
# City of Launceston

## Launceston Central Bus Interchange Options
## Technical Feasibility Assessment

December 2017

# Executive Summary

GHD were engaged by City of Launceston to undertake a technical feasibility assessment of relocating part of the existing Launceston Central Bus Interchange from St John Street (between York Street and Brisbane Street) to twelve potential locations around Launceston.

The purpose of this report was to document the potential issues associated with the bus stop relocation including a review of the operational feasibility of each option, the resulting transport impacts and the design considerations required to achieve a workable solution.

## Design Requirements

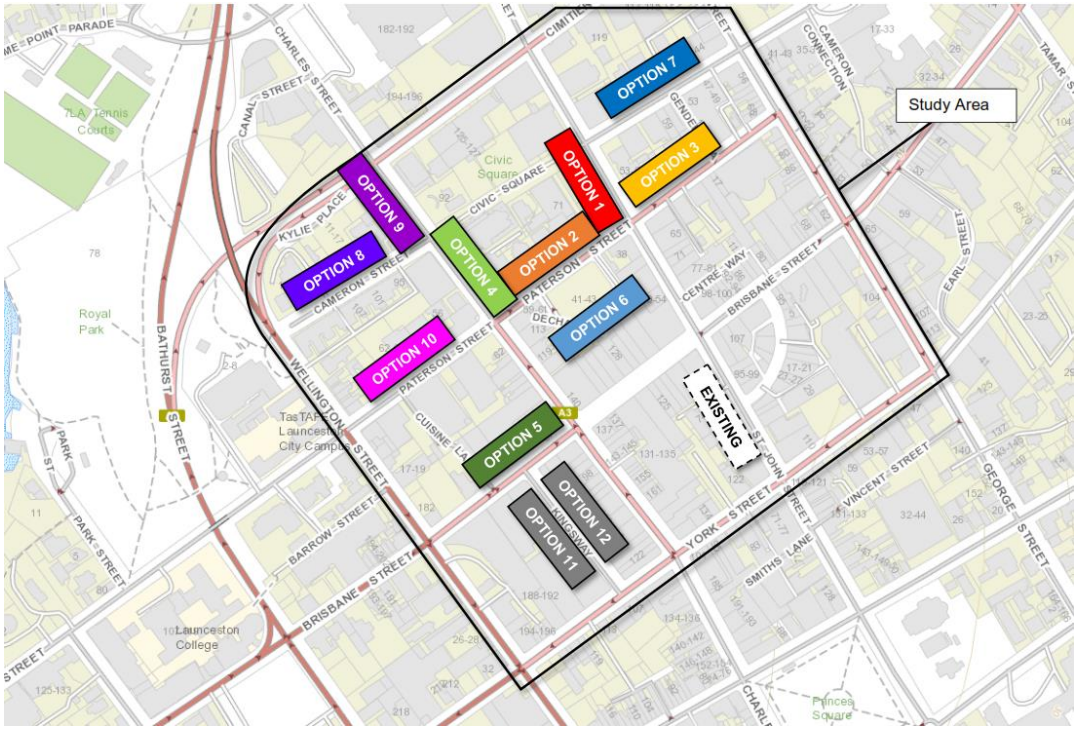
The minimum requirements were established initially based on a review of current timetables for Metro services and typical design standards from other jurisdictions. The adopted minimum requirements are summarised as follows:

- Design vehicle — 12.5 metre rigid bus
- Number of stops — 2 independently operating
- Minimum separation — 11.5 metres between stopped buses
- Footpath width — 5.6 metres
- Bus stop width — 3.0 metres
- Lane width — 3.5 metres
- Maximum gradient — 2.5% in any direction

Other requirements include a need to ensure a close proximity to the CBD Centroid (considered to be the intersection of St John Street and Brisbane Street), minimise impacts on bus travel times and reliability, and minimise impacts on other road users.

## List of Options

The following options have been investigated in detail in this report:



All other potential locations within the Launceston City Heart Boundaries were eliminated prior to the preparation of this report on the basis of gradient, accessibility, road use or function, and/or active street frontages.

## Technical Feasibility Review

Each of the twelve options identified were assessed in detail with respect to the following key constraints and criteria:

- Roadway cross section
  - *The physical dimensions of the road including footpaths, parking bays, traffic lanes and other infrastructure.*
- Operating space
  - *The ability for buses to physically manoeuvre into and out of bus stops, and around parked buses.*
- Accessibility
  - *Primarily relating to access for people with disabilities including gradients and proximity to key demand generators.*
- Impacts on bus routing
  - *Any change to existing bus routes and potential impacts to travel times.*
- Impacts on dead running services and circulation
  - *Circulation for dead running services introduces additional operating costs which should be minimised as far as practicable.*
- Impacts on network operation
  - *Includes a rough overview of intersection delays.*
- Impacts on road safety
  - *Includes a review of safety hazards associated with each option.*
- Impacts on other operators
  - *Includes impacts on other operators such as regional services and the Tiger Bus.*
- Impacts on parking
  - *On-street car parking is affected for all options, however the amount of parking required to be removed depends on a range of factors.*

