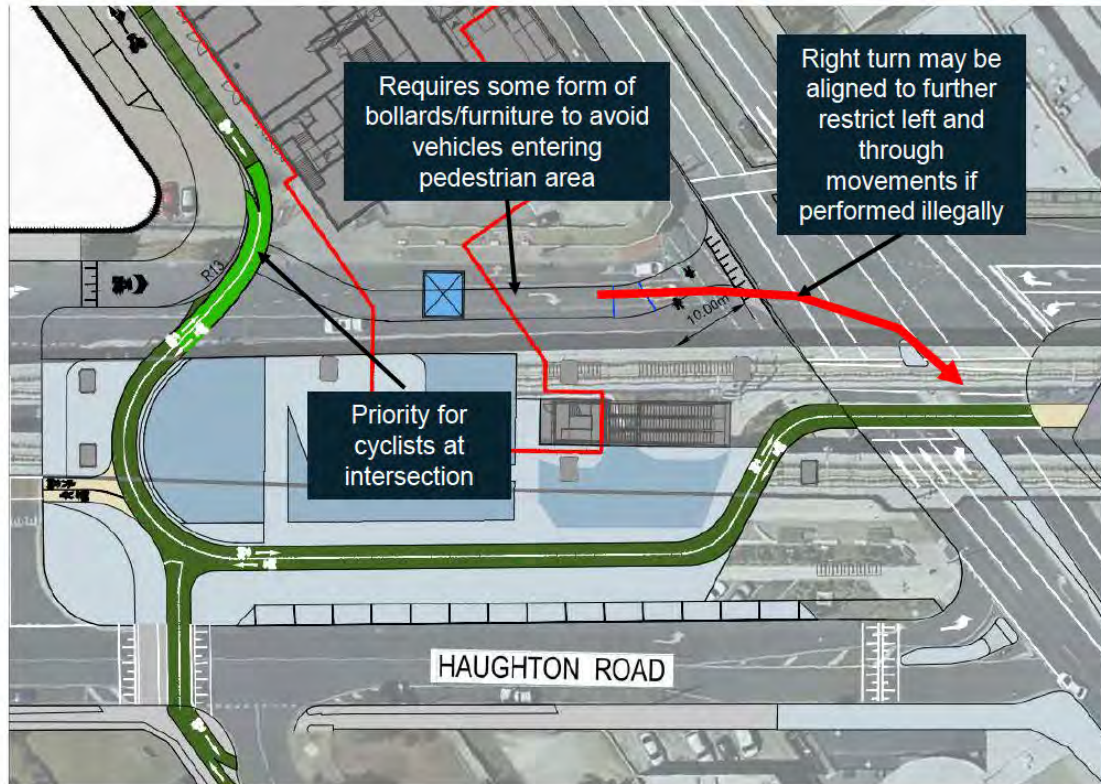


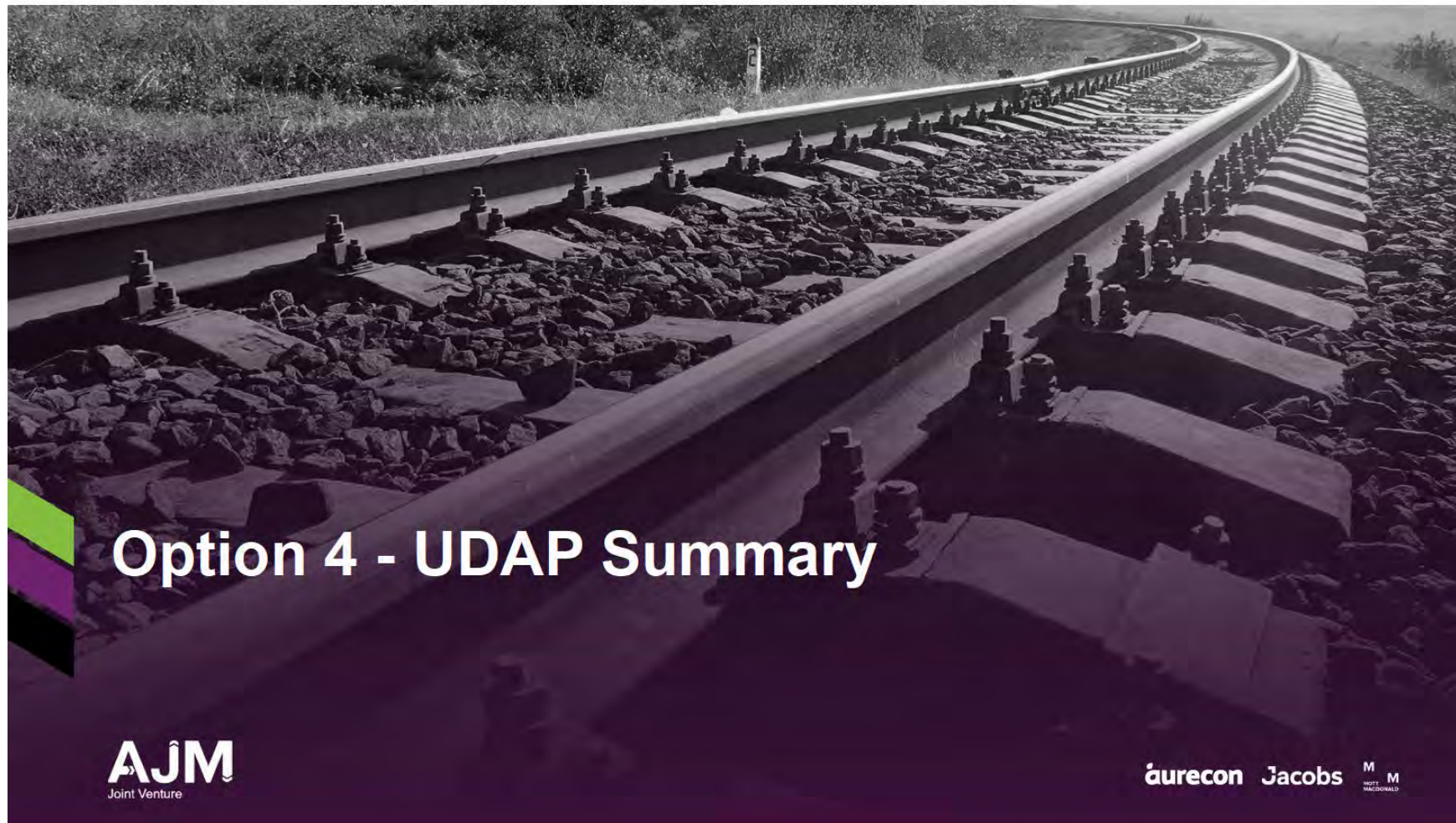
### Option 4 – Recommendation

- A **one-way (eastbound)** layout with a **right turn only** is recommended for Option 4
- Provides the right turn which is not provided in the Baseline
- Seeks to minimise potential traffic volumes by limiting vehicle access/movements
- Potentially allows for a shared arrangement between pedestrians and vehicles
- Reduces the roadway width from 6m



