InfrastructureSA

Mitcham Hills Corridor
Independent Review

Report & Recommendations

Proposed Roundabout:
Old Belair Road/James Road junction

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The Old Belair Road and James Road junction project is 100% funded by the Australian Government and was committed in the 2019–20 Federal Mid-Year Economic and Fiscal Outlook.

In April 2022, the State Government placed the Old Belair and James Road junction project (the Project) on hold and referred the project to Infrastructure SA (ISA) for independent review (the Review).

ISA is an independent advisory body established to provide advice to government to enable informed and evidence-based decisions on infrastructure planning, investment, delivery and optimisation.

ISA reviewed information and considered public commentary in respect to the proposed project when establishing the objective and scope for the Review.

The objective of the Review was to assess the merit of the proposed intervention at the Old Belair Road and James Road junction and prepare a report that includes recommendations on how the State Government could improve movement outcomes in this locality. ISA consulted with a select group of key stakeholders and engaged expert advice to assist with the Review.

Current state of key roads and junction

Old Belair Road is the most direct route into the inner areas of Adelaide and the CBD from Belair and surrounding suburbs.

On average, approximately 17,500 vehicles per day pass through the unsignalised Old Belair Road and James Road junction (based on a count undertaken in September 2019).

During the morning peak period, vehicles turning right from James Road experience delays of up to three minutes that are caused by continuous streams of traffic along Old Belair Road. Vehicles turning right onto Old Belair Road often rely on the Old Belair Road traffic to 'let them in'. No major issues for northbound traffic in the afternoon peaks or in the southbound direction for either the morning or afternoon peaks were identified.

There were eight (8) recorded crashes between 2015 and 2019. Seven (7) of these were right angle crashes and the other was a rear end crash. Three (3) of the eight (8) crashes incurred injuries; no fatalities were recorded. Cyclists and pedestrians use these roads primarily for recreation purposes. No incidents were recorded; however, community/stakeholder feedback advised bicycle crashes occur frequently on Old Belair Road.

Adjacent to Old Belair Road is Randell Park, which is home to high quality woodland, including threatened *Grey Box Microcarpa* grassy woodlands. The woodland has been subject to previous conservation efforts.

Rethinking demand and need

The study area is a well-established residential area. Independent analysis into future traffic growth for the area identified there are no current strategies or plans for substantial residential development or other increased traffic generators. This suggests traffic volumes are not anticipated to significantly grow over the medium to longer term.

The overall approach to managing demand can be summarised as being limited to developing solutions to manage a saturated corridor and improving junction efficiencies via capacity upgrades. However, if a range of proposed interventions in the study area were reviewed and rescoped, and a mix of other non-infrastructure and small-scale infrastructure options are explored that reroute and reduce traffic, demand

could be reduced to an extent that alternative options could be pursued at the Old Belair Road and James Road junction.

Approach to identifying a preferred option

The Old Belair Road and James Road intersection study was undertaken as a part of the broader Mitcham Hills Road Corridor Planning Study (Planning Study) that also included the Main Road and Russel Street junction and the length of Old Belair Road. This resulted in a 'one size fits all' approach to defining the problems and objectives.

Four objectives/benefits were developed, and weightings were applied for development and assessment purposes. The objectives and weightings are presented below.

Objective	Weighting
Improved safety	37.5%
Improved traffic efficiency	37.5%
Minimise the impacts of the final scheme	15%
Minimise impacts during construction	10%

Options were developed to address stated problems and meet traffic efficiency and safety objectives/benefits. All shortlisted options generated similar junction footprints, resulting in similar environmental impacts to the site. There was no documented evidence to suggest work was undertaken to reduce or mitigate environmental impacts of options during the options development phase.

A rapid cost benefit analysis (CBA) was undertaken on the shortlisted options, which produced benefit-cost ratios (BCRs) that were close to 1 for all shortlisted options. A multi-criteria assessment (MCA) was used to ultimately select the proposed roundabout; however, there was a limitation with the MCA approach. As minimising environmental impacts was not a standalone key objective of the study and sufficient weightings were not allocated to these impacts during the assessment process (5.7%), they were not a determining factor in designing and selecting the preferred option. If the environmental value of adjoining woodland was more appropriately recognised during the design phase and the MCA process, then an option with reduced environmental impacts may have received a more favourable MCA result and become the preferred solution.

Understanding the environmental impact

Initial community consultation focused on the key issues, concerns and priorities for the local community. Potential options or concept plans were not available at that time. Subsequent consultation occurred after the proposed roundabout was already selected. At this point, local stakeholders developed serious reservations about the environmental impacts of the proposed roundabout.

Following consultation, the project team decreased the size of the roundabout. The revised roundabout proposes a loss of quality woodland in the Randell Park area adjacent to Old Belair Road, with the potential removal of 148 scattered trees. This included threatened *Grey Box Microcarpa Grassy Woodlands* that scatter the project area with 100 square metres affected by the proposed roundabout and 47 *Microcarpa Woodland Trees* marked for removal. The loss of high-quality woodland area represents a disproportional impact on the ecology of the Randell Park area, with the scattered trees providing foraging, roosting, nesting and shelter habitat for the threatened Grey-Headed Flying Fox and other fauna.

Local stakeholders retain reservations about the environmental impacts of the revised design.

Alternative options to the proposed roundabout

Once the proposed interventions in the study area are reviewed and rescoped and a mix of other non-infrastructure and small-scale infrastructure demand reduction options are considered, other options for the Old Belair Road and James Road junction may be effective. This Review has identified the following options for further analysis and consideration.

1. Demand is reduced to enable deferral/avoidance of a major upgrade
2. Demand is reduced to support a single lane metered roundabout
3. Demand is reduced to support an alternative single lane option
4. Demand cannot be reduced, and a major upgrade is abandoned.

Independent testing suggests a single-laned metered (i.e. signalised) roundabout controlling the James Road approach could be a viable option if morning peak volumes for James Road were reduced from 240 vehicles per hour to 180 vehicles per hour or less. Whilst a single-laned metered roundabout or an alternative single lane option may deliver a better balance of technical outcomes, environmental impacts and community views and be more affordable than the currently preferred option, this concept would need further analysis and careful consideration, particularly as it could increase overall travel times in the morning and afternoon peaks and increase the risk of rear end crashes on Old Belair Road in comparison to the current junction configuration and the currently preferred roundabout option.

Is the proposed roundabout justified?

This Review recognised the traffic management issues at the junction; however, it has also identified a noticeable level of discontent in the local community with respect to the environmental impacts of the proposed roundabout and the perceived lack of other options to reduce demand on the corridor to avoid the type of infrastructure intervention that is currently presented.

The proposed roundabout aims to improve traffic conditions, safety for motorists and crossing conditions for pedestrians and cyclists. The proposed roundabout design innovatively achieves these objectives. The proposed solution is partly justified on travel timings savings achieved for James Road commuters and improved crossing conditions for pedestrians and cyclists. The project has a rapid BCR of 0.9.

Ultimately, the proposed junction treatment represents a capital expenditure of over $15 million to address traffic issues primarily caused by 240 vehicles per hour in the morning peak hour(s). The proposed roundabout will also result in the potential loss of 148 native trees, which have unique environmental value and are of significant interest to the community.

Based on the design of the current roundabout solution and the associated impacts, both in terms of costs, benefits and disbenefits and the possibility of other non-infrastructure and infrastructure options that could minimise impacts and traffic issues at this junction, this Review finds the investment as currently proposed is not justified and further options to potentially reduce demand at the junction should be explored.

Where to next?

ISA has prepared six (6) key recommendations for action (presented in order of priority) that will enable the Department for Infrastructure and Transport (DIT) to comprehensively assess and identify a more favourable solution. When actioning these recommendations, it is recommended DIT actively engages with the local community throughout the process and maintains transparency.

ISA recommendations

Greater understanding of commuter behaviour

Suspend any upgrade of Old Belair Road and James Road and undertake further analysis on northbound movements, particularly along James Road during the morning peak hours. This will provide greater understanding of commuter movements patterns, which will guide investment choice or investment in other transport modes (public transport, walking, cycling etc). Aspects to be considered:

- Traffic volume counting during school holidays, and
- Origin and destination survey and/or additional traffic modelling.

Review related interventions

Review the Main/Russell/Sheoak 'Belair Triangle' project proposal to ensure proposed interventions do not worsen vehicle movement issues on Old Belair Road and at the James Road, Sheoak Road and Main Road junctions with Old Belair Road, or require additional interventions in the short to medium term. Key aspects to be considered:

- The banning of right turns from Sheoak Road onto Old Belair Road may potentially shift vehicles onto James Road and worsen the traffic problem at the Old Belair Road/James Road junction.
- Options to improve the ability for westbound traffic on Sheoak Road to safely turn right onto Old Belair Road and Belair Road.
- The merit of upgrading Main Road and Russell Street junction, which may also trigger another upgrade at the staggered junction of Main Road, Sheoak Road and Gloucester Avenue in future.
- The merit of reconfiguring the staggered junction of Main Road, Sheoak Road and Gloucester Avenue rather than upgrading the Main Road and Russell Street junction.