## Comparison of Options

A summary of all options is provided in the table below. For each option, a rating has been assigned against the relevant constraints and criteria. The ratings are broadly described as follows:

| | |
|---|---|
| ✓ | Can comply with minimum requirements |
| | Nil or minor impacts only |
| – | Could be feasible subject to relaxation of design standards |
| | Moderate impacts only |
| × | Option not feasible |
| | Major impacts which may be prohibitive for the option |

| Option | | Technical Feasibility | | | Overall Traffic and Safety Impacts | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Roadway Cross Section | Operating Space | Accessibility | Bus Routing | Dead Running Services | Intersection Operation | Road Safety | Parking | Other Bus Operators |
| 1 | St John Street North | ✓ | × | ✓ | ✓ | – | × | × | × | × |
| 2 | Paterson Street Central | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ |
| 3 | Paterson Street East | ✓ | ✓ | ✓ | – | ✓ | – | ✓ | ✓ | ✓ |
| 4 | Charles Street North A | – | – | – | – | × | × | × | × | ✓ |
| 5 | Brisbane Street West | ✓ | ✓ | ✓ | – | × | ✓ | – | – | × |
| 6 | Dechaineux Way | – | × | ✓ | ✓ | – | ✓ | × | × | ✓ |
| 7 | Cameron Street East | – | – | ✓ | – | – | ✓ | ✓ | × | – |
| 8 | Cameron Street West | ✓ | – | × | ✓ | × | – | × | – | ✓ |
| 9 | Charles Street North B | ✓ | – | × | ✓ | × | ✓ | – | – | ✓ |
| 10 | Paterson Street West | × | – | – | – | × | ✓ | – | × | ✓ |
| 11 | Kingsway Northbound | ✓ | ✓ | – | × | ✓ | – | ✓ | × | × |
| 12 | Kingsway Southbound | ✓ | ✓ | – | ✓ | × | ✓ | – | × | ✓ |

## Key Findings

Based on the investigations detailed in this report, there are a number of options that are not considered feasible on the basis of the physical geometry and bus access requirements, or accessibility, including the following:

- St John Street North
- Dechaineux Way
- Cameron Street West
- Charles Street North B
- Paterson Street West

The following four options may be feasible subject to a relaxation of minimum design standards, however each of these may result in major impacts based on the key criteria assessed in this report:

- Charles Street North A
- Cameron Street East
- Kingsway Northbound
- Kingsway Southbound

Based on those factors investigated in this report, only three options were found to comply with the minimum design standards and are not considered to result in major detrimental impacts:

- Paterson Street Central
- Paterson Street East
- Brisbane Street West

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# 1. Introduction

## 1.1 Background

GHD were engaged by City of Launceston to undertake a technical feasibility assessment of relocating part of the existing Launceston Central Bus Interchange from St John Street (between York Street and Brisbane Street) to twelve potential locations around the Launceston.

## 1.2 Purpose of This Report

The purpose of this report is to document the potential issues associated with the bus stop relocation including a review of the operational feasibility of each option, the resulting transport impacts and the design considerations required to achieve a workable solution. This report primarily focusses on the relocation of departure stops, however it is acknowledged that inbound 'set down' stops may also need to be relocated.

## 1.3 Scope and Limitations

This report has been prepared by GHD for City of Launceston and may only be used and relied on by City of Launceston for the purpose agreed between GHD and the City of Launceston as set out in Section 1.2 this report.

GHD otherwise disclaims responsibility to any person other than City of Launceston arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Launceston and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## 1.4 Study Area

The Study Area comprises the Launceston CBD, bounded by Wellington Street, Cimitiere Street, George Street and York Street. The extents of the Study Area are presented in Figure 1.