### Option 4 – Recommended Layout – One way eastbound with right turn only





# Option 4 - UDAP Summary

**AJM**  
Joint Venture

**aurecon** **Jacobs** **M M**  
McDONALD

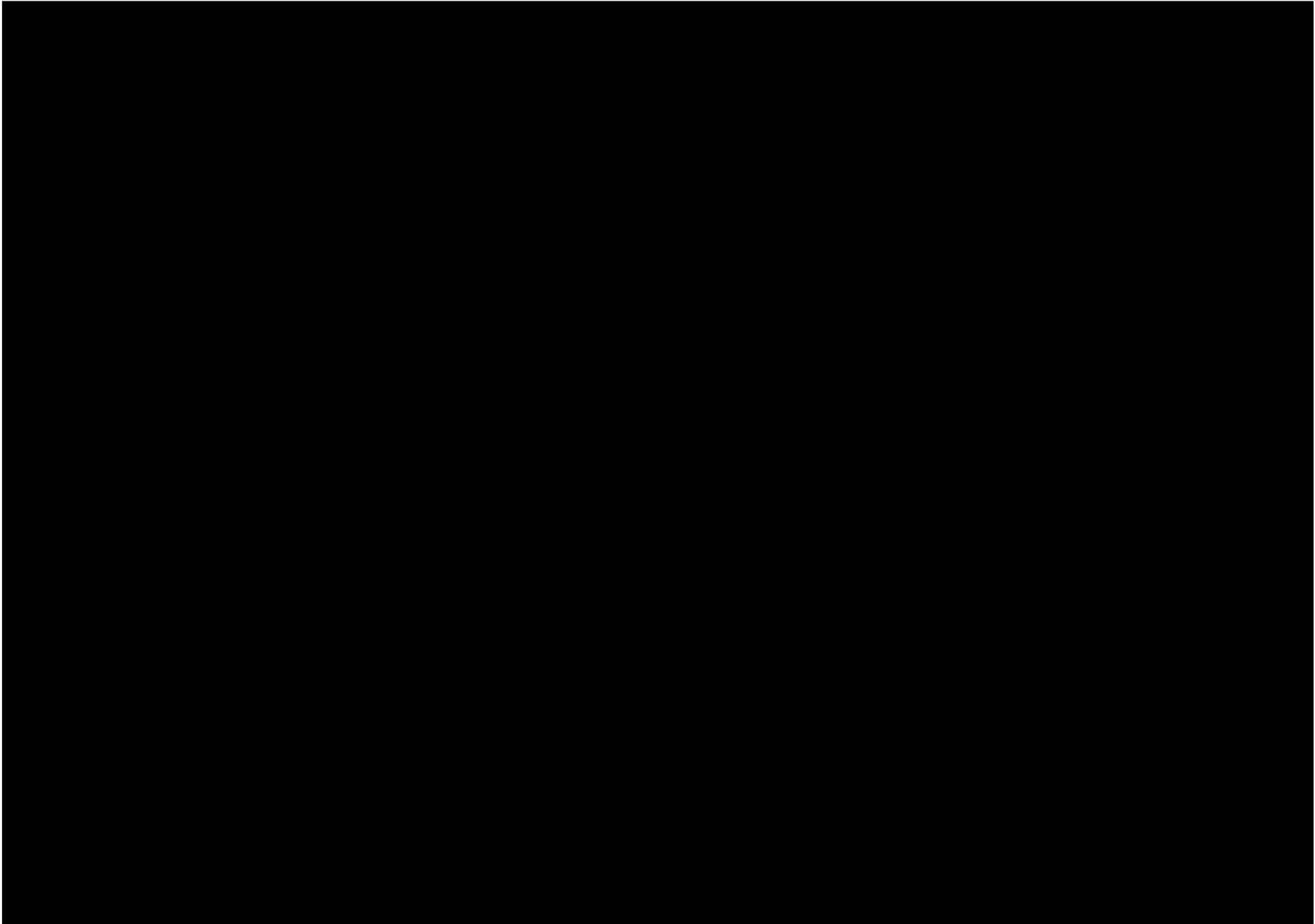


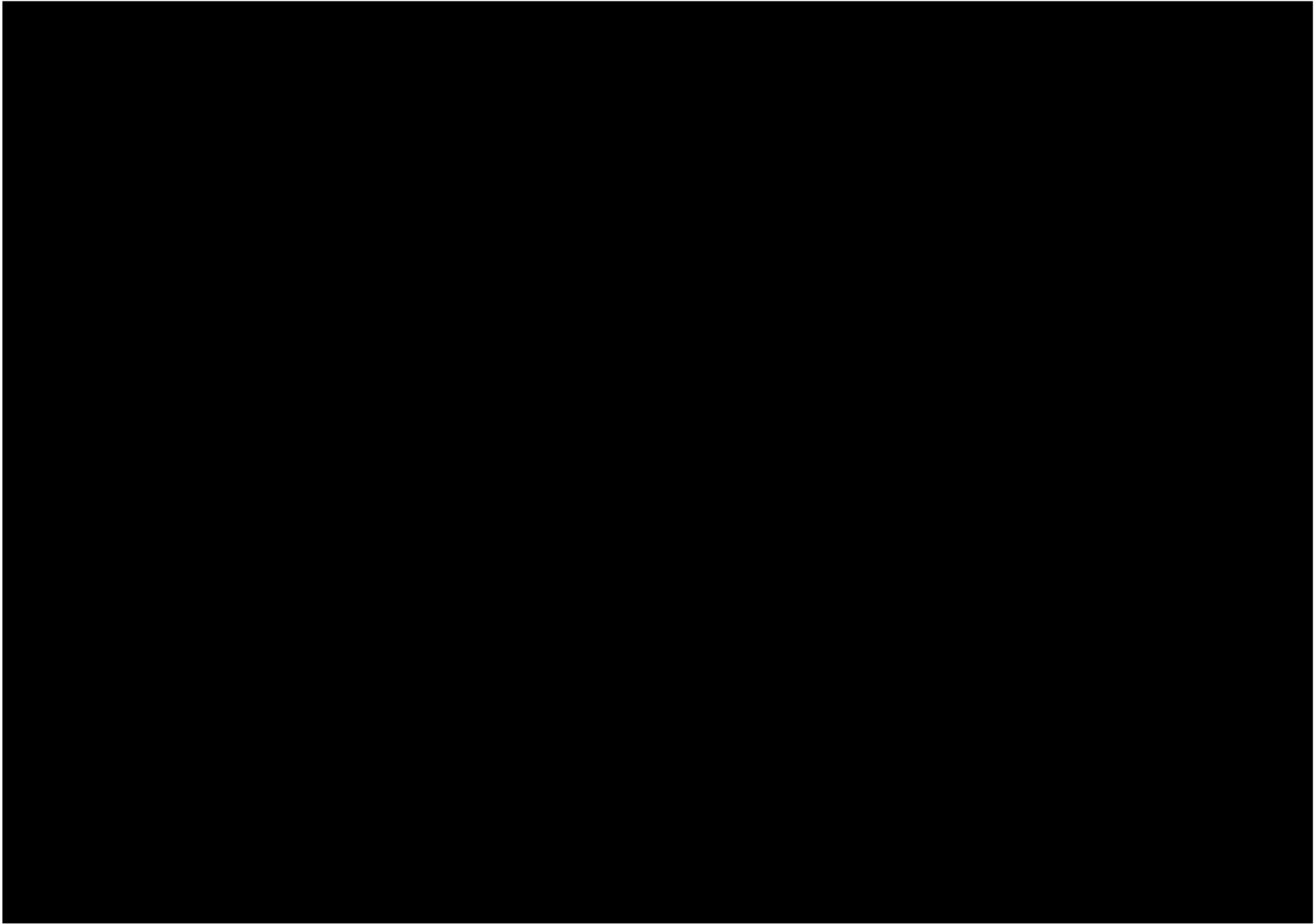


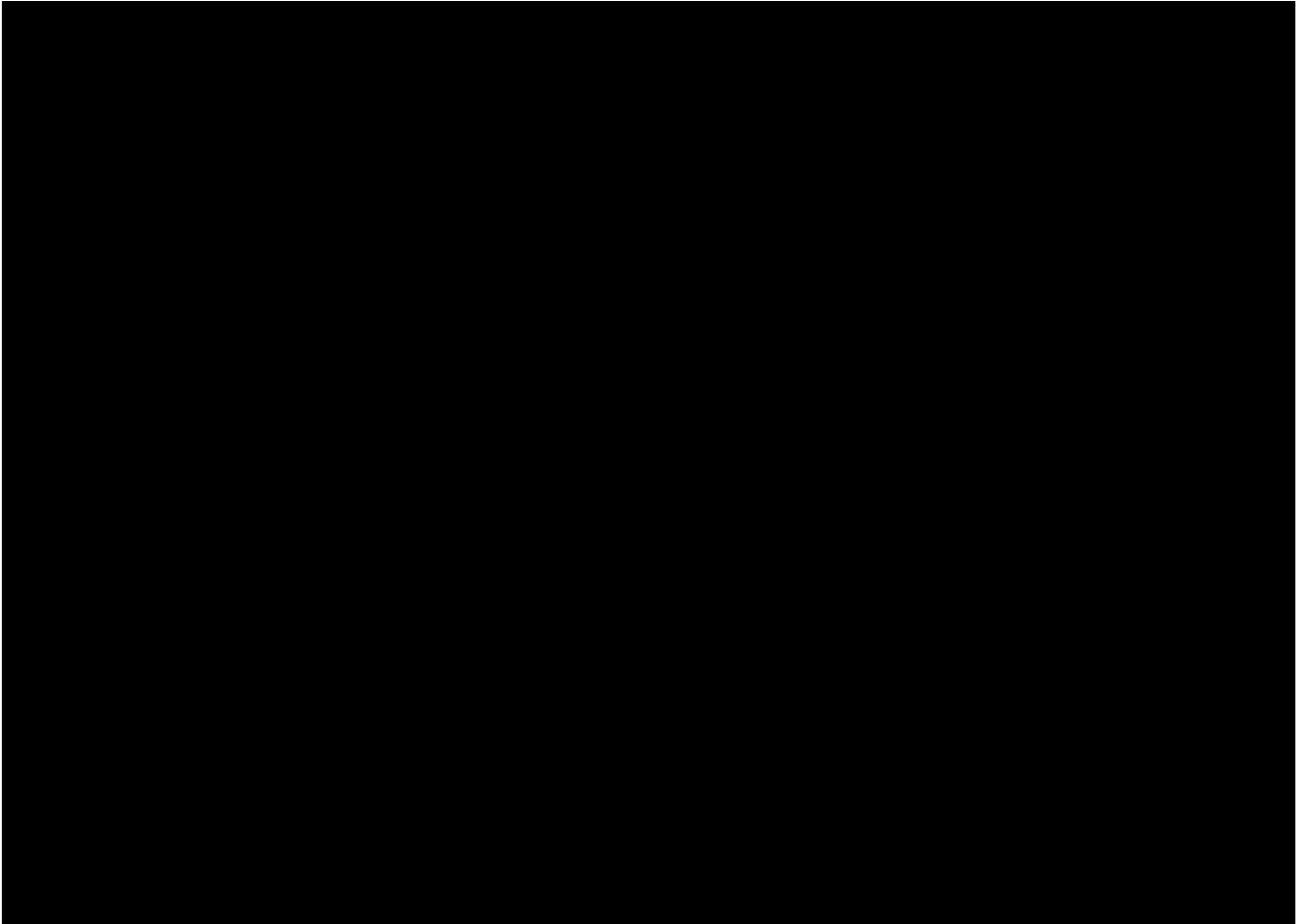
## UDAP Summary – Comments and Feedback (extract from 23 January 2023 Meeting minutes)

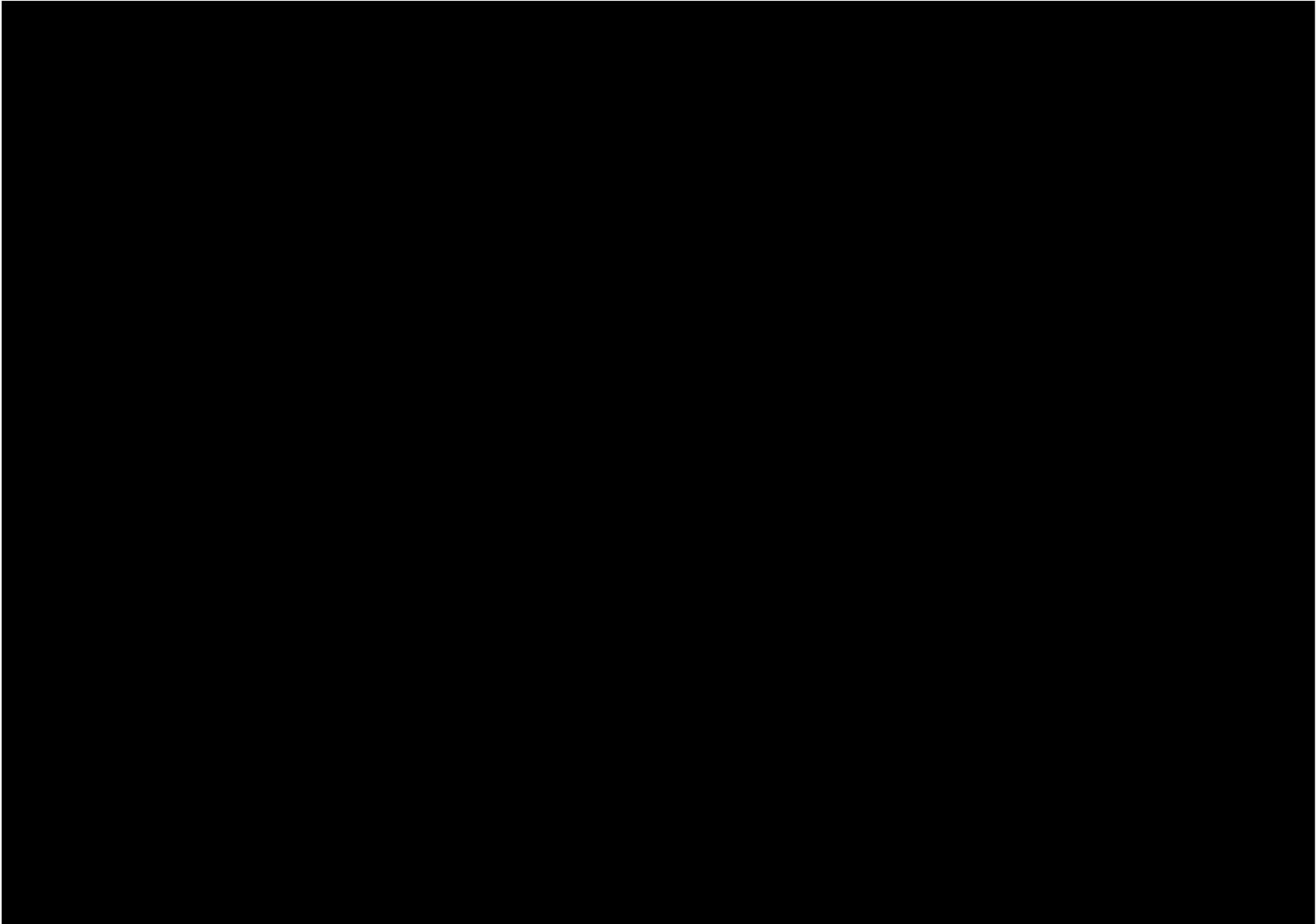
- UDAP advised that the option 4 as presented is not able to meet the requirements of the UDS – specifically the place-specific requirements which prioritise pedestrian movement amongst others.
- UDAP reflected on the proposed road closure and the significance and value of the space to the local community and its importance as a local open space. Given this, UDAP strongly suggested that Carinish Road should remain closed to enable the appropriate resolution of the station forecourt. UDAP advised that vehicular traffic movements and a right-turn lane onto Clayton Road for local residents should be provided to the north of Carinish Rd at Shandeau Avenue or at an appropriate alternative (between Carinish Road and North Road).
- UDAP acknowledged that moving the right-turn lane to the north could cause some local community concerns for a potential increase of vehicles along Madeleine Rd.
- UDAP acknowledged the various design options which have been tested and explored to date post the ESS, however believes that the various elements proposed within option 4 will not be able to provide a 'coherent, visually uncluttered and coordinated user experience' as required under the UDS.
- UDAP noted the precedent examples shared and noted that Greville St is a very different scenario that has varying scale, focus, orientation and purpose. This precedent also has the benefit of exposure and sunlight from the north-south streets which contribute to the success of this space. UDAP noted it would be very difficult to get a similarly good outcome at Carinish Road.
- UDAP reflected that the focus on accommodating vehicular movements has been at the detriment to the substantial pedestrian movements anticipated through this area, and that establishing a sense of place for pedestrians and the community should remain the key priority as outlined in the UDS.