Consider alternative road interventions

Investigate **infrastructure options** and potential benefits of upgrading Laffers Road and Main Road junction to provide an alternative location for northbound traffic from Hawthorndene and Glenalta to join the priority northbound route (Main Road/Old Belair Road/Belair Road).

Review public transport services

Review train and bus services in the Belair and Mitcham Hills areas, with the key objective of increasing patronage and reducing the number of vehicles on key roads. Consider **non-infrastructure options** to improve the functionality, frequency and efficiency of public transport services and ensure services take more people to where they need to go during peak periods.

Improve access to public transport

Develop **small scale infrastructure options** to improve general accessibility and amenity of stations to incentivise greater use of existing and new public transport services. Aspects to be considered:

- Improved lighting and car parking capacity at Belair, Pinera, Glenalta, Blackwood and Coromandel railway stations.
- Construction of footpaths to and along Upper Sturt Road between Hawthorndene Drive and Sheoak Road to improve accessibility to bus stops and the Belair railway station.
- Commercial activation of railway station buildings at Blackwood, Belair etc.

Re-evaluate options for the junction

Assess the actual/potential performance of actions responding to the above recommendations and *then* reconsider and re-evaluate options for the Old Belair Road and James Road junction, with the objective of obtaining value for money and either:

a) no environmental impacts, or

b) significantly reduced environmental impacts.

Review objectives and scope

Context and objective

In April 2022, the State Government placed the Project on hold and referred it to Infrastructure SA (ISA) for Review.

ISA is an independent advisory body established to provide advice to government to enable informed and evidence-based decisions on infrastructure planning, investment, delivery and optimisation.

ISA reviewed information that was made available to ISA at the time and considered public commentary in respect to the proposed project when establishing the objective and scope for the Review.

The objective of the Review was to assess the merit of the proposed intervention at the Old Belair Road and James Road junction and prepare a report that includes recommendations on how the State Government could improve movement outcomes in this locality (**Figure 1**).

Scope

The summarised scope for the Review comprised the following:

- Consider traffic movements along and across the key roads and junctions in the Review area and their influence on the Old Belair Road and James Road junction, including:
    - Upper Sturt Road
    - Laffer's Road, Belair
    - Main Road, Belair
    - Laffer's Road and Main Road junction, Belair
    - Main Road and Russell Street junction, Belair
    - Russel Street and Sheoak Road
    - Sheoak Road and Old Belair Road junction, Belair
    - Sheoak Road and James Road junction, Belair.
- Assess whether all environmental impacts and community consultation outcomes have been appropriately assessed and considered in the options development and evaluation process.
- Assess whether other traffic treatments at the Old Belair Road and James Road junction may be more effective and offer better value for money than the proposed roundabout solution.
- Assess whether the following treatments could reduce pressure on the Old Belair Road and James Road junction to the extent that traffic assumptions and the solution should be revisited:
    - Planned traffic management treatments at the Main Road and Russell Street junction
    - Any other potential treatments at other junctions in the Review area in consideration of all the above.
- Determine if the proposed intervention at the Old Belair and James Road junction is justified.
- Recommend infrastructure and non-infrastructure option(s) for the Department for Infrastructure and Transport (DIT) to consider and action(s) for DIT to undertake.

The following areas were out of scope for the Review:

- Undertaking detailed design work, modelling and value for money assessments on new options and recommendations. This should be pursued by DIT in a transparent manner when addressing the recommendations.

- Considering the transferability of allocated funding to other options. This should be pursued by DIT when addressing the recommendations.
- Validating all suggestions from stakeholders that were heard by ISA during the Review.

The Old Belair Road and James Road junction planning study work was undertaken as a part of the broader Mitcham Hills Road Corridor Study that also included the Main Road and Russel Street junction upgrade and the length of Old Belair Road. As this Review is focused on the Old Belair Road and James Road junction, it only references that work where is intersects with the defined scope.

Important note: Some content in this Report has been extracted from key project documents for the purposes of accuracy and efficiency in undertaking the Review.

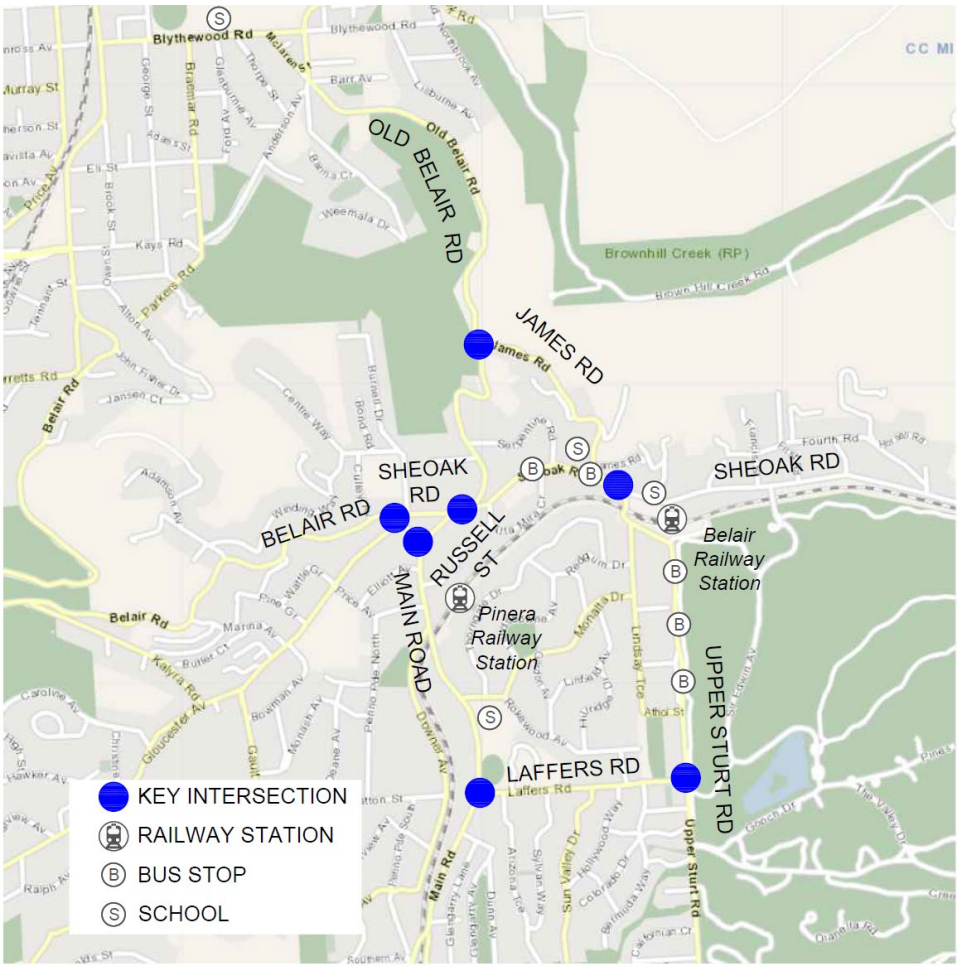


Figure 1: Locality plan

Stakeholder consultation

ISA has met with the following key stakeholders to better understand the problems and opportunities in the local area:

- Catherine Hutchesson MP, Member for Waite
- Department for Infrastructure and Transport (DIT)
- City of Mitcham
- Gould Thorpe Planning
- EcoSphere
- Friends of Old Belair Road.

Stakeholders provided insights into key issues, technical challenges and current community perspectives on the proposed roundabout, as well as alternative ways to address issues in the locality. Perspectives have informed the direction of this Review and key insights have been embedded within the document.

Current state

Project funding and planning study

The State Government committed $20 million towards the Mitcham Hills Road Corridor Upgrade initiative to address priority infrastructure requirements; in particular, to improve safety and efficiency over a four-year period (2018/19–2021/22).

The Old Belair Road and James Road junction project is 100% funded by the Australian Government and was committed in the 2019-20 Federal Mid-Year Economic and Fiscal Outlook as per the following announcement:

> "*Commonwealth Government Urban Congestion Fund – The Australian Government will allocate $20 million to the Old Belair Road Upgrade under the Urban Congestion Fund.*"

The Old Belair Road and James Road junction planning study work was undertaken as a part of the broader Planning Study that also included the Main Road and Russel Street junction upgrade and the length of Old Belair Road. See **Figure 2** below.

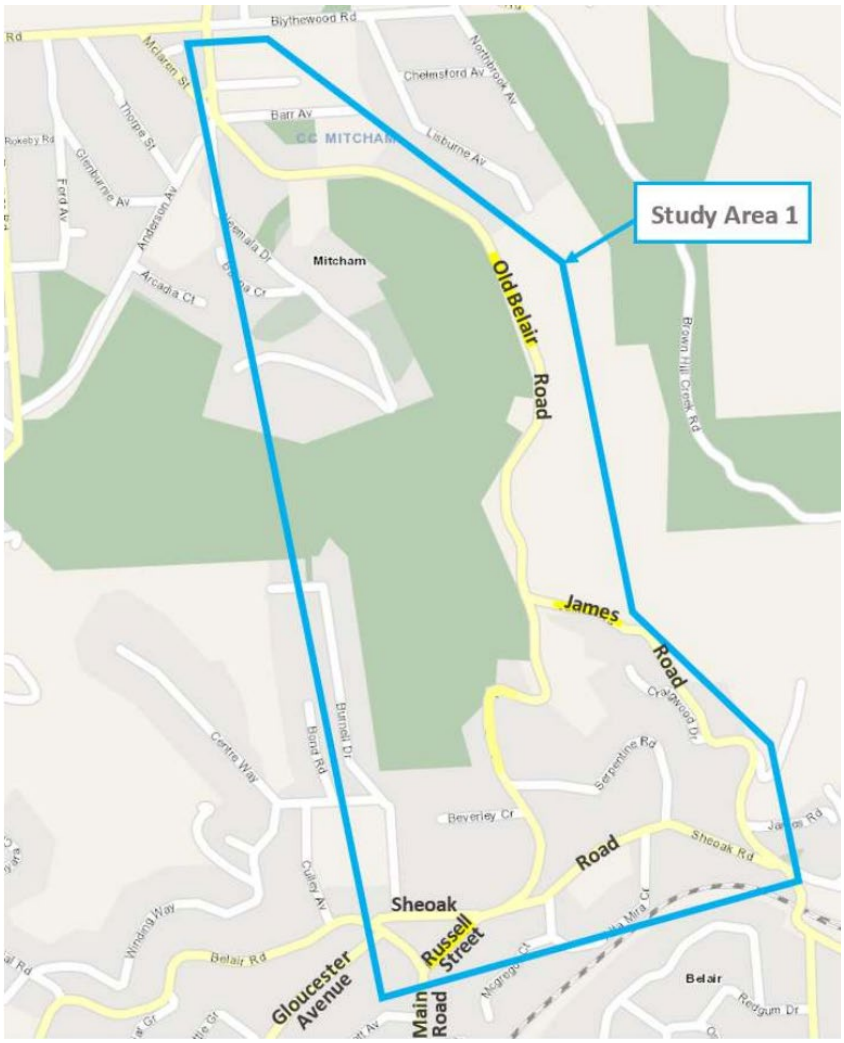


Figure 2: DIT Mitcham Hills Corridor Study Area 1

Source: Mitcham Hills Road Corridor Planning Study Report (Revision 3) (DIT, 2021)

Current state of Old Belair Road and James Road

Old Belair Road is the most direct route into the inner areas of Adelaide and the CBD from Belair and surrounding suburbs.

Joining part way along Old Belair Road is James Road, which feeds the northern portion of Old Belair Road with traffic from the Upper Sturt area. Both roads have:

- geometry that is generally poor, with narrow lanes, minimal verge width, steep grades, tight curves and limited visibility
- a single lane in each direction
- a posted traffic speed of 60kmh, and
- restrictions on vehicles of no more than 12 meters in length.

An average of approximately 17,500 vehicles per day pass through the Old Belair Road and James Road junction (based on a traffic count conducted in September 2019). The estimated daily traffic flows and commercial percentage for the junction are outlined in the table below:

Old Belair Road and James Road T-Junction	Estimated traffic volumes	Commercial Vehicle %
Old Belair Road (north of the T-junction)	17,500	1.0
Old Belair Road (south of the T-junction)	13,100	1.0
James Road	4,400	1.0

Source: DIT Mitcham Hills Corridor Old Belair Road Upgrades Project Public Works Committee Report

The current Old Belair Road and James Road junction is unsignalised. Both roads are significantly busier in morning and afternoon peak periods and Old Belair Road operates at capacity in the morning peak. During the morning peak period, vehicles turning right from James Road experience delays that are caused by continuous streams of traffic along Old Belair Road. Vehicles turning right onto Old Belair Road often rely on the Old Belair Road traffic to 'let them in'.

Traffic counts and modelling for the planning study captured the queuing observed on James Road with the 95th percentile queue to be 24 vehicles (approx. 169.4m) and an average delay time of 174 seconds (approximately 3 minutes). This approach was the key area of focus for improving overall efficiency of the junction.

Initial traffic modelling for the planning study indicated the James Road approach in the morning peak period performs with a Degree of Saturation (DoS) greater than 1.0 (1.319).

No major issues for northbound traffic in the afternoon peaks or in the southbound direction for either the morning or afternoon peaks were identified.

There were 50 crashes (including 21 casualty crashes) on Old Belair Road (between Sheoak Road and Blythewood Road) over the five-year period between 2015 and 2019. Eight (8) of the recorded crashes took place at the Old Belair Road and James Road junction. Seven (7) of these were right angle crashes and the other was a rear end crash. Three (3) of the eight (8) incurred injuries; no fatalities were recorded.

In relation to cyclists, the study recognised low volumes of cyclist travelling up Old Belair Road and moderate-high volumes in the down direction. Strava GPS identified:

- For the first 40 days of 2020, an average of three rides per day in the up direction
- Over 30 rides logged in the down direction on a Saturday (noting this is likely not representative of all trips). Weekend volumes were observed to be higher than on weekdays (anecdotal)
- cyclists exceed 70km/h in northbound direction.

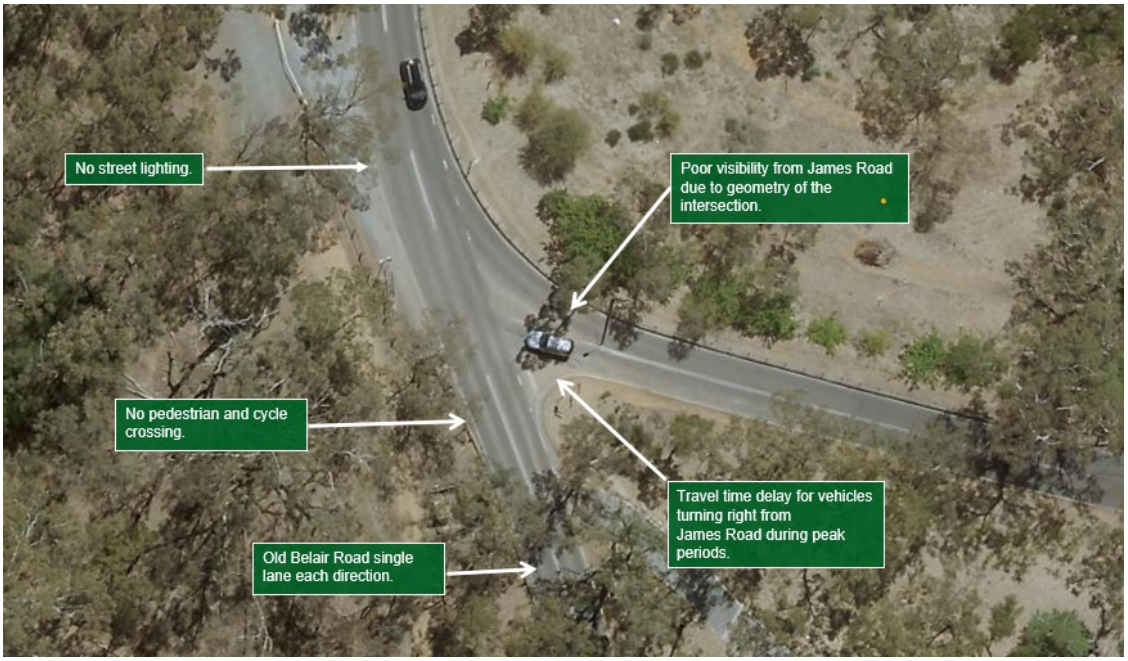
Over the five years, there were no reported bicycle crashes. However, community/stakeholder feedback advised bicycle crashes occur frequently on Old Belair Road. Single bicycle crashes are often not reported and are therefore under-represented in historical crash data. There were also anecdotal accounts of mountain bike riders congregating and crossing at Old Belair Road and James Road intersection.

Independent analysis of Strava suggest Belair Road, Sheoak Road and Old Belair Road are all preferred cyclist routes in the study area with heavy use also occurring on the park trails adjacent to Old Belair Road. The increase in cyclist volumes toward the eastern end of Gloucester Avenue implies that cyclists local to the area prefer to travel via the Belair Triangle rather than the Lynton Belair Urban Trail.

Strava data indicates there is considerable pedestrian activity between Old Belair Road trail (north of James Road) and Randell Park Reserve to the west of Old Belair Road.

Source: DIT

Source: DIT Mitcham Hills Corridor Old Belair Road Upgrades Project Public Works Committee Report



Source: DIT Mitcham Hills Corridor Old Belair Road Upgrades Project Public Works Committee Report

Rethinking demand

Current demand

Understanding future demand is important for options development and assessment.

The Planning Study analysed data from the **2016 census** to assess demand, which is summarised below.