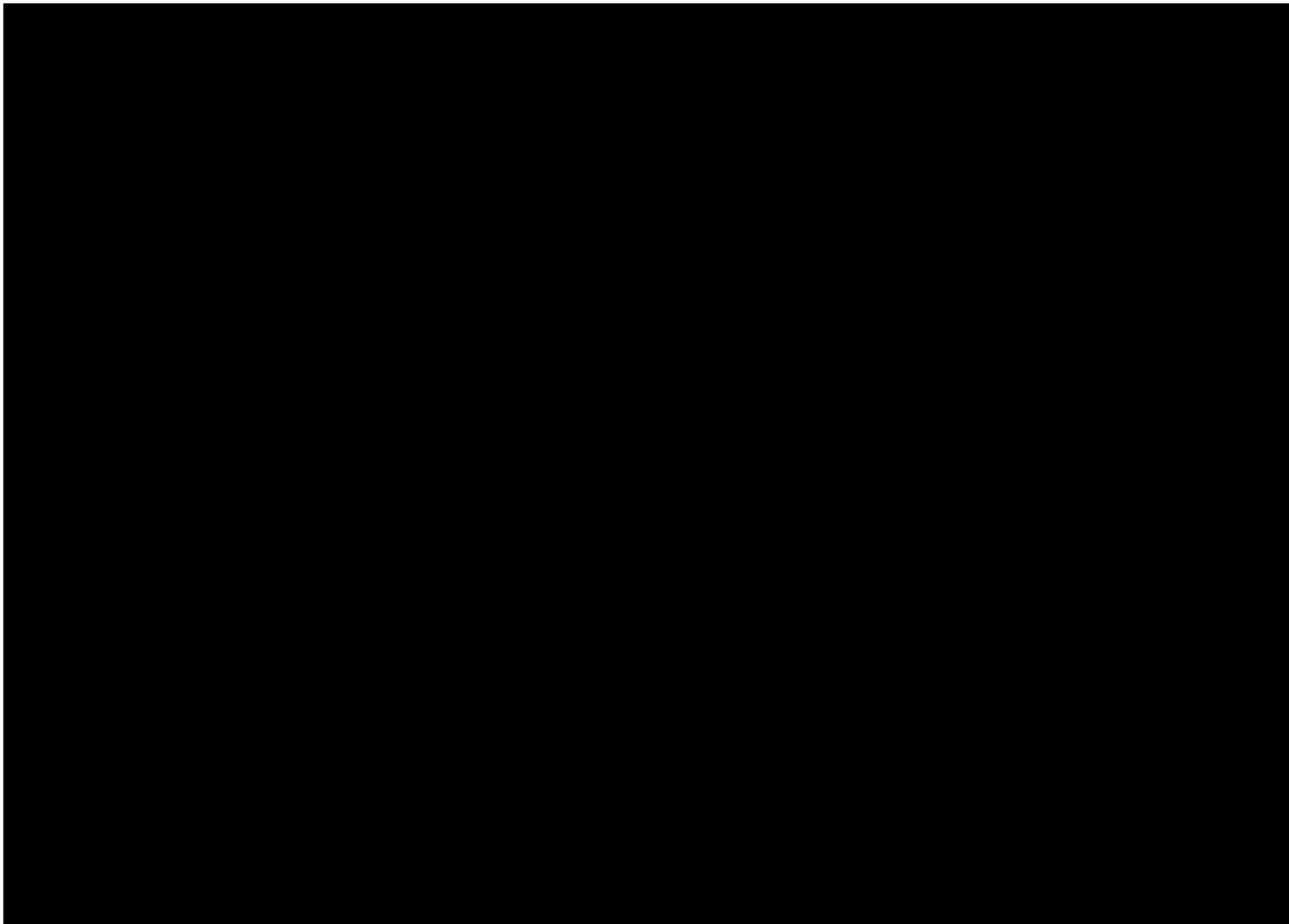


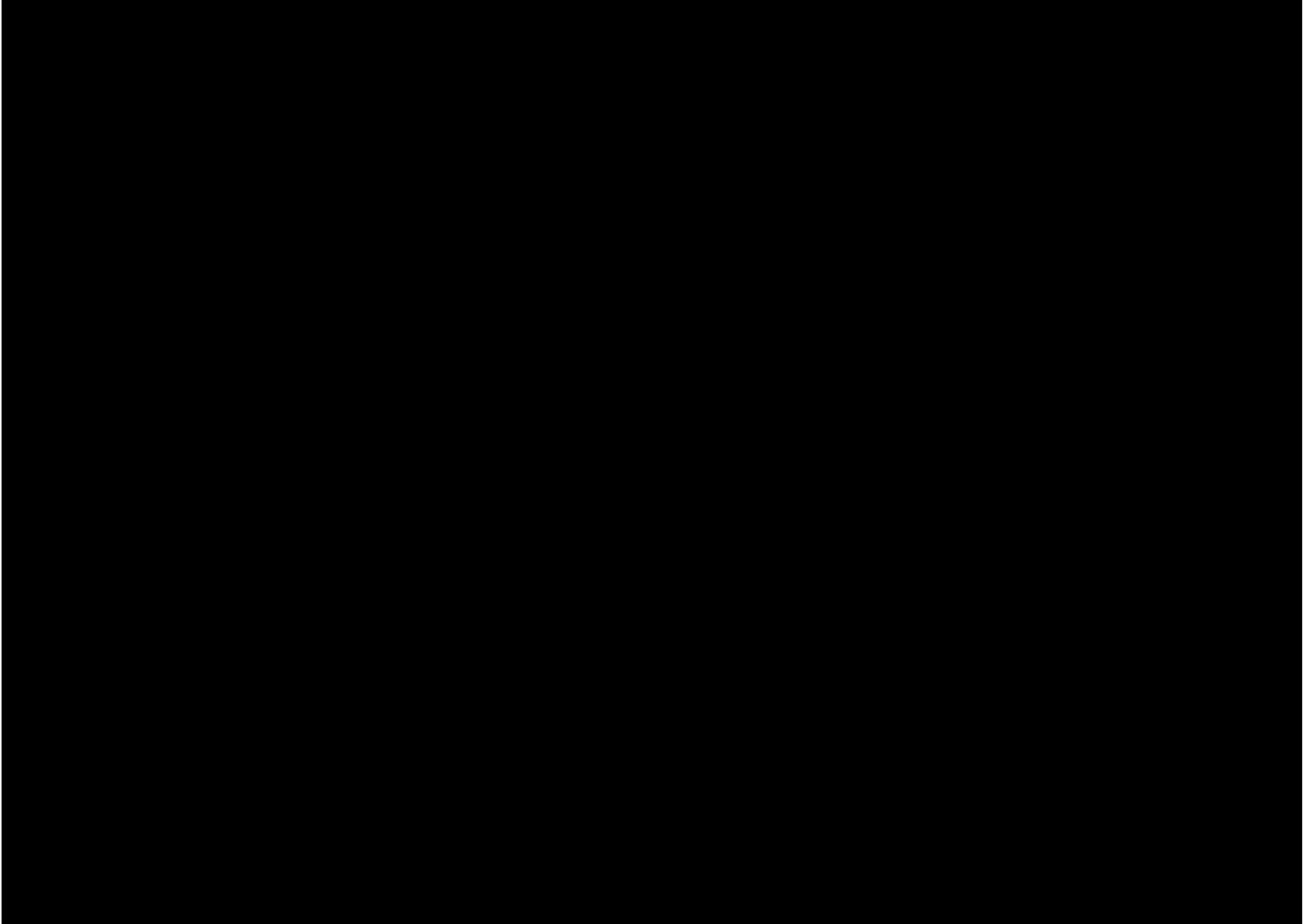




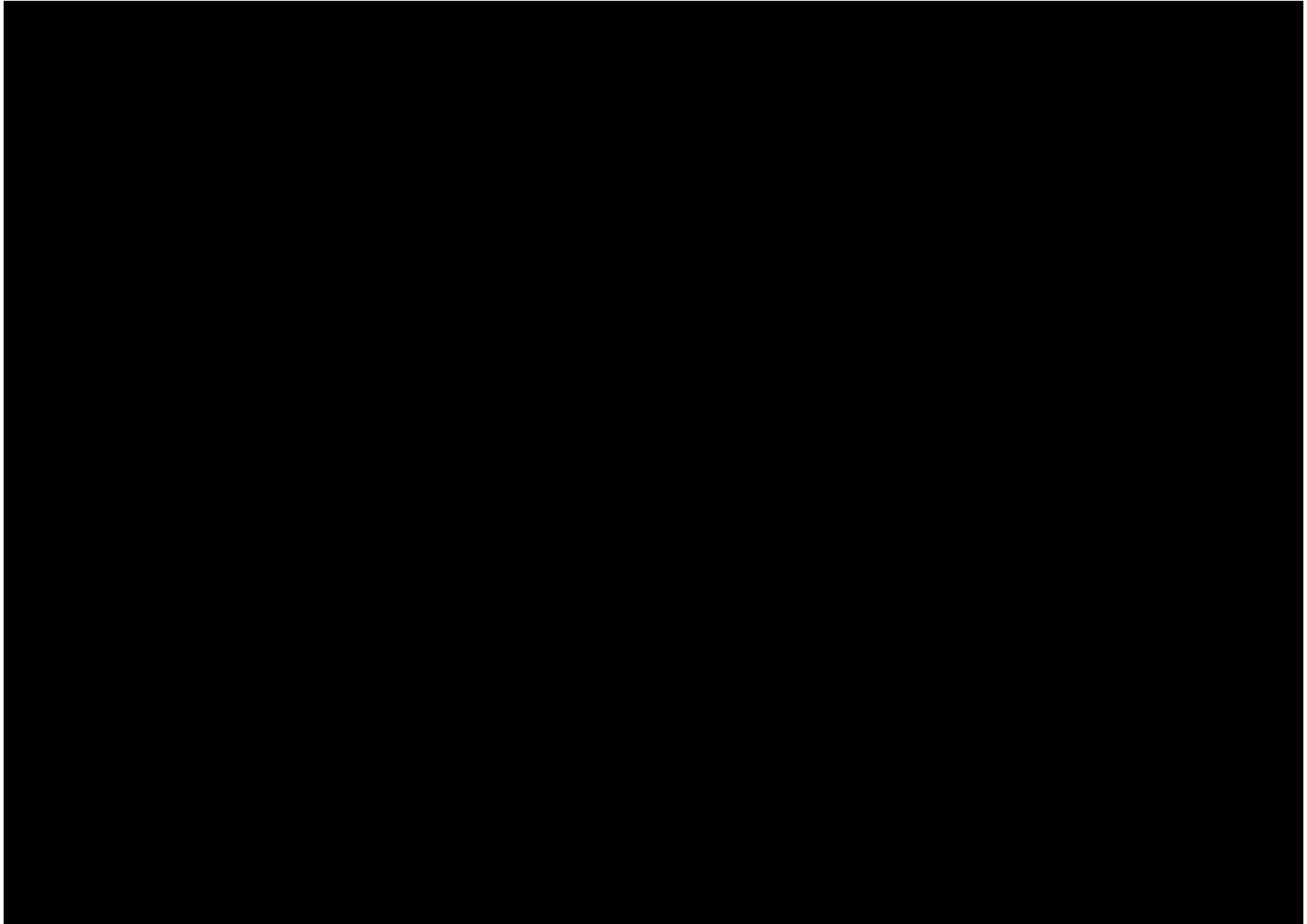


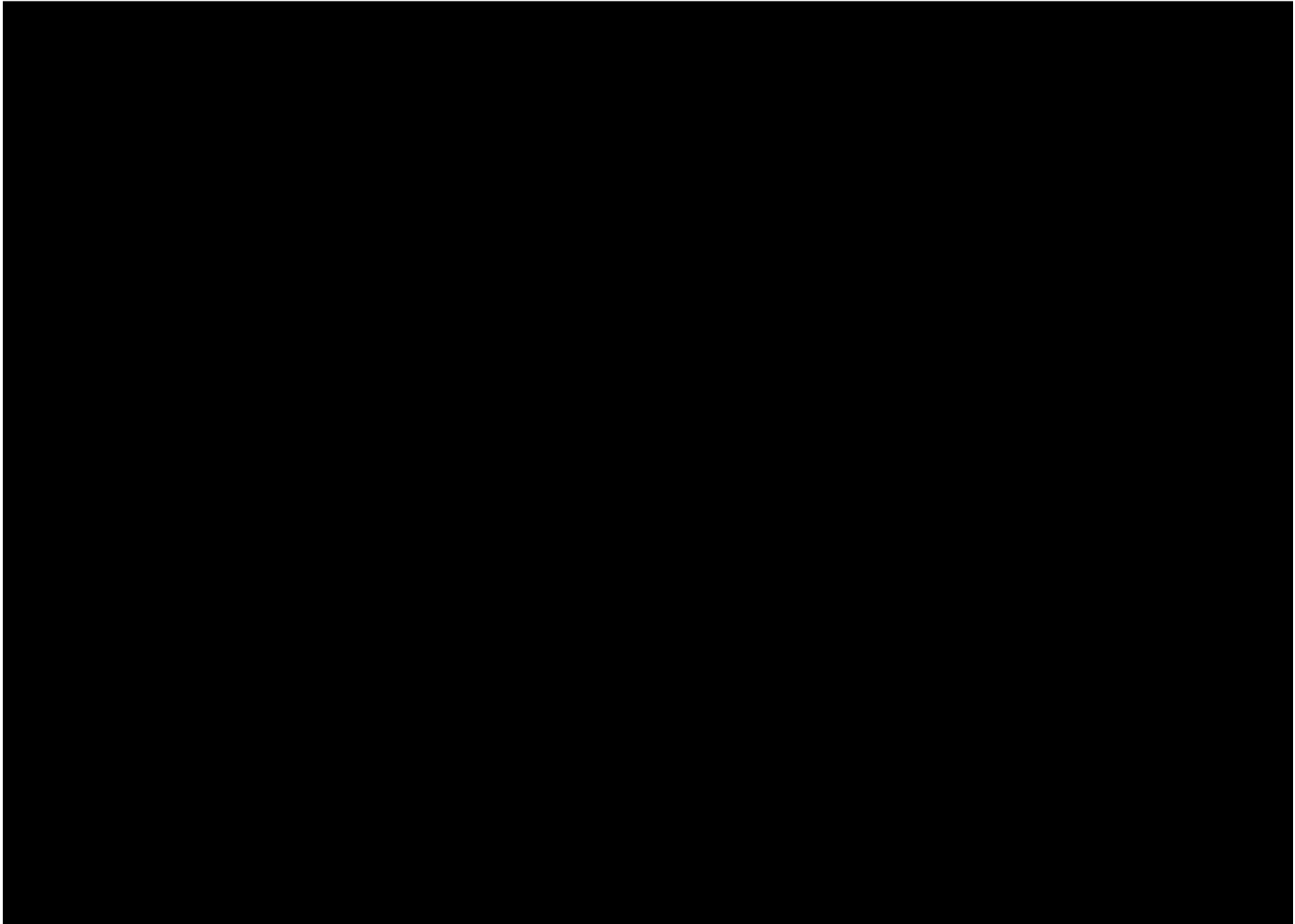


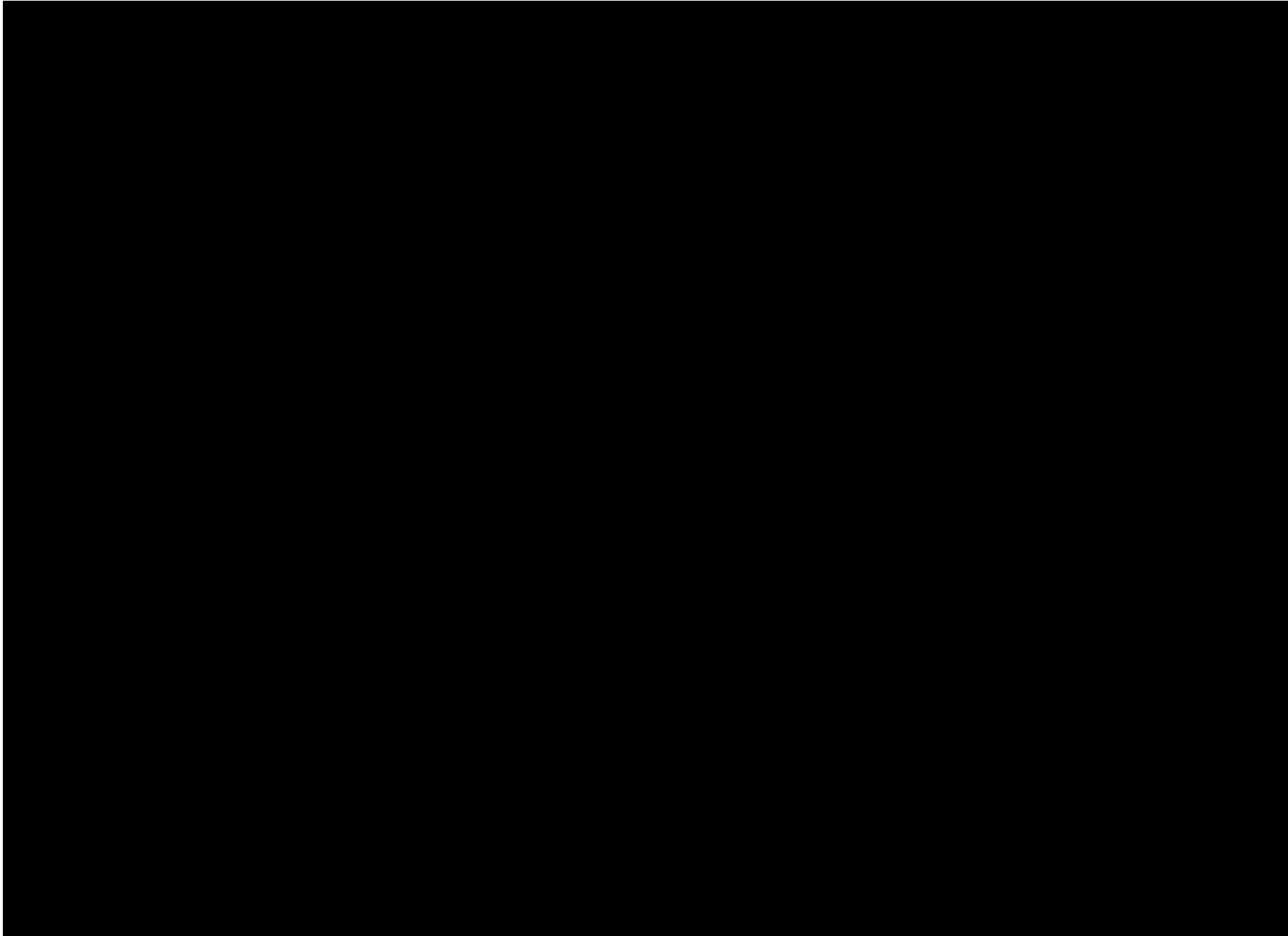


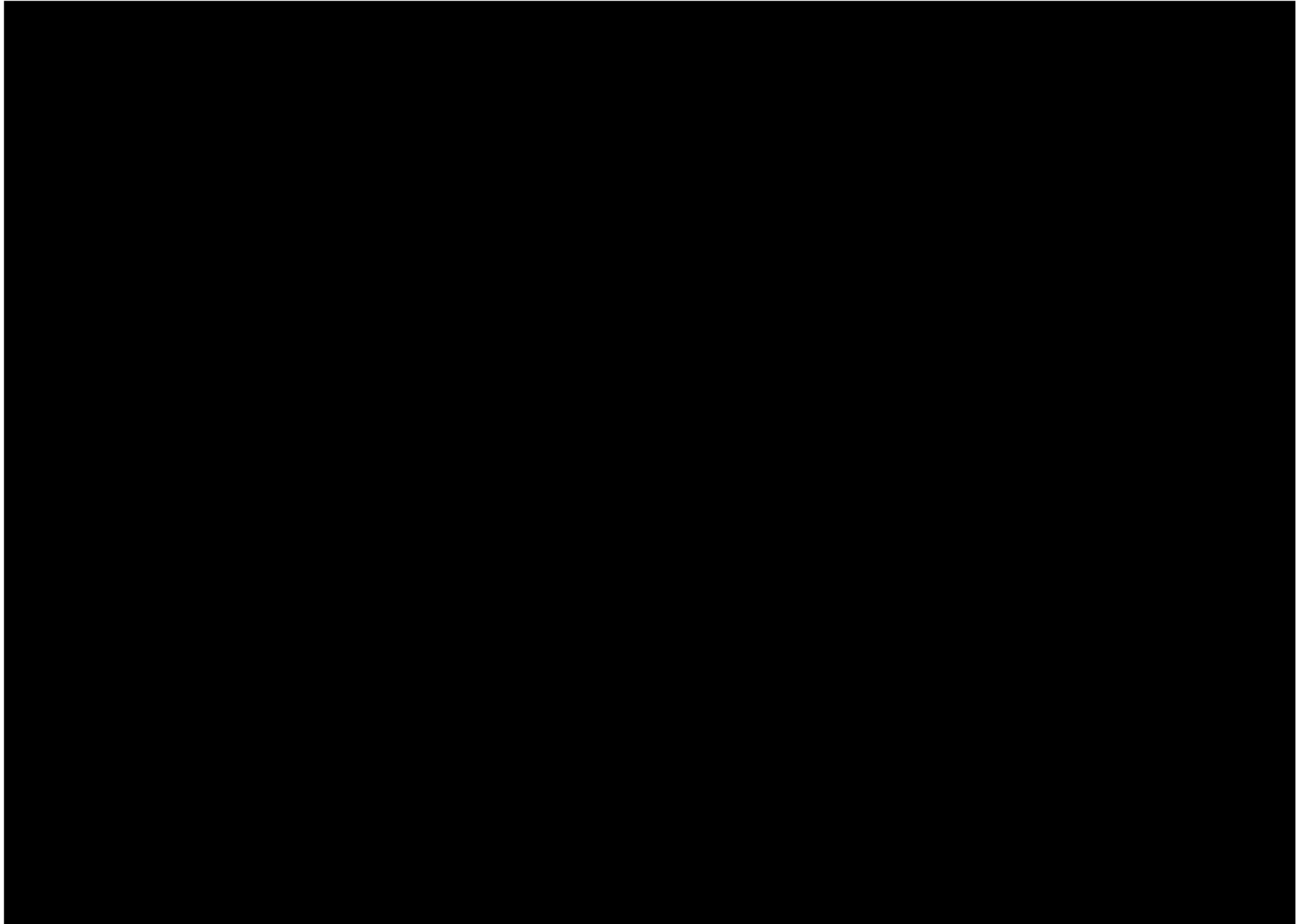














# Recommendation and Next Steps

**AJM**  
Joint Venture

**aurecon** **Jacobs** **M M**  
McDONALD

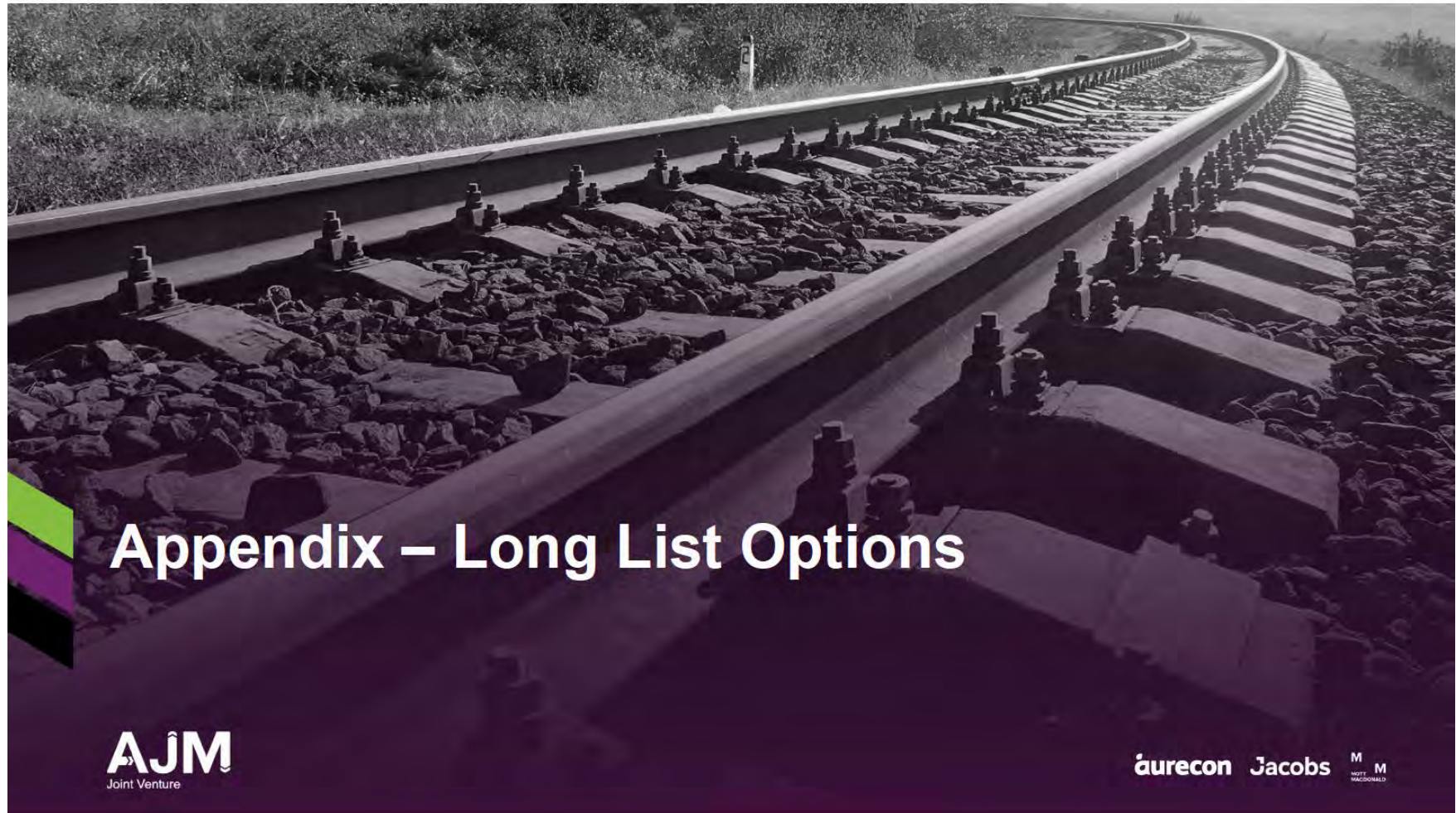


## Recommendation

- Option 2 is recommended as the preferred option following the MCA
- Additional PuDO is recommended to be investigated further on Carinish Road (East) northern verge and on Mary Street for ease of access from all directions of travel