- The population in the Mitcham Hills Corridor study area grew by approximately 0.18% p.a. between 2011 and 2016, which is considerably less than 0.8% p.a. population growth for Greater Adelaide.
- The study area also has an aging population, with noticeable increases in elderly age groups. In 2016, the median age was 44 years old, which is higher than the median age for Greater Adelaide (39 years old).
- In terms of transport mode preference, a high percentage of the population (66.1%) journey to work by car, with only 3.7% of these as a passenger. This driver percentage has increased by 2.5% since 2011 and is similar to that of Greater Adelaide (66.3% driver and 4.5% passenger).
- The use of public transport and active transport as a method of getting to work makes up 10.3% of the population in the study area, which is slightly lower than Greater Adelaide (11.3%). All forms of public and active transport as a way of getting to work have decreased since 2011 within the study area.
- Working from home has increased by 1.6% since 2011 and accounts for 6.5% of the working population within the study area. In comparison to Greater Adelaide, the study area has almost double the proportion of people working from home (3.6%).

The study area is a well-established residential area. Independent analysis into future traffic growth for the area identified there are no current strategies or plans for substantial residential development or other increased traffic generators. Based on this analysis and the broader outlook, traffic volumes are not anticipated to significantly grow over the medium to longer term.

The *Mitcham Planning Study Report Appendix D – AIMSUN Base Model Development Report* notes that under the "no upgrade at Old Belair/James scenario" (i.e. the junction remaining as is):

- James Road traffic volumes are not anticipated to rise significantly in 2026, with volumes anticipated to fall below 2019 volumes in 2036 (in the order of 10%), and
- northbound traffic volumes on Old Belair Road in the AM peak hour are forecast to increase in 2036, compared with 2019 volumes (in the order of 10%).

Reconsidering future demand

The overall approach to managing future demand in this project can be summarised as managing saturated corridors and improving junction efficiencies via capacity upgrades. This approach, when considering both the proposed interventions at Old Belair Road and James Road junction and the Russell Street and Main Road Junction and Sheoak Road upgrade, will have the effect of increasing vehicles on James Road.

State strategic land use and transport plans and policies, including the *30-Year Plan for Greater Adelaide (2017)* and the *Integrated Land Use and Transport Plan (2013)* advocate for improving land use planning and better public transport and active travel options to reduce private vehicle use and congestion on roads. Such policies support better use of existing infrastructure and a transition towards a more environmentally conscious movement network and ultimately, net-zero emissions.

This strategic lens, coupled with the anticipated decline in traffic on James Road over the longer term, supports a rethink to the current approach to the Project. If a range of proposed interventions in the study area were reviewed and rescoped and a mix of other non-infrastructure and small-scale infrastructure solutions as explored in this report were considered and found effective, demand could be reduced to an extent that alternative interventions could be pursued at the Old Belair Road and James junction.

Seeking to reduce demand via non-infrastructure and small-scale infrastructure solutions before proposing expensive infrastructure interventions is good practice for infrastructure projects. This Review has prepared a number of recommendations that are aligned to this practice. Specific opportunities are presented below.

Opportunities to better manage vehicle movement

Review the Russell Street and Main Road Junction and Sheoak Road upgrade project

The Planning Study also included a study of the Russell Street and Main Road junction and surrounds. Option 2 (Signals) was ultimately selected as the preferred option. This option included a signalised intersection that creates a bus-only right turn on Russell Street to Main Road.

A new traffic light at the Russell Street and Main Road junction will likely change movement patterns on Old Belair Road. This could provide an opportunity for the Old Belair Road and James Road junction by potentially creating 'breaks' in the flow of traffic along Old Belair Road, enabling northbound traffic on James Road sufficient breaks to turn right at Old Belair Road.

Independent analysis of Bluetooth data suggests the slowest speeds throughout the network are experienced by westbound vehicles on Sheoak Road between James Road and Old Belair Road, with an average speed of 22.6 kph. See **Figure 3** below.

This is significant as this road is a key link for buses servicing Belair, Glenalta and Hawthorndene to Mitcham, inner areas of Adelaide and the CBD in the morning peak period. Private vehicle commuter trips have the flexibility to avoid these under-performing sections of road, unlike public transport services with fixed routes.

The 195 city-bound bus route that services these suburbs during the morning peak period travels through this slow section of network (i.e. road section between the Sheoak Road and Old Belair junction and Main Road and Russell Street junction). Bus times are even slower than average vehicle times (**Figure 3**).

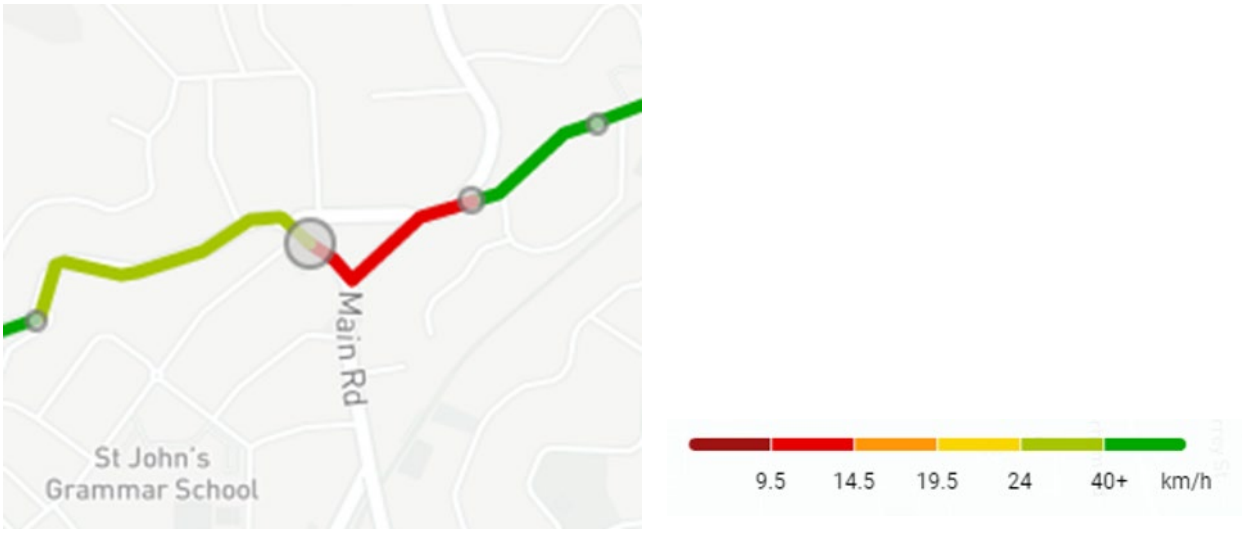


Figure 3: DIT Mitcham Hills Corridor Study Area Average bus travel speed along Sheoak Road, Russell Street, Main Road, between Russell Street and Sheoak Road, and Belair Road, Sheoak Road to Briar Grove

Source: South Australian Public Transport Authority

The proposed Main Road and Russell Street junction upgrade is likely to improve morning peak period bus trip times in the northbound direction as a result of the inclusion of a bus-only right turn lane from Russell Street onto Main Road. However, this treatment does not specifically address the issues associated with travel time reliability and slow travel speeds along Sheoak Road.

The installation of a bus-only right turn on Russell Street may reduce the ability for vehicles moving westbound along Sheoak Road to access Main Road and Belair Road. This may inadvertently result in an increase in vehicles on Old Belair Road and James Road. If demand management techniques are to be successful, this needs further consideration.

The proposed Main Road and Russell Street junction upgrade also proposes to ban right turn movements from Sheoak Road onto Old Belair Road. There are currently approximately 140 vehicles that make this turn in the morning peak hour. Banning the right turn may result in an increase in vehicles using James Road, which would be counterintuitive to managing demand on James Road. If demand management techniques are to be successful, entry onto Old Belair Road from the east/Sheoak Road should be facilitated in some way.

In addition, another upgrade of the Sheoak Road and Main Road junction, potentially including Gloucester Street, will likely be required in the future as a result of the proposed upgrade at Russell Street and Main Road junction.

These issues should be considered as part of the proposed upgrades to the Main Road and Russell Street and Russell Street junction and Sheoak Road.

Review broader road network, including potential interventions at Laffers Road and Main Road junction

Beyond the Main Road and Russell Street junction and Sheoak Road upgrade, key traffic movements throughout the review area may also impact traffic volumes on Old Belair Road and James Road.

In the absence of origin-destination data, desktop analysis suggests that traffic from Hawthorndene and Glenalta may significantly contribute to northbound volumes on James Road during the critical morning peak period. Providing an alternate route to travel northbound may reduce traffic volumes on Upper Sturt Road and James Road and reduce demand on the Old Belair Road and James Road junction.

This Review recognises that turning right from Laffers Road onto Main Road can be challenging in the morning due to the heavy use of Main Road and the junction's proximity to Belair Primary School.

An upgrade of the unsignalised junction at Laffers Road and Main Road may provide sufficient access to Main Road, which will enable vehicles to enter the priority city-bound traffic streams along Main Road, Belair Road and Old Belair Road.

This Review therefore considers there is merit in studying some form of intervention at this locality.