## Next Steps

- Option 2 to be included in the Revision D update to the Reference Design



## Baseline – Carinish Rd Closed

### Key Advantages / Opportunities

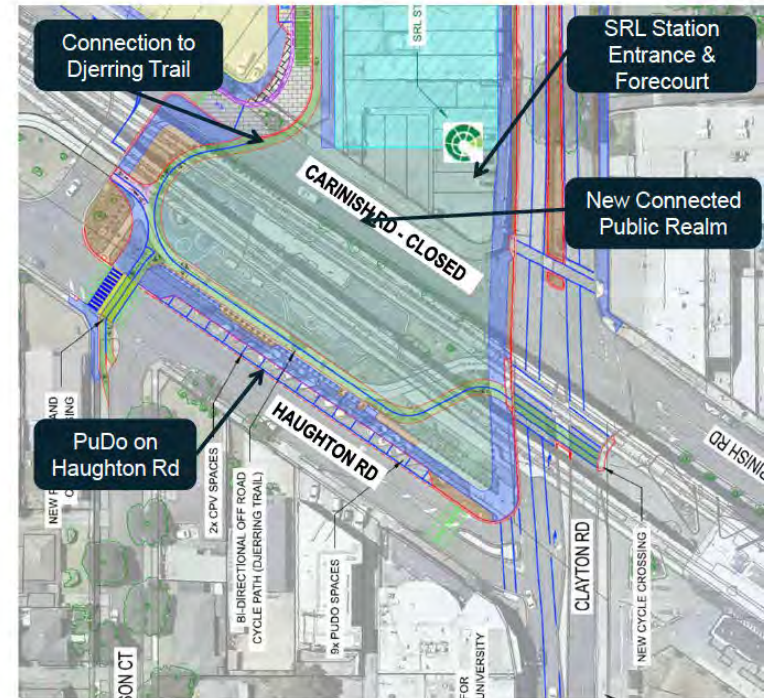
- Contiguous and integrated **public realm** with the station surrounds. Additional 1100m<sup>2</sup> of public space
- Improved **Clayton Road Performance** due to removal of intersection leg.
- Deter potential rat running between North Rd and Clayton Rd.
- Improved **pedestrian safety** via reduced number of traffic lanes to be crossed

### Key Constraints / Issues

- Restricted **PuDo access** from Clayton Road for either arrival or departure
- **Redistribution** of local traffic and increased flows on some local residential streets. Estimated an additional 500 vehicles per day use Madeleine St
- Limited **Right Turn** movements from existing residential pocket.
- Convoluted access for **emergency services** to SRL Station

### Cost

- Baseline per funding submission (\$\$)





## Option 1 – Reinstate Carinish Rd in Current Configuration

### Key Advantages / Opportunities

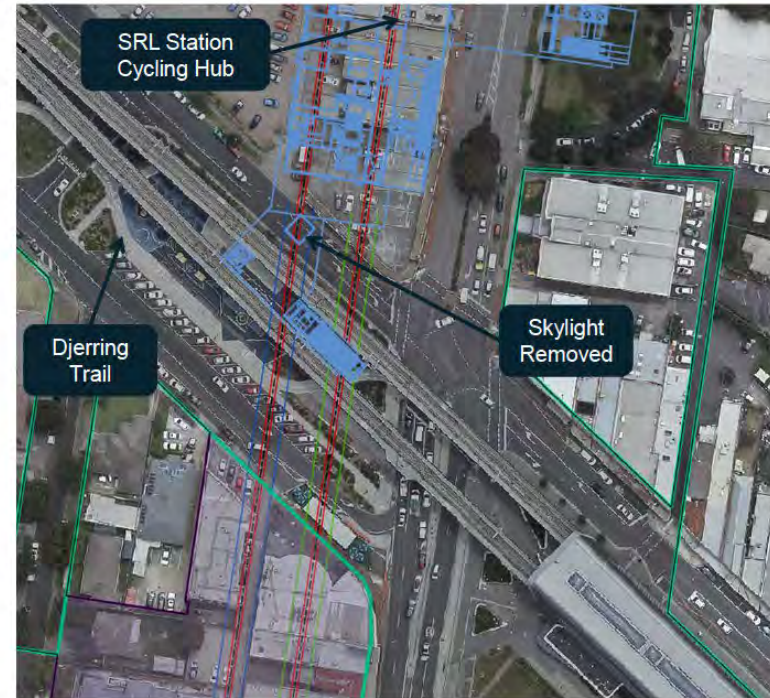
- Maintenance of **existing local access** to surrounding local streets.
- Supported by Local Council
- Improved access to **PuDo** with opportunity to locate some on Carinish Rd.
- Improved access for **emergency services** to SRL Station.

### Key Constraints / Issues

- Loss of future public realm / open space of ~1100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Less efficient connection of SRL Station cycling facilities to Djerring Trail and doesn't prioritise the North/South connectivity
- Requires removal of **skylight** and associated impact to **wayfinding** within SRL Station (potential other options)
- Reduced **pedestrian safety** via additional number of traffic lanes to be crossed
- Reduced **Clayton Road performance** due to reinstatement of intersection leg.
- Does not prioritise pedestrian movements or amenity (**non compliance to UDS**). **Breaks link between north south precinct.**

### Cost

- Lower than Baseline (\$)



## Option 2 – Carinish Rd Closed with Shandeau Ave Modifications

### Key Advantages / Opportunities

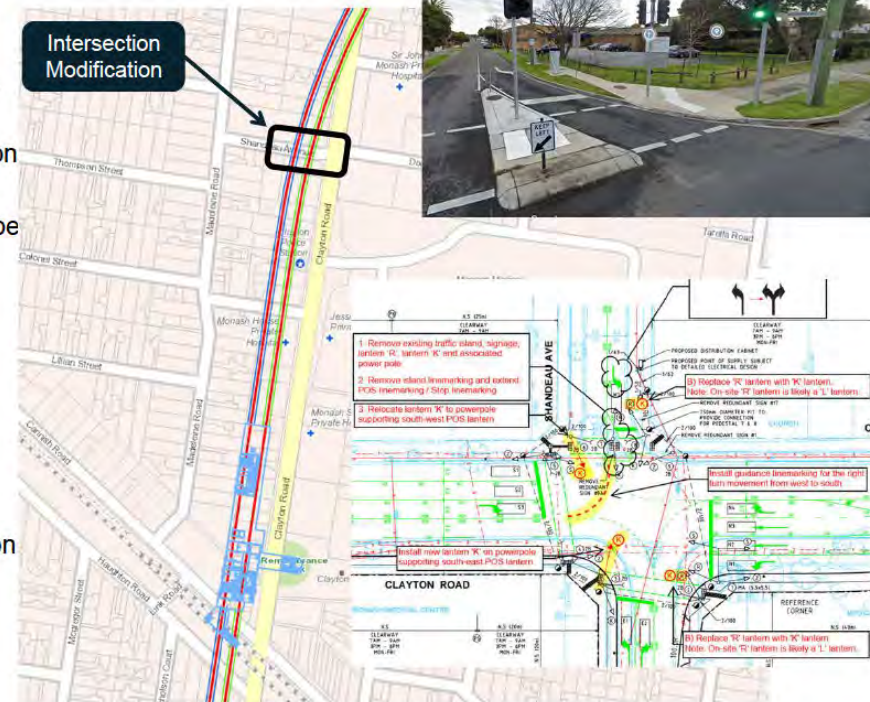
- Improved **Right Turn** movements from existing residential pocket
- Contiguous and integrated **public realm** with the station surrounds. Additional 1100m<sup>2</sup> of public space
- Improved **Clayton Road Performance** due to removal of intersection leg.
- Improved **pedestrian safety** via reduced number of traffic lanes to be crossed

### Key Constraints / Issues

- Restricted **PuDo access** from Clayton Road for either arrival or departure
- Some **redistribution** of local traffic and increased flows on some local residential streets.
- Convoluted access for emergency services to SRL Station
- **Restriction of parking** on Shandeau Avenue to facilitate intersection upgrade

### Cost

- Baseline + Intersection Modifications (\$\$\$)



## Option 3 – Carinish Rd Shared Zone

### Key Advantages / Opportunities

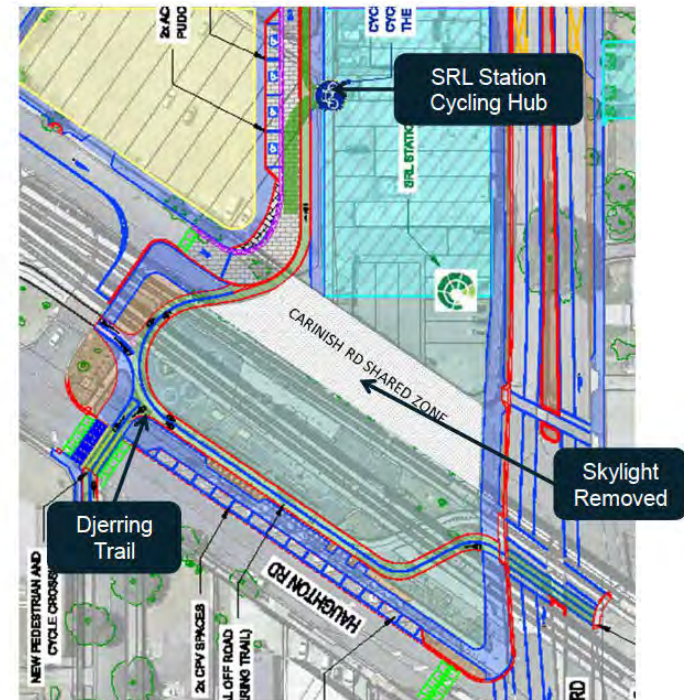
- Maintenance of **existing local access** to surrounding local streets and reduced redistribution to local streets.
- Improved access to **PuDo** with opportunity to located some on Carinish Rd.
- Improved access for **emergency services** to SRL Station.

### Key Constraints / Issues

- Compromised scenario that has limited benefit for pedestrians or motorists. Shared zone has effective capacity of **~1000 vehicles/day**. **PuDo volumes need to be considered**
- Less convenient environment for pedestrians, with reduced **pedestrian safety** via additional number of traffic lanes to be crossed
- Loss of future public realm/open space of <1100m2 which integrates seamlessly with the open space under the viaduct.
- Connection of SRL Station cycling facilities to Djerring Trail
- Requires removal of **skylight** and associated impact to **wayfinding** within SRL Station
- Reduced **Clayton Road performance** due to reinstatement of intersection leg.