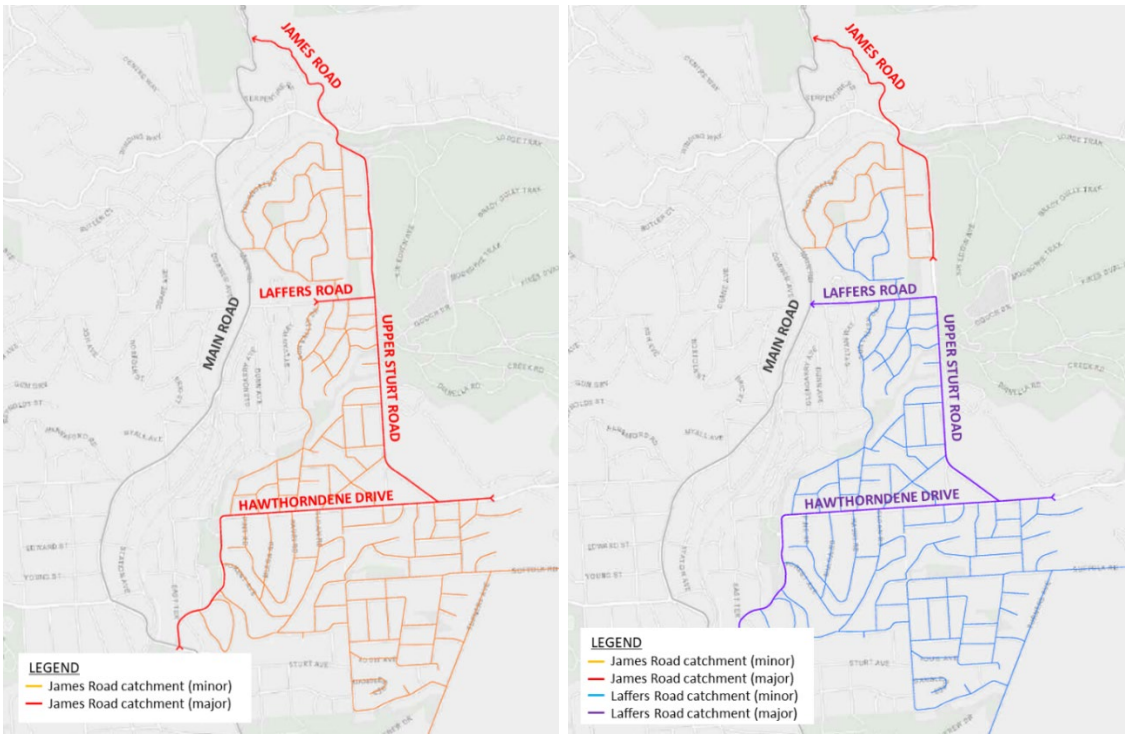


Figure 4: Indicative diversion of James Road traffic considering a junction upgrade at Laffers Road and Main Road, current traffic movements (left), reprioritised traffic movements (right)

Opportunities to reduce vehicle demand

Review public transport services

The Belair, Blackwood, Glenalta and Hawthorndene areas have access to several public transport options for northbound movements into the inner areas of Adelaide and the CBD. However, it was strongly suggested during the Review that there is a pressing need for better public transport planning in the area and that improving rail and bus services, as well as enabling better movement for pedestrians to access services, could support reduction in traffic and traffic related issues.

It was suggested during the Review that service frequency and travel times (e.g. the morning train service from Belair into the CBD takes approximately 43 minutes) may discourage some commuters, resulting in cars being the preferred mode choice.

It was suggested during the Review that some commuters may drive to train stations and bus stops closer to the city to park their vehicles and catch a train or bus into the CBD, as this is quicker/a better option than catching the train or bus into the CBD from the Belair and Blackwood areas. To improve travel times, express train services in peak periods from Blackwood/Coromandel railway stations, as well as express bus services to Mitcham and the CBD should be considered.

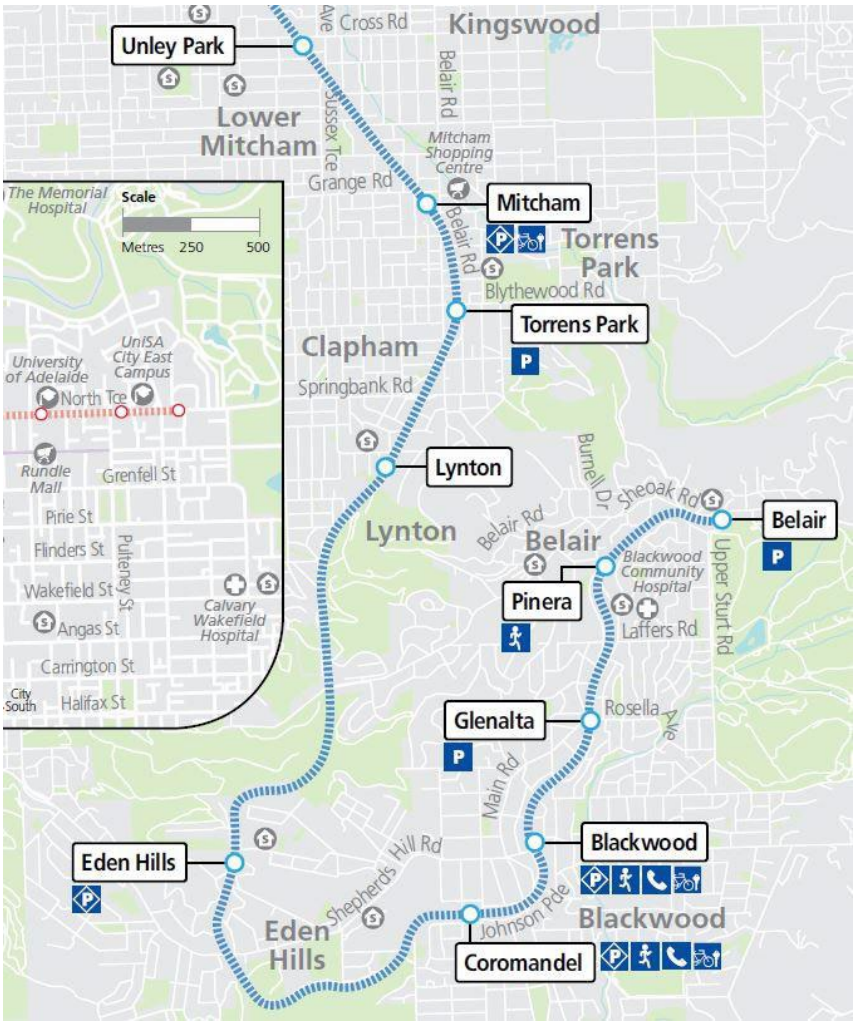


Figure 5: **Adelaide Metro Belair to City Train Map**

Source: Adelaide Metro via Planning Study

In addition, it was suggested that a sizable proportion of vehicle movements (and associated congestion) may be related to school 'drop offs' within the study area and in the inner suburbs of Adelaide. This was supported by anecdotal accounts of noticeable reductions in traffic and better performance of key roads, including the Old Belair Road and James Road junction, during school holiday periods. Observations during the Planning Study suggest traffic numbers could be 10-20% lower during school holidays.

It is noted that the 173-bus service that operates along Main Road, Blythewood Road and Fullarton Road during school days is designed to service schools in the inner aeras of Adelaide. There is an opportunity to review this service and also test alternate routes and services, including fixed route and on-demand services, to understand potential mode shift and reduction in vehicle demand on key roads. Improved bus route priority and frequency for morning bus services, including bus services that are aligned to school hours (public and private) should be a part of this work. Travel behaviour change programs in key schools should also be explored.

Review access to public transport services

Footpath access and parking availability at key public transport locations is severely limited and, if improved, may enable and encourage more people to use bus and/or train services.

During the Review, stakeholders identified the following:

- Car parks at train stations are reaching capacity and are in varying conditions, which may be restricting use of train services.

- There are safety concerns at bus stops and train stations.
- There is limited bicycle parking and access at train stations.

There is a need to consider the potential impacts of small-scale infrastructure solutions to support current public transport services and generate mode shift to reduce vehicle demand on key roads.

Consider opportunities to increase cycling

There is no safe and convenient bicycle route that connects residents in the Belair/Mitcham Hills precinct to the inner south areas of Adelaide and the CBD, which may discourage cycling as a preferred mode choice. Whilst the mode shift to cycling in this locality is not expected to significantly change vehicle numbers, this should still be considered in future studies.

Consider opportunities to increase working from home

The Planning Study identified working from home increased by 1.6% between 2011 and 2016 and accounted for 6.5% of the working population within the study area. In comparison to Greater Adelaide, the study area has almost double the proportion of people working from home (3.6%). This is expected to have increased as result of a greater acceptance of working from home practices over the past two years.

The study area comprises a higher proportion of professionals and managers compared to Greater Adelaide, whilst clerical and administrative workers, community and personal service workers, technicians and trades workers, sales workers, machinery operators/drivers and labourers were all underrepresented compared to Greater Adelaide.

This distribution of employment lends itself to increase working from home numbers in the study area.