### Cost

- Similar to Baseline (\$\$)



## Option 4 – Carinish Rd Modified Cross Section

### Key Advantages / Opportunities

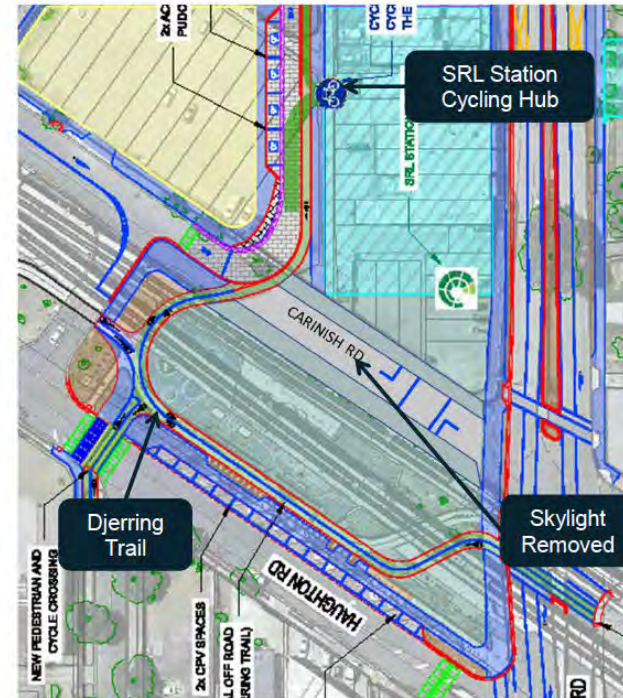
- Maintenance of **existing local access** to surrounding local streets and reduced redistribution to local streets.
- Potential to stage closure of Carinish Rd as Precinct evolves.
- Improved access to **PuDo** with opportunity to located some on Carinish Rd.
- Improved access for **emergency services** to SRL Station.

### Key Constraints / Issues

- Less convenient environment for pedestrians, with reduced **pedestrian safety** via additional number of traffic lanes to be crossed.
- Loss of future public realm / open space of <1100m<sup>2</sup> which integrates seamlessly with the open space under the viaduct.
- Connection of SRL Station cycling facilities to Djerring Trail
- Requires removal of **skylight** and associated impact to **wayfinding** within SRL Station
- Reduced **Clayton Road performance** due to reinstatement of intersection leg with potential for queuing issues associated with pedestrian crossing.

### Cost

- Similar to Baseline (\$\$)



## Option 5 – Houghton Rd Closed

### Key Advantages / Opportunities

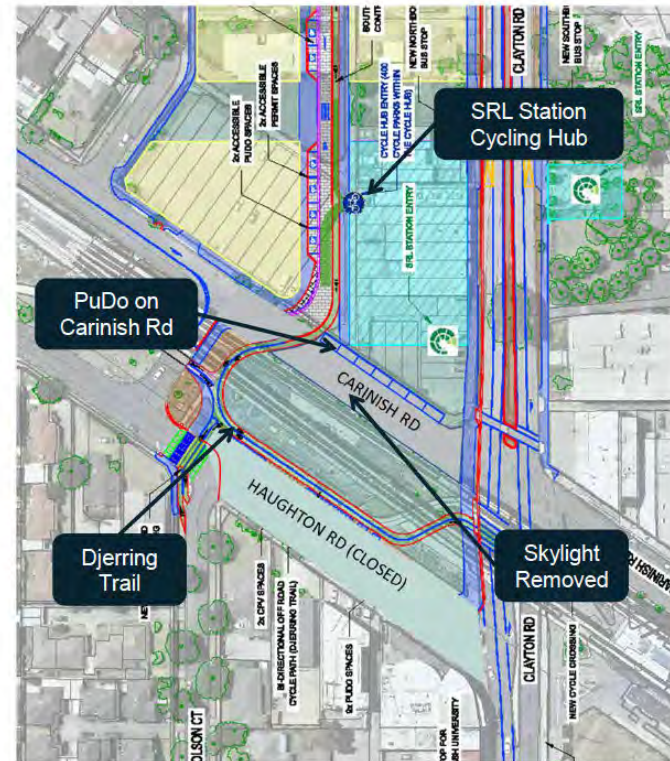
- Aligned with Council Clayton Precinct Plan 2020
- Maintenance of **existing local access** to surrounding local streets and reduced redistribution to local streets.
- Provides **PuDo parking** in proximity to station
- Improved access for **emergency services** to SRL Station.
- Provides comparable sized provision of public realm/open space

### Key Constraints / Issues

- Restricted **PuDo access** from Clayton Road for either arrival or departure
- Public realm/open space not connected to Station
- Connection of SRL Station cycling facilities to Djerring Trail
- Requires removal of **skylight** and associated impact to **wayfinding** within SRL Station
- Reduced **Clayton Road performance** due to reinstatement of intersection leg.
- Loss of service access for business on Houghton Rd

### Cost

- Higher than Baseline (\$\$\$)



## Option 6 – New Carinish / Houghton Intersection

### Key Advantages / Opportunities

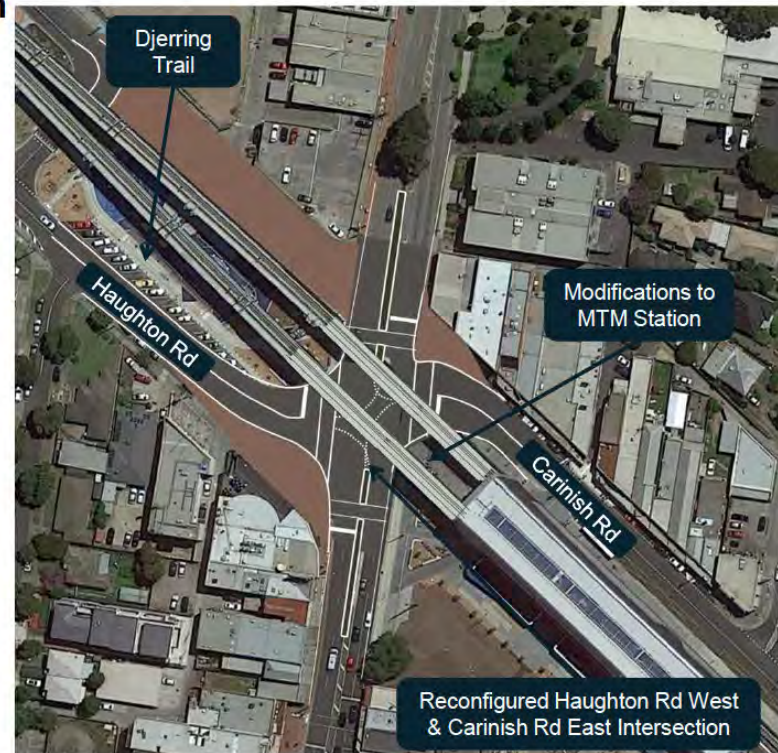
- Maintenance of **existing local access** to surrounding local streets.
- Improved access for **emergency services** to SRL Station.
- Improved **pedestrian safety** via reduced number of traffic lanes to be crossed
- Large provision of connected open space / public realm
- Connection of SRL Station cycling facilities to Djerring Trail

### Key Constraints / Issues

- Restricted **PuDo access** on either arrival or departure
- Substantial impact to **Djerring Trail** users crossing Clayton Road
- Reduced **Clayton Road performance** due to reinstatement of intersection leg.
- Additional **disruption** on east side of Clayton Road at MTM Station.
- Severs the North/South connection between major precinct elements hospital to activity centre.

### Cost

- Significantly higher than Baseline (\$\$\$\$)



## Option 7 – Lillian St Connection

### Key Advantages / Opportunities

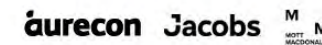
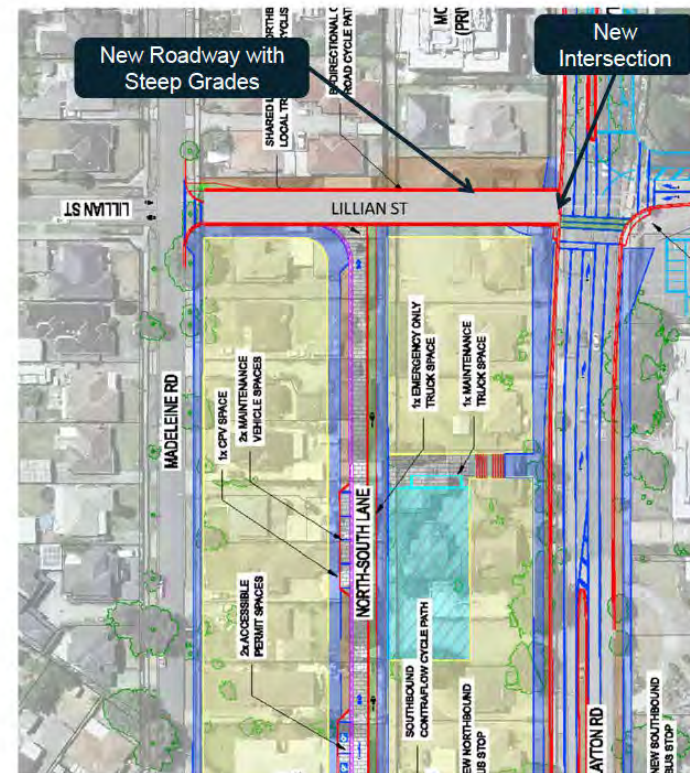
- Improved PuDo access
- Improved local access from streets to west
- Maintains public realm / open space near Station entrance
- Improved access for emergency services to SRL Station

### Key Constraints / Issues

- **Not technically feasible** - Steep incline with grades of ~10% between laneway and Clayton Road non compliant
- Loss of DDA Access at northern end of Station site
- May sever important east west-cycle and pedestrian link
- Potential concerns from residents due to redistribution of traffic to local streets.
- Reduced Clayton Road performance due to new intersection.
- Potential visual impact to northern residential neighbours.

### Cost

- Higher than Baseline cost (\$\$\$)



## Option 8 – Carinish Rd Realignment

### Key Advantages / Opportunities

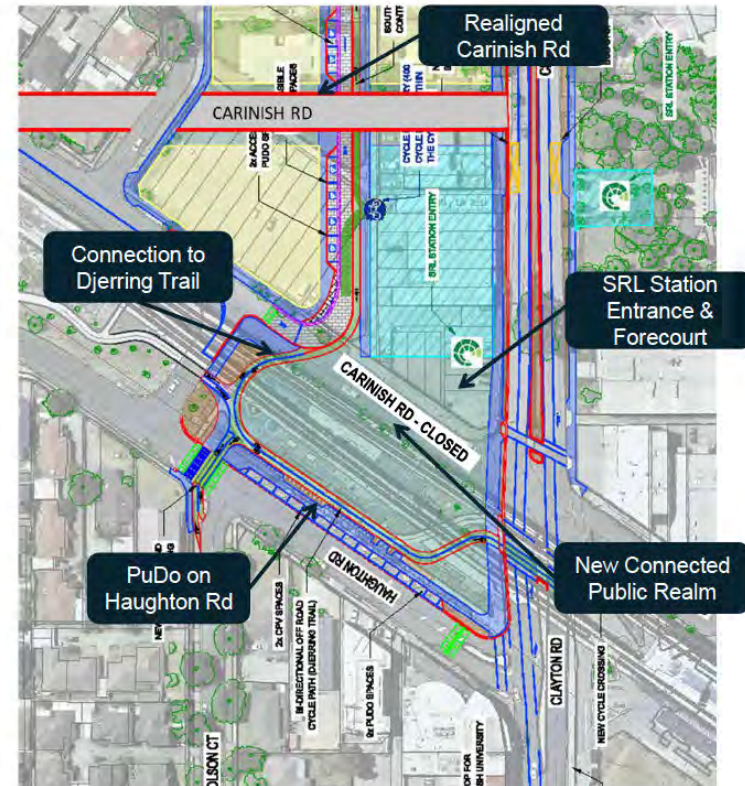
- Maintains public realm / open space south of Station entrance
- Improved pedestrian safety via reduced number of traffic lanes to be crossed from south
- Improved PuDo access
- Improved local access from streets to west

### Key Constraints / Issues

- Additional property acquisitions
- Works outside of project boundary
- Loss of public realm north of Station building
- Reduced Clayton Road performance due to new intersection.
- Loss of Skylights at Concourse
- Will divide the precinct to north & south of new Carinish Rd.