Consolidated impact of opportunities

When the range of demand reduction opportunities are combined, volumes on Old Belair Road and James Road may reduce and alternate interventions with reduced impact such as discussed in this Review Report may to be considered further. Further investigations (e.g. origin-destination data, traffic counting and modelling) are required to determine the extent of impact from these combined interventions and possible alternate solutions.

Approach to identifying a preferred option

Stated problems and the objectives/benefits

The Old Belair Road and James Road junction study was undertaken as a part of the broader Mitcham Hills Road Corridor Study that also included the Main Road and Russel Street junction and the length of Old Belair Road. This resulted in a 'one size fits all' approach to defining the problems and objectives.

1. Motorist safety: Significant number of crashes along Old Belair Road and at other locations within the study area.
2. Cyclist safety: Safety for different user groups including recreational/downhill cyclists, commuter cyclists, recreational road cyclists.
3. Pedestrian safety and accessibility.
4. Road capacity (this includes efficiency).

Four objectives/benefits were developed for the Mitcham Hills Road Corridor Study. Weightings were then applied to criteria aligning to these objectives/benefits for assessment purposes. The objectives and weightings are presented below.

Objective	Weighting
Improved safety	37.5%
Improved traffic efficiency	37.5%
Minimise the impacts of the final scheme	15%
Minimise impacts during construction	10%

It is important to note that safety, including motorist, cyclist and pedestrian safety, represents three out of the four problems but only one out of the four objectives/benefits for the study area. The difference suggests there is a degree of misalignment between the problems and objectives/benefits sought.

Consideration of community consultation and environmental impacts in design and development phase

Initial list and shortlist of options

A traditional long list of options to address problems and deliver the intended benefits, including non-infrastructure and infrastructure solution options, was not developed for the Planning Study. An initial list of options was developed using:

- previous work undertaken by DIT, and
- high-level optioneering that considered information obtained from a site visit and initial discussions between both DIT and the City of Mitcham.

The initial list of options was designed to address the Planning Study's demand assumptions, not a reduced demand, as expressed earlier in the Report.

In February 2020, the initial list of options was shortlisted to an initial shortlist of five (5) options, as presented below. These were all infrastructure solution options. Shortlisting considered:

- Real benefit to the users – does the change really make a difference?
- Would the problem be shifted to another location?
- Would it create a material new problem at another location? E.g. rat running
- What are the likely safety implications for motorists, pedestrians/cyclists, emergency services?
- Are there material constructability issues? E.g. space
- What is the connectivity for pedestrian and cyclists?
- Will it change the amenity of the site?

The shortlisted options are presented below.

Shortlisted options	Brief description
Option 1: Roundabout (Free Flow)	A free flow lane for northbound movements along Old Belair Road. The Old Belair Road and James Road merge would occur after the roundabout.
Option 1A: Roundabout (Simple)	Standard, single lane roundabout with metering (signalised) control on James Road.
Option 2: Signals with U-turn	Signalised control of the whole junction. Right turn onto James Road would be banned and the movement enabled further downstream on Old Belair Road via a U-turn.
Option 2A: Signals (No U-turn)	Same as Option 2 but right turn onto James Road enabled.
Option 3: Seagull Treatment	Right turn from James Road into a channel lane in the median and then a merge into Old Belair Road.

Other options/treatments that were not shortlisted for a variety of safety and/or practical reasons included the following:

- Various options that would ban right turns from James Road.
- Converting James Road into a one-way road.
- Other junction treatments to manage flows.
- Traffic calming measures.
- Banning right turns from James Road and Old Belair Road and installing U-turns.

In February 2020, Options 1A, 2 and 2A were dismissed following more detailed technical assessments that focussd on the operational performance, including efficiency and road safety of the options. A new option, this being a hybrid between Options 1 and 3, was also developed for further assessment.

The shortlisting down to three options (i.e. Options 1, 3 and the Hybrid) occurred after the initial community consultation, which is explored in the next section.

Initial community consultation

In January and February 2020, community consultation was undertaken on a range of movement issues in the Mitcham Hills and Blackwood areas, which focused on the key issues, concerns and priorities for the local community. Potential infrastructure options and/or concept plans were not available for consideration at this point in time. A survey was developed with the objective of collecting information that would be of use to the project team. The survey was completed by 787 people.

The community was asked to rate their satisfaction with Old Belair Road (Russell Street/Sheoak Road through to Blythewood Road), with regard to the following aspects as listed below in order of dissatisfaction (i.e. noted as 'very' to 'totally' dissatisfied).

1. Cyclist access and safety
2. Pedestrian access and safety
3. Emergency access
4. Junction safety
5. Road safety
6. Private property access
7. Road travel times/delays
8. Business/community access.

The outcomes of the consultation revealed higher levels of dissatisfaction with cyclist and pedestrian safely, ahead of dissatisfaction levels with motorist safety. This infers there could be higher prioritisation of cycle and pedestrian safety improvements, including:

- upgrades to cycling routes along or parallel to Old Belair Road, and
- upgrades to enable pedestrians to move around this area and across key roads.

The community was also asked how important the following aspects were in relation to the proposed improvements to Old Belair Road. These are listed below in order of importance (i.e. noted as 'very' to 'extremely' important).

1. Motorist safety
2. Reliable travel times
3. Cycling facilities
4. Local amenity and vegetation impacts
5. Management of construction impacts on residents
6. Pedestrian facilities
7. Access to private properties
8. Management of construction impacts on business
9. Access to local businesses and community services.

Further, the community prioritised the following key issues for the proposed project:

1. No roundabout at Old Belair Road and James Road, because this "will encourage motorists to use James Road"
2. Improved travel times
3. Safety for all road users
4. Pedestrian facilities
5. Cycling facilities
6. Local amenity
7. Station access
8. Management of noise
9. Management of construction impacts on residents
10. Management of construction impacts on business
11. Reliability of travel times.

The community also identified a further range of issues including property acquisition, access to local streets and businesses, traffic management during and post construction and landscaping and tree removal.

Relationship between the initial shortlisted options and community consultation outcomes and environmental impacts.

The problem statements and the objectives/benefits were developed around the time the initial consultation occurred. There was general alignment between the areas of dissatisfaction and the problems stated for the corridor. There was also general alignment between the areas of importance to the community and the stated objectives/benefits and weightings for assessment.

Regarding the correlation of shortlisted options and community feedback, there is general alignment, albeit a slightly higher degree of weighting towards improving safety and travel time savings outcomes for motorists over safety outcomes for cyclists and pedestrians.

The development of options and subsequent shortlisting of options appears to have placed minimal value on environmental impacts.

As a result, all shortlisted options generated similar junction footprints, resulting in similar environmental impacts to the site. There was no documented evidence to suggest work was undertaken to reduce or mitigate environmental impacts of options during the options development phase. Impacts and eventual responses to environmental impacts are discussed later in this Report.

Assessment of community consultation and environmental impacts

The shortlist was evaluated against a safe system assessment, constructability assessment, traffic performance assessment and environmental assessment. The environmental assessment recognised:

- an estimated number of trees to be removed
- a need to obtain Native Vegetation Council clearance approval, and
- a recommended referral under the *Environment Protection and Biodiversity Conservation Act 1999*.

No option was dismissed at this time, noting all three shortlisted options had similar environmental impacts.

Socio economic evaluation

Cost-benefit analysis (CBA) is a robust methodology that assesses monetised impacts (costs and benefits) that accrue to society as a whole. It considers a broad range of socio-economic costs and benefits to the community, rather than costs and benefits that accrue solely to the South Australian Government and/or an individual entity or firm undertaking the project.

A CBA seeks to systematically measure the effects of a proposal over time. The output is ultimately expressed in terms of a net monetised benefit expressed as a ratio/multiple of benefits compared to costs. This is termed a benefit-cost ratio (BCR).

All three shortlisted options went through a rapid CBA and all three options achieved BCRs around 1, with monetised benefits primarily driven by travel time savings generated by a more efficient right turn movement from James Road onto Old Belair Road.

The proposed roundabout achieved a rapid BCR of 0.9 using 2020 costs, meaning the monetised socio-economic benefits are estimated to be of slightly less monetised value to society than the costs of construction and ongoing maintenance of the roundabout. No subsequent detailed CBAs were undertaken on the shortlisted options. Considering delays and recent cost escalation in infrastructure projects, the BCR could be slightly lower depending on the revised project cost.

It is important to note CBAs are only one assessment tool and do not consider non-monetisable (including environmental and socio-economic) impacts of proposed options.

Multi criteria assessment, evaluation and selection of preferred option

A multi criteria assessment (MCA) enables comparative scoring of multiple options against one another based on how well they align with all impacts. The MCA was used on the three shortlisted options following the CBA. The objectives/benefits and the allocated weightings were used for the MCA.

Objective	Weighting
Improved safety	37.5%
Improved traffic efficiency	37.5%
Minimise the impacts of the final scheme	15%
Minimise impacts during construction	10%

The four objectives were broken down into 23 sub-criteria, with each sub-criterion provided an equal sub-weighting. For example, one of the four sub-criteria of '*Improved safety*' received ¼ of the 37.5% weighting.

Long term motorist safety and traffic efficiency (excluding safety during construction activities) represented the highest sum of sub-weightings, accounting for a combined 42.5% of the total weighting, which maintains sound alignment to stated problems and objectives/benefits. Cycling safety and pedestrian safety were each allocated 9.8% weighting.

There was, however, a limitation with the MCA approach. The objectives utilised to design the options were also used to assess and select the preferred solution. As minimising environmental impacts was not a standalone key objective/benefit of the study (it was imbedded in the 'minimise the impacts of the final scheme' objective), and sufficient weightings were not allocated to environmental impacts during the assessment process (5.7%), environmental impacts were not a determining factor in selecting the preferred option.

If the environmental value of adjoining woodland was more appropriately recognised during the design phase and as part of the MCA process, then an option with less environmental impacts may have received a more favourable MCA result and become the preferred solution.

At the conclusion of the MCA assessment in April 2020, Option 1 (Roundabout - Free Flow northbound lane solution) at the junction of Old Belair Road and James Road was confirmed as the preferred solution. The selection of Option 1 was reaffirmed in July 2020 following subsequent retesting and validation of the design.

In summary, the selection of Option 1 implies the following:

- Correction of road geometry to address motorist safety.
- Northbound traffic on James Road will enter the northbound stream of traffic on Old Belair Road far more easily than the current configuration. The existing three-minute delay for this movement will be reduced to an average of nine seconds in the morning peak.
- Reduced risk of right-angle road crashes and queue lengths, in turn reducing road trauma and the costs associated with road crashes.
- The roundabout solution would improve safety for cyclists crossing Old Belair Road. The solution offers cyclists the option to dismount and cross Old Belair Road in two stages by using a refuge just to the south of the roundabout. The roundabout solution offers minimal improvements to safety for cyclists travelling along Old Belair Road in the north- and southbound directions.
- The merging behaviour designed for the northbound exit may still pose a significant risk to cyclists exiting James Road (ISA has not assessed this), noting that cyclists have the option with the roundabout solution of dismounting and crossing in two stages using the pedestrian proposed refuge on the southern side of the roundabout.

- High-level concept options for cycle connectivity and safety improvements have been developed as part of the options development phase. It was noted that the scale of separated cyclist facilities was to be contingent on any budget remaining from the upgrade of the James Road/Old Belair Road junction.
- A range of environmental impacts (as explored in the following sections).

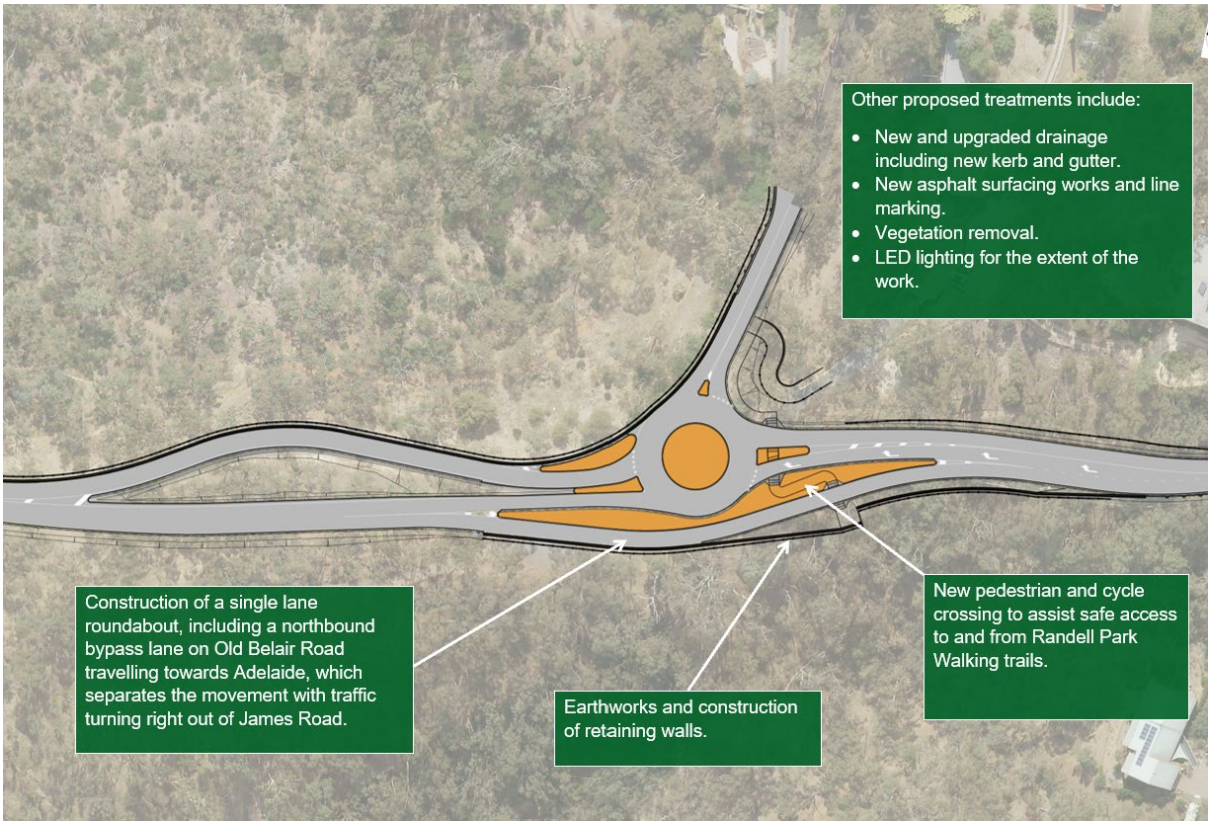


Figure 6: Concept design of proposed roundabout at the junction of James Road and Old Belair Road
Source: DIT Mitcham Hills Road Corridor Planning Study Report 2021 (Revision 3)

Additional community consultation

In February 2021, DIT released designs for the roundabout solution for consultation within the Mitcham Hills study area. This was part of a broader round of engagement DIT undertook between February and May 2021.

Key themes raised by the community, in order of frequency, include:

- Importance of minimising vegetation and fauna impacts (29%)
- Design change suggestions (19%)
- Importance of safety (12%)
- Suggestions to incorporate traffic lights (12%)
- Preference for enhance cyclist access (7%), and
- Several other concerns that were each below 3% each.

These results suggest participants developed serious reservations about the environmental impacts of the proposed roundabout design.

Following consultation, DIT made changes to the proposed roundabout solution at the Old Belair and James Road junction, which included decreasing the size of the roundabout to minimise the overall footprint of the project and reduce the impact on surrounding vegetation.

The project team held additional information sessions in November 2021 on the revised roundabout design. The final environmental impacts, after design revisioning, are described in the following section.

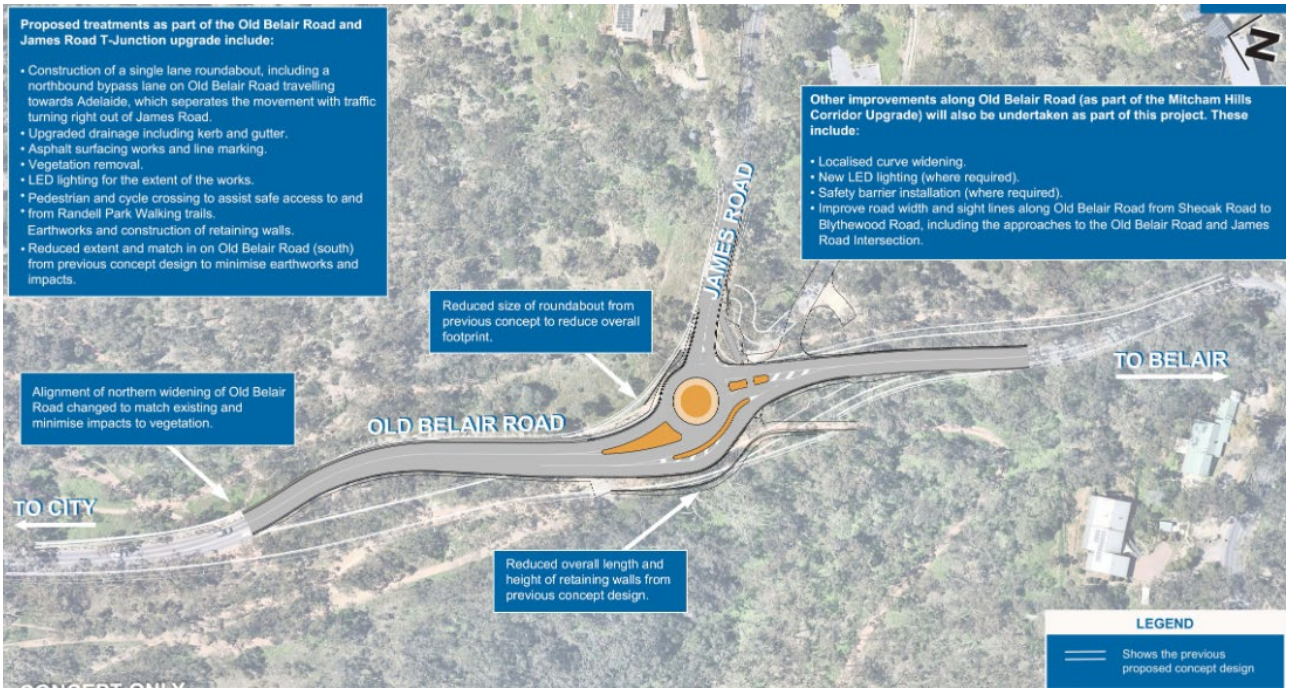


Figure 7: Revised roundabout design for the junction of James Road and Old Belair Road

Source: Department for Infrastructure and Planning

Environmental impacts of proposed roundabout

The proposed roundabout for the Old Belair Road and James Road junction will result in the removal of quality woodland in the Randell Park area adjacent to Old Belair Road, with the potential for 148 scattered trees to be removed.