### Cost

- Higher than baseline cost (\$\$\$\$)









## Appendix B



# Clayton Road, Dixon Street, Shandeanu Avenue - 2041 with SRL SIDRA Results

## MOVEMENT SUMMARY

**Site: 101 [AM Clayton Road/ Dixon Street/ Shandeanu Avenue - 2041 With SRL (Base Case) (Site Folder: General)]**

2041 With SRL - PM Peak (17:00-18:00) [copied initial model, change signal coordination to favourable for Clayton Rd S]

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [ Total HV ] veh/h %		DEMAND FLOWS [ Total HV ] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [ Veh. Dist ] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clayton Road (South)														
1	L2	42	2.0	44	2.0	0.371	13.6	LOS B	5.8	43.4	0.38	0.38	0.38	33.1
2	T1	671	8.0	706	8.0	0.371	8.0	LOS A	5.9	43.9	0.38	0.35	0.38	49.5
3	R2	169	2.0	178	2.0	*0.683	47.4	LOS D	7.7	54.8	0.98	0.83	1.04	16.3
Approach		882	6.6	928	6.6	0.683	15.8	LOS B	7.7	54.8	0.50	0.45	0.51	40.4
East: Dixon Street (East)														
4	L2	42	2.0	44	2.0	0.074	26.5	LOS C	1.3	9.4	0.71	0.69	0.71	22.4
6	R2	26	2.0	27	2.0	*0.114	42.6	LOS D	1.1	7.7	0.91	0.71	0.91	29.6
Approach		68	2.0	72	2.0	0.114	32.7	LOS C	1.3	9.4	0.79	0.70	0.79	26.2
North: Clayton Road (North)														
7	L2	155	2.0	163	2.0	0.129	10.3	LOS B	2.3	16.5	0.35	0.67	0.35	46.3
8	T1	1109	8.0	1167	8.0	*0.674	16.2	LOS B	18.4	137.9	0.76	0.68	0.76	42.4
9	R2	74	2.0	78	2.0	0.389	47.5	LOS D	3.3	23.8	0.97	0.76	0.97	26.5
Approach		1338	7.0	1408	7.0	0.674	17.3	LOS B	18.4	137.9	0.72	0.68	0.72	41.5
West: Shandeanu Avenue (West)														
10	L2	46	2.0	48	2.0	0.238	45.6	LOS D	2.0	14.4	0.95	0.74	0.95	27.0
Approach		46	2.0	48	2.0	0.238	45.6	LOS D	2.0	14.4	0.95	0.74	0.95	27.0
All Vehicles		2334	6.6	2457	6.6	0.683	17.7	LOS B	18.4	137.9	0.64	0.59	0.65	40.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped	Dist ]					
South: Clayton Road (South)												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	206.2	217.0	1.05
East: Dixon Street (East)												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.0	211.5	1.05
West: Shandeanu Avenue (West)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	199.9	208.8	1.04
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	202.7	212.4	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)  
 Pedestrian movement LOS values are based on average delay per pedestrian movement.  
 Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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 Organisation: MOTT MACDONALD | Licence: NETWORK / 1PC | Processed: Wednesday, 14 June 2023 2:20:08 PM  
 Project: C:\Users\cha95017\OneDrive - Mott MacDonald\Documents\Suburban Rail Loop\Carinish Road Traffic Assessment\Shandeanu Op 2 20232704.sip9

## MOVEMENT SUMMARY

**Site: 101 [PM Clayton Road/ Dixon Street/ Shandeanu Avenue - 2041 With SRL (Base Case) (Site Folder: General)]**

2041 With SRL - PM Peak (17:00-18:00) [copied initial model, change signal coordination to favourable for Clayton Rd S]

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [ Total HV ] veh/h %		DEMAND FLOWS [ Total HV ] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [ Veh. Dist ] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clayton Road (South)														
1	L2	97	2.0	102	2.0	0.383	11.3	LOS B	5.2	38.5	0.31	0.37	0.31	35.4
2	T1	695	8.0	732	8.0	0.383	5.7	LOS A	5.3	39.4	0.31	0.32	0.31	51.6
3	R2	40	2.0	42	2.0	*0.350	52.0	LOS D	1.9	13.3	0.98	0.73	0.98	15.3
Approach		832	7.0	876	7.0	0.383	8.6	LOS A	5.3	39.4	0.34	0.34	0.34	47.7
East: Dixon Street (East)														
4	L2	122	2.0	128	2.0	0.279	33.9	LOS C	4.6	32.6	0.84	0.76	0.84	19.6
6	R2	70	2.0	74	2.0	*0.307	44.0	LOS D	3.0	21.6	0.94	0.76	0.94	29.2
Approach		192	2.0	202	2.0	0.307	37.6	LOS D	4.6	32.6	0.88	0.76	0.88	24.2
North: Clayton Road (North)														
7	L2	30	2.0	32	2.0	0.023	7.9	LOS A	0.3	2.2	0.24	0.62	0.24	48.2
8	T1	1068	8.0	1124	8.0	*0.524	11.1	LOS B	14.5	108.8	0.62	0.56	0.62	46.7
9	R2	23	2.0	24	2.0	0.201	51.2	LOS D	1.1	7.7	0.98	0.71	0.98	25.5
Approach		1121	7.7	1180	7.7	0.524	11.9	LOS B	14.5	108.8	0.62	0.56	0.62	46.0
West: Shandeanu Avenue (West)														
10	L2	48	2.0	51	2.0	0.414	51.3	LOS D	2.3	16.3	1.00	0.74	1.00	25.3
Approach		48	2.0	51	2.0	0.414	51.3	LOS D	2.3	16.3	1.00	0.74	1.00	25.3
All Vehicles		2193	6.8	2308	6.8	0.524	13.7	LOS B	14.5	108.8	0.55	0.50	0.55	43.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).  
 HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
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East: Dixon Street (East)												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.0	211.5	1.05
West: Shandeanu Avenue (West)												
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All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	202.7	212.4	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)  
 Pedestrian movement LOS values are based on average delay per pedestrian movement.  
 Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

## MOVEMENT SUMMARY

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Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [ Total HV ] veh/h %		DEMAND FLOWS [ Total HV ] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [ Veh. Dist ] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clayton Road (South)														
1	L2	97	2.0	102	2.0	0.746	35.4	LOS D	16.6	122.6	0.90	0.82	0.94	17.2
2	T1	695	8.0	732	8.0	0.746	30.2	LOS C	16.6	122.6	0.89	0.81	0.93	33.6
3	R2	40	2.0	42	2.0	*0.350	52.0	LOS D	1.9	13.3	0.98	0.73	0.98	15.3
Approach		832	7.0	876	7.0	0.746	31.9	LOS C	16.6	122.6	0.90	0.81	0.94	31.3
East: Dixon Street (East)														
4	L2	122	2.0	128	2.0	*0.377	25.2	LOS C	3.5	25.2	0.92	0.77	0.92	23.0
6	R2	70	2.0	74	2.0	0.307	44.0	LOS D	3.0	21.6	0.94	0.76	0.94	29.2
Approach		192	2.0	202	2.0	0.377	32.1	LOS C	3.5	25.2	0.93	0.76	0.93	26.2
North: Clayton Road (North)														
7	L2	30	2.0	32	2.0	0.030	13.7	LOS B	0.6	4.0	0.44	0.65	0.44	43.7
8	T1	1068	8.0	1124	8.0	*0.771	26.2	LOS C	22.3	166.8	0.91	0.85	0.96	35.9
9	R2	23	2.0	24	2.0	0.081	40.2	LOS D	0.9	6.5	0.88	0.71	0.88	28.9
Approach		1121	7.7	1180	7.7	0.771	26.2	LOS C	22.3	166.8	0.90	0.84	0.94	35.9
West: Shandeanu Avenue (West)														
10	L2	48	2.0	51	2.0	0.718	47.9	LOS D	7.1	50.7	1.00	0.93	1.13	26.3
12	R2	116	2.0	122	2.0	*0.718	47.9	LOS D	7.1	50.7	1.00	0.93	1.13	12.4
Approach		164	2.0	173	2.0	0.718	47.9	LOS D	7.1	50.7	1.00	0.93	1.13	17.4
All Vehicles		2309	6.6	2431	6.6	0.771	30.3	LOS C	22.3	166.8	0.91	0.83	0.95	32.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Clayton Road (South)												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	206.2	217.0	1.05
East: Dixon Street (East)												
P2	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.0	211.5	1.05
West: Shandeanu Avenue (West)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	199.9	208.8	1.04
All Pedestrians		150	158	39.3	LOS D	0.1	0.1	0.94	0.94	202.7	212.4	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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## MOVEMENT SUMMARY

**Site: 101 [AM Clayton Road/ Dixon Street/ Shandeanu Avenue - 2041 With SRL (Option 2) (Site Folder: General)]**

2041 With SRL Option 2 - PM Peak (17:00-18:00) [copied initial model, change signal coordination to favourable for Clayton Rd S]

Site Category: Existing Design

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 98 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [ Total HV ] veh/h %		DEMAND FLOWS [ Total HV ] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [ Veh. Dist ] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Clayton Road (South)														
1	L2	12	2.0	13	2.0	0.696	36.7	LOS D	15.4	115.2	0.87	0.76	0.88	17.1
2	T1	676	8.0	712	8.0	0.696	31.2	LOS C	15.4	115.2	0.86	0.75	0.86	33.4
3	R2	173	2.0	182	2.0	*0.825	56.6	LOS E	9.3	66.3	1.00	0.90	1.22	14.4
Approach		861	6.7	906	6.7	0.825	36.4	LOS D	15.4	115.2	0.88	0.78	0.94	29.0
East: Dixon Street (East)														
4	L2	42	2.0	44	2.0	*0.109	26.2	LOS C	1.3	9.5	0.83	0.71	0.83	22.5
6	R2	25	2.0	26	2.0	0.119	47.0	LOS D	1.2	8.2	0.92	0.71	0.92	28.3
Approach		67	2.0	71	2.0	0.119	34.0	LOS C	1.3	9.5	0.86	0.71	0.86	25.6
North: Clayton Road (North)														
7	L2	156	2.0	164	2.0	0.151	14.6	LOS B	3.4	24.1	0.46	0.70	0.46	43.1
8	T1	1116	8.0	1175	8.0	*0.802	26.9	LOS C	24.7	184.8	0.87	0.83	0.94	35.5
9	R2	73	2.0	77	2.0	0.161	35.4	LOS D	2.8	20.2	0.80	0.75	0.80	30.7
Approach		1345	7.0	1416	7.0	0.802	26.0	LOS C	24.7	184.8	0.82	0.81	0.88	36.1
West: Shandeanu Avenue (West)														
10	L2	46	2.0	48	2.0	0.640	35.8	LOS D	2.9	20.9	1.00	0.82	1.09	30.3
12	R2	45	2.0	47	2.0	*0.640	35.8	LOS D	2.9	20.9	1.00	0.82	1.09	15.2
Approach		91	2.0	96	2.0	0.640	35.8	LOS D	2.9	20.9	1.00	0.82	1.09	24.3
All Vehicles		2364	6.5	2488	6.5	0.825	30.4	LOS C	24.7	184.8	0.85	0.80	0.91	32.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [ Ped ped Dist ] m		Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Clayton Road (South)												
P1	Full	50	53	43.3	LOS E	0.1	0.1	0.94	0.94	210.2	217.0	1.03
East: Dixon Street (East)												
P2	Full	50	53	43.3	LOS E	0.1	0.1	0.94	0.94	206.0	211.5	1.03
West: Shandeanu Avenue (West)												
P4	Full	50	53	43.3	LOS E	0.1	0.1	0.94	0.94	203.9	208.8	1.02
All Pedestrians		150	158	43.3	LOS E	0.1	0.1	0.94	0.94	206.7	212.4	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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## Appendix C

# Clayton Road, Dixon Street, Shandeanu Avenue – Volume Changes



The results output from the VISUM (strategic) models shown in the tables below need to be interpreted with the following limitations considered:

- Given VISUM models are intended to analyse and model large-scale (strategic levels) road networks, it may not necessarily consider all relevant traffic variability. Therefore, it is one level of modelling undertaken and should be considered with the outputs from the microsimulation (VISSIM) and intersection (SIDRA) models.
- It must be noted there may be slight differences between the results when compared to their respective plots, due to rounding.
- Additionally, where there are road segments that yield a value of 0 vehicles per hour, this would be due to the nature of that particular road segment not facilitating high levels of traffic. This would be evident along residential local roads where a volume of less than 1 vehicle per hour is quite possible, therefore, yielding a value of 0 over a given hour. Furthermore, these road segments which continue to yield a volume of 0 vehicles per hour in the project cases are unaffected by either the proposed closure of Carinish Road or the permission of right turn movements out of Shandean Avenue.