The woodland is home to threatened native flora – *Grey Box Microcarpa* grassy woodlands scatter the project area with 100 square metres affected by the proposed roundabout, including 47 Microcarpa Woodland trees marked for removal.

The woodland has also been subject to previous conservation efforts. Exotic and invasive weed growth is substantial in other areas of the adjacent woodland and efforts to remediate may take several decades.

The loss of high-quality woodland area represents a disproportional impact on the ecology of the Randell Park area, with the scattered trees providing foraging, roosting, nesting and shelter habitat for the threatened Grey-Headed Flying Fox and other fauna.

As geography dictates that expansion of the intersection is only viable in a western direction, the only way to reduce the environmental impact of works is to rely on minimising the footprint of works at the James Road/Old Belair Road intersection.

Alternative options to the proposed roundabout

Demand is reduced to enable deferral/avoidance of a significant upgrade

This option considers overall demand being managed and reduced to an extent that a significant upgrade at the Old Belair Road and James Road junction is deferred or avoided.

This Review found demand had not been managed and minimised before upgrade options were explored. Once the proposed interventions in the study area are reviewed and rescoped and a mix of other non-infrastructure and small-scale infrastructure solutions are pursued, demand could be reduced to an extent that a significant upgrade can be deferred or avoided all together.

Based on anecdotal accounts of reductions in traffic and better performance of key roads, including the Old Belair Road and James Road junction during school holiday periods and observations during the Planning Study, an overall reduction between 10–30% could be effective, although this needs to be supported by further modelling and analysis.

Demand is reduced to support a single lane metered roundabout

This option considers demand has been reduced; however, an intervention is still suitable and desirable.

The current demand on James Road for the approach in the morning peak hours is approximately 240 vehicles per hour.

As stated earlier, a single-laned metered (i.e. signalised) roundabout (Option 1A) was dismissed in the Planning Study shortlisting process, primarily due to the following results:

- Queue lengths of 218m on Old Belair Road for northbound traffic and queue lengths of 126.3m on James Road for northbound traffic, which surpassed the bend in the road alignment.
- The average delay experienced for the intersection was 25 seconds. Average delay for vehicles on James Road turning right into Old Belair Road was reduced to just under a minute.
- The Level of Service on James Road would be E, which would not meet DIT's requirements.
- DOS for the Old Belair Road approach (1.041) and the James Road approach (1.019) would both be greater than 0.85, which would not meet DIT's requirements for a new roundabout.

However, independent testing suggests a single-laned metered roundabout controlling the James Road approach could have merit if morning peak volumes on James Road were closer to 180 vehicles per hour or less (25% reduction).

In comparison to the currently proposed roundabout, a single-lane metered roundabout could have a reduced footprint, including a northbound lane that conforms more closely to the existing topography of the area. The extent of the reduced footprint is unknown as no concept design was produced during the Planning Study for this option. In summary, the substantially smaller single-laned roundabout could have the following impacts.

Advantages (relative to other upgrade options)	Advantages (relative to current state)	Disadvantages (relative to current state)
• Reduced environmental impact • Good outcome for cyclists from James Road • Space to include a cyclist bypass for downhill on Old Belair Road • Ability to manage James Road to achieve desirable traffic movements between James Road and Old Belair Road • No merge required downstream.	• Improved travel times for northbound traffic on James Road • Ability to manage James Road to achieve desirable traffic movements between James Road and Old Belair Road • Space to include a cyclist bypass for downhill on Old Belair Road.	• Some environmental impact • Average increased travel times in morning and afternoon • Rear end crash risk on Old Belair Road.

Whilst a single-laned metered roundabout may deliver a better balance of technical outcomes, environmental impacts and community views and be more affordable than the currently preferred option, this concept would need further analysis and careful consideration, particularly as it would increase overall travel times in the morning and afternoon peaks and increase the risk of rear end crashes on Old Belair Road in comparison to the current junction configuration and the currently preferred roundabout option.

Demand is reduced to support an alternative single lane option

This option considers demand has been reduced; however, a single lane intervention, other than the single lane metered roundabout option, is still suitable and supported. This option would likely have impacts that are similar to the potential impacts of the single-laned metered roundabout option. As with above, any other single lane option would need further analysis and careful consideration.

Demand cannot be reduced, and a significant upgrade is abandoned

This option considers demand cannot be reduced and no significant upgrade is undertaken. This option effectively means there would be no environmental impacts to the adjacent woodlands and current issues experienced at the junction prevail for the foreseeable future.

Recognising cycling and pedestrian safety

Whilst cycling and pedestrian safety considerations and opportunities haven't been explicitly documented in these options, primarily as minor improvements would not have a major environmental impact, they should be appropriately considered when exploring these options further.

Justification assessment

This Review recognised the traffic management issues at the Junction; however, found there is a noticeable level of discontent in the local community with respect to the environmental impacts of the proposed roundabout and the perceived lack of options that were explored to reduce demand on the corridor and defer/avoid a significant upgrade to the junction.

The Old Belair Road and James Road junction study was undertaken as a part of the broader Planning Study. The approach primarily focused on infrastructure solutions on the corridor and at the junction. This Review identified there are many other non-infrastructure and infrastructure options that could have been explored to reduce demand and the magnitude of interventions and impacts.

The 'one size fits all' approach to defining project objectives and assessment weightings overlooked the need for site-specific problem statements and objectives/benefits. This has resulted in key issues such as the environmental impacts adjacent to Old Belair Road not being appropriately considered during options development and assessment.

The preferred roundabout aimed to improve traffic conditions and safety for motorists and crossing conditions for pedestrians and cyclists. The roundabout design innovatively achieves these objectives.

The proposed roundabout is partly justified on travel time savings achieved for James Road commuters during the morning peak period and improved crossing conditions for pedestrians and cyclists.

The proposed roundabout achieves a rapid BCR of 0.9; however, as previously stated, BCRs are only one assessment tool and do not consider non-monetisable environmental or socio-economic impacts.

Ultimately, the proposed junction treatment represents a capital expenditure of over $15 million to address traffic issues primarily caused by 240 vehicles per hour in the morning peak hour(s). The proposed roundabout will also result in the potential loss of 148 native trees, which have unique environmental value and are of significant interest to the community.

A comprehensive options analysis and value for money assessment could not be undertaken during this Review as this is contingent on exploring and assessing the affordability and effectiveness of additional non-infrastructure and infrastructure options across the Review area in greater detail in conjunction with the community and with alternative options for Old Belair Road and James Road junction. This is the crux of the six (6) key recommendations for action.

Based on the design of the current roundabout solution and the associated impacts, both in terms of costs, benefits and disbenefits and the possibility of other non-infrastructure and infrastructure options that could minimise impacts and traffic issues at this junction, this Review finds the investment, as it is currently proposed, is not justified and options to potentially reduce demand at the junction should be explored.

Key learnings

Key learnings and opportunities for future infrastructure projects

1. Demand analyses should include areas where problems may be arising from, not just where they are occurring, which may highlight a need/opportunity for alternate interventions.
2. Project teams should explore opportunities to reduce demand, including non-infrastructure solutions such as improving public transport services, as well as infrastructure solutions.
3. Increasing transparency and bringing the local community along in the option development process enables project teams to access local knowledge, gain support and reduce risks.
4. Project teams should have stronger regard for stakeholder views and environmental impacts during option development processes.

Documents consulted

- Key Project documentation
- Mitcham Hills Corridor Old Belair Road Upgrades Project Public Works Committee Report
- Austroads Guides to Road Design
- *Guide to Traffic Management (Austroads, 2020)*
- *Australian Transport Assessment and Planning Guidelines*, available from atap.gov.au
- *The 30-Year Plan for Greater Adelaide (2017 update)*
- *The Integrated Transport and Land Use Plan (2015)*

Other matters

During the Review, ISA became aware of concerns about the performance of the roundabout at the junction of Shepherds Hill Road and Main Road in Blackwood. This location was out of scope for this Review. Functionality and use of this junction may be an area for further consideration by DIT and Mitcham Council in the future.