**Carinish Road Volumes – AM Peak**

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
Carinish Road	Mary Street	Clayton Road	WB	300	345	45	0.8
			EB	610	611	2	0.0
	Clayton Road	Madeleine Road	WB	281	0	-281	-4.7
			EB	268	0	-268	-4.5
	Madeleine Road	Flora Road	WB	127	125	-2	0.0
			EB	79	31	-48	-0.8
	Flora Road	Thompson Street	WB	17	17	0	0.0
			EB	75	56	-19	-0.3
	Thompson Street	Colin Road	WB	17	17	0	0.0
			EB	76	67	-9	-0.2
	Colin Road	Milgate Street	WB	36	40	4	0.1
			EB	101	106	5	0.1
Whitburn Street	Clayton Road	Royalty Street	EB	173	167	-6	-0.1
			WB	34	38	3	0.1
Dixon Street	Clayton Road	Fregon Road	EB	139	144	5	0.1
			WB	60	60	-1	0.0
Mary Street	Wright Street	Francis Street	SB	1	22	21	0.4
			NB	0	0	0	0.0

Attachment 7.1.8.1 SRL Carinish Road, Clayton Traffic Assessment - Redacted

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
	Francis Street	Carinish Road	SB	94	93	-2	0.0
			NB	236	209	-27	-0.5
<b>Dunstan Street</b>	Prince Charles Street	Yarram Crescent	EB	3	6	3	0.1
			WB	2	2	0	0.0
	Yarram Crescent	Cooke Street	EB	0	1	1	0.0
			WB	1	1	0	0.0
Cooke Street	Clayton Road	EB	82	86	4	0.1	
		WB	21	22	1	0.0	
<b>Prince Charles Street</b>	Dunstan Street	Faulkiner Street	NB	2	2	0	0.0
			SB	14	34	20	0.3
	Faulkiner Street	Gentle Street	NB	0	0	0	0.0
			SB	3	7	4	0.1
Gentle Street	Haughton Road	NB	40	40	-1	0.0	
		SB	2	6	4	0.1	
<b>Faulkiner Street</b>	Prince Charles Street	McGregor Street	EB	3	3	0	0.0
<b>McGregor Street</b>	Faulkiner Street	Haughton Road	NB	112	98	-14	-0.2
			SB	146	142	-4	-0.1
<b>Haughton Road</b>	Prince Charles Street	McGregor Street	EB	476	452	-25	-0.4
			WB	220	224	4	0.1
	McGregor Street	Nicholson Court	EB	518	457	-61	-1.0
			WB	297	274	-23	-0.4
Nicholson Court	Clayton Road	EB	251	362	112	1.9	
		WB	218	359	141	2.4	
<b>Madeleine Road</b>	Carinish Road	Colonel Street	NB	0	4	4	0.1
			SB	0	67	67	1.1
	Colonel Street	Thompson Street	NB	0	4	4	0.1
			SB	30	58	27	0.5
	Thompson Street	Shandeanu Avenue	NB	1	25	24	0.4
			SB	85	97	12	0.2
	Shandeanu Avenue	Alice Street	NB	13	9	-4	-0.1
			SB	12	26	14	0.2
Alice Street	Margaret Street	NB	3	1	-2	0.0	

Attachment 7.1.8.1 SRL Carinish Road, Clayton Traffic Assessment - Redacted

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)	
	Margaret Street	Manton Road	SB	10	20	10	0.2	
			NB	1	0	-1	0.0	
	Manton Road	North Road	SB	10	10	0	0.0	
			NB	0	0	0	0.0	
<b>Banksia Street</b>	Edinburgh Street	Manton Road	NB	93	91	-2	0.0	
			SB	195	193	-2	0.0	
	Manton Road	North Road	NB	83	81	-2	0.0	
			SB	194	193	-1	0.0	
	<b>Flora Street</b>	Carinish Road	Colonel Street	NB	156	159	3	0.1
				SB	50	26	-24	-0.4
Colonel Street		Thompson Street	NB	29	42	13	0.2	
			SB	79	87	8	0.1	
Thompson Street		Alice Street	NB	29	31	2	0.0	
			SB	25	48	23	0.4	
Alice Street	Margaret Street	NB	39	39	1	0.0		
		SB	26	54	27	0.5		
Margaret Street	North Road	NB	65	67	2	0.0		
		SB	123	160	37	0.6		
<b>Colin Road</b>	Carinish Road	Edinburgh Street	NB	1	1	0	0.0	
			SB	42	32	-10	-0.2	
	Edinburgh Street	North Road	NB	41	55	14	0.2	
			SB	89	87	-2	0.0	
<b>Milgate Street</b>	Carinish Road	Edinburgh Street	NB	36	40	4	0.1	
			SB	101	106	5	0.1	
	Edinburgh Street	Fulton Street	NB	36	40	4	0.1	
			SB	136	149	14	0.2	
	Fulton Street	North Road	NB	89	95	7	0.1	
			SB	234	251	16	0.3	
<b>Lilian Street</b>	Carinish Road	Madeleine Road	EB	0	0	0	0.0	
			WB	0	0	0	0.0	
<b>Colonel Street</b>	Flora Road	Madeleine Road	EB	31	32	0	0.0	
			WB	30	4	-26	-0.4	

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
	Madeleine Road	Clayton Road	EB	31	32	0	0.0
			WB	0	14	14	0.2
	Carinish Road	Flora Road	EB	1	11	10	0.2
			WB	0	0	0	0.0
<b>Thompson Street</b>	Flora Road	Madeleine Road	EB	1	21	20	0.3
			WB	55	39	-15	-0.3
<b>Shandean Avenue</b>	Madeleine Road	Clayton Road	EB	13	51	38	0.6
			WB	98	106	8	0.1
<b>Alice Street</b>	Flora Road	Madeleine Road	EB	2	6	4	0.1
			WB	10	8	-2	0.0
<b>Margaret Street</b>	Flora Road	Madeleine Road	EB	0	10	10	0.2
			WB	2	1	-1	0.0
<b>Edinburgh Street</b>	Milgate Street	Colin Road	EB	34	43	8	0.1
			WB	0	0	0	0.0
	Colin Road	Flora Road	EB	1	1	0	0.0
			WB	0	0	0	0.0
	Flora Road	Banksia Street	EB	39	36	-3	-0.1
			WB	1	2	0	0.0
<b>Manton Road</b>	Banksia Street	Madeleine Road	EB	10	10	0	0.0
			WB	1	0	-1	0.0

Carinish Road Volumes – PM Peak

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
Carinish Road	Mary Street	Clayton Road	WB	327	381	54	0.9
			EB	410	443	33	0.6
	Clayton Road	Madeleine Road	WB	231	0	-231	-3.9
			EB	453	0	-453	-7.6
	Madeleine Road	Flora Road	WB	42	46	4	0.1
			EB	138	63	-74	-1.2
	Flora Road	Thompson Street	WB	25	53	28	0.5
			EB	46	38	-8	-0.1
	Thompson Street	Colin Road	WB	25	53	28	0.5
			EB	46	46	-1	0.0
Colin Road	Milgate Street	WB	40	61	21	0.4	
		EB	75	74	-1	0.0	
Whitburn Street	Clayton Road	Royalty Street	EB	68	68	0	0.0
			WB	60	70	10	0.2
Dixon Street	Clayton Road	Fregon Road	EB	45	81	36	0.6
			WB	83	86	2	0.0
Mary Street	Wright Street	Francis Street	SB	0	0	0	0.0
			NB	0	0	0	0.0
	Francis Street	Carinish Road	SB	143	145	2	0.0
			NB	105	105	0	0.0
Dunstan Street	Prince Charles Street	Yarram Crescent	EB	4	10	6	0.1
			WB	2	2	0	0.0
	Yarram Crescent	Cooke Street	EB	0	3	3	0.1
			WB	0	0	0	0.0
	Cooke Street	Clayton Road	EB	23	23	0	0.0
			WB	52	52	1	0.0
Prince Charles Street	Dunstan Street	Faulkiner Street	NB	1	1	0	0.0
			SB	24	107	83	1.4
	Faulkiner Street	Gentle Street	NB	2	2	0	0.0



Attachment 7.1.8.1 SRL Carinish Road, Clayton Traffic Assessment - Redacted

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
	Gentle Street	Haughton Road	SB	4	14	10	0.2
			NB	6	8	3	0.1
Faulkner Street	Prince Charles Street	McGregor Street	SB	26	32	6	0.1
			EB	2	2	0	0.0
McGregor Street	Faulkner Street	Haughton Road	WB	23	96	73	1.2
			NB	275	198	-78	-1.3
Haughton Road	Prince Charles Street	McGregor Street	SB	129	130	2	0.0
			EB	239	236	-3	-0.1
	McGregor Street	Nicholson Court	WB	290	307	17	0.3
			EB	465	378	-87	-1.5
	Nicholson Court	Clayton Road	WB	370	382	12	0.2
			EB	296	500	204	3.4
Madeleine Road	Carinish Road	Colonel Street	WB	253	379	125	2.1
			NB	0	42	42	0.7
	Colonel Street	Thompson Street	SB	0	74	74	1.2
			NB	0	25	25	0.4
	Thompson Street	Shandeanu Avenue	SB	0	71	71	1.2
			NB	0	87	87	1.5
	Shandeanu Avenue	Alice Street	SB	38	95	57	1.0
			NB	3	2	-1	0.0
	Alice Street	Margaret Street	SB	33	31	-2	0.0
			NB	3	0	-3	-0.1
	Margaret Street	Manton Road	SB	21	18	-3	-0.1
			NB	0	0	0	0.0
Manton Road	North Road	SB	21	17	-3	-0.1	
		NB	0	0	0	0.0	
Banksia Street	Edinburgh Street	Manton Road	SB	0	0	0	0.0
			NB	142	144	3	0.1
	Manton Road	North Road	SB	96	94	-3	-0.1
			NB	121	127	6	0.1
Flora Street	Carinish Road	Colonel Street	SB	96	94	-3	-0.1
			NB	63	65	3	0.1
			SB	137	99	-39	-0.7

Attachment 7.1.8.1 SRL Carinish Road, Clayton Traffic Assessment - Redacted

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
	Colonel Street	Thompson Street	NB	45	91	45	0.8
			SB	51	50	-1	0.0
	Thompson Street	Alice Street	NB	45	37	-9	-0.2
			SB	13	26	13	0.2
	Alice Street	Margaret Street	NB	46	38	-8	-0.1
			SB	26	39	14	0.2
	Margaret Street	North Road	NB	66	60	-5	-0.1
			SB	96	107	11	0.2
Colin Road	Carinish Road	Edinburgh Street	NB	1	16	15	0.3
			SB	33	36	3	0.1
	Edinburgh Street	North Road	NB	39	58	19	0.3
			SB	113	120	7	0.1
Milgate Street	Carinish Road	Edinburgh Street	NB	40	61	21	0.4
			SB	75	74	-1	0.0
	Edinburgh Street	Fulton Street	NB	40	61	21	0.4
			SB	80	75	-5	-0.1
	Fulton Street	North Road	NB	78	105	27	0.5
			SB	164	161	-4	-0.1
Lilian Street	Carinish Road	Madeleine Road	EB	0	0	0	0.0
			WB	0	0	0	0.0
Colonel Street	Flora Road	Madeleine Road	EB	110	111	1	0.0
			WB	0	2	2	0.0
	Madeleine Road	Clayton Road	EB	110	128	18	0.3
			WB	0	5	5	0.1
Thompson Street	Carinish Road	Flora Road	EB	0	8	7	0.1
			WB	0	0	0	0.0
	Flora Road	Madeleine Road	EB	0	62	62	1.0
			WB	38	24	-14	-0.2
Shandau Avenue	Madeleine Road	Clayton Road	EB	33	117	84	1.4
			WB	41	96	55	0.9
Alice Street	Flora Road	Madeleine Road	EB	12	13	0	0.0
			WB	0	2	1	0.0
Margaret Street	Flora Road	Madeleine Road	EB	0	1	-1	0.0

Road	Section Starts	Section Ends	Direction	Base Case – No SRL (veh)	Option 2 (veh)	Option 2 vs. Base Case – No SRL Comparison (veh)	Comparison (veh/min)
			WB	3	0	-3	-0.1
<b>Edinburgh Street</b>	Milgate Street	Colin Road	EB	5	1	-4	-0.1
			WB	0	0	0	0.0
	Colin Road	Flora Road	EB	1	1	0	0.0
			WB	0	0	0	0.0
	Flora Road	Banksia Street	EB	9	10	0	0.0
			WB	1	1	0	0.0
<b>Manton Road</b>	Banksia Street	Madeleine Road	EB	21	17	-4	-0.1
			WB	0	0	0	0.0



222 EXHIBITION STREET, MELBOURNE VIC 3000  
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