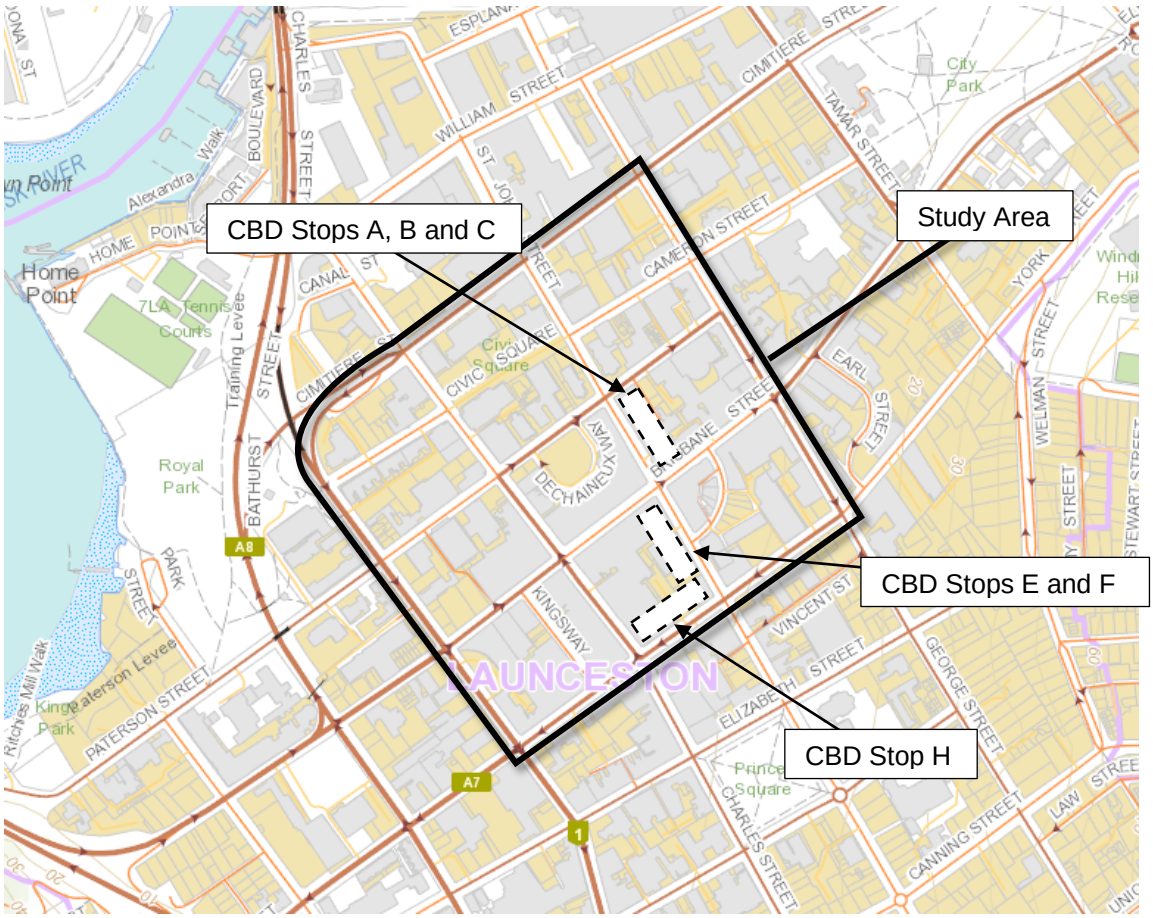



**Figure 1 Study Area**

*Base map obtained from TheLIST © State of Tasmania*

## 1.5 Referenced Materials

The following documents and materials were referred to during the preparation of this report:

- *Hobart Bus Interchange Options Assessment Report,* GHD, October 2014
- *Hobart Central Bus Interchange Study – Technical Report,* Parsons Brinckerhoff, September 2013
- *Launceston CBD Bus Interchange Study Rev01,* Pitt & Sherry, September 2014
- Metro Tasmania Timetables (www.metrotas.com.au)
- Australian Standard AS2890.5, *Parking facilities – Part 5: On-street parking,* 1993

# 2. Design Requirements

## 2.1 Design Vehicle

The design vehicle is the standard 12.5 metre rigid bus. Metro does not currently operate long rigid (14.5 metre) or articulated (19 metre) buses in its Launceston fleet. However, the potential future use of these buses should not be designed out.

## 2.2 Capacity

Metro Tasmania have previously advised that the current timetabled loading time allowance is 3 minutes for a rigid bus and 5 minutes for an articulated bus. Therefore, if a switchover time of 1 minute is allowed for a bus to arrive after another bus has left the bus stop, the theoretical maximum bus stop capacity is:

- Single bus stop – independent operation
  - Rigid 15 buses per hour
  - Articulated 10 buses per hour

While technically achievable the maximum theoretical capacity outlined above may not necessarily be practical all the time. Bus headways at the Hobart Bus Interchange recorded in Appendix E of the *Hobart Central Bus Interchange Study – Technical Report* (Parsons Brinckerhoff, September 2013) suggest that switchover times can vary significantly, with minimum headways at the more heavily utilised stops typically being around 3 minutes. Based on a switchover time of 3 minutes, a more realistic estimate of the practical capacity of bus stops would be:

- Single bus stop – independent operation
  - Rigid 10 buses per hour
  - Articulated 7.5 buses per hour

The above practical capacities are consistent with the current operation at heavily utilised stops within the *Hobart Bus Interchange,* which currently cater for up to 8-10 bus departures per hour during the evening peak.

The focus of this report is on the relocation of CBD Stops E and F, currently provided at St John Street South (between York Street and Brisbane Street). Based on publicly accessible Metro timetabling information, there are currently 74 services departing Stop E, and 53 services departing Stop F, on a typical weekday. The peak activity at Stops E and F occurs several times throughout the day with a combined five departures over a half-hour period (equivalent to 10 buses per hour).

Therefore it is possible that there might be sufficient capacity within a single bus stop to accommodate existing services departing stop E and stop F. However this would require very strict timetabling, without room for error, and would not allow future growth in services. It is considered that a minimum of two independently operating bus stops would be required at the proposed location to accommodate existing and future demand.

## 2.3 Bus Routing

Based on Metro timetables, bus routes currently departing Stops E and F are as follows:

- Stop E Routes 6, 7, 8, 10
- Stop F Routes 20, 25, 28, 30, 32, 35, 38, 45, 55

Routes for departing services are presented in Figure 2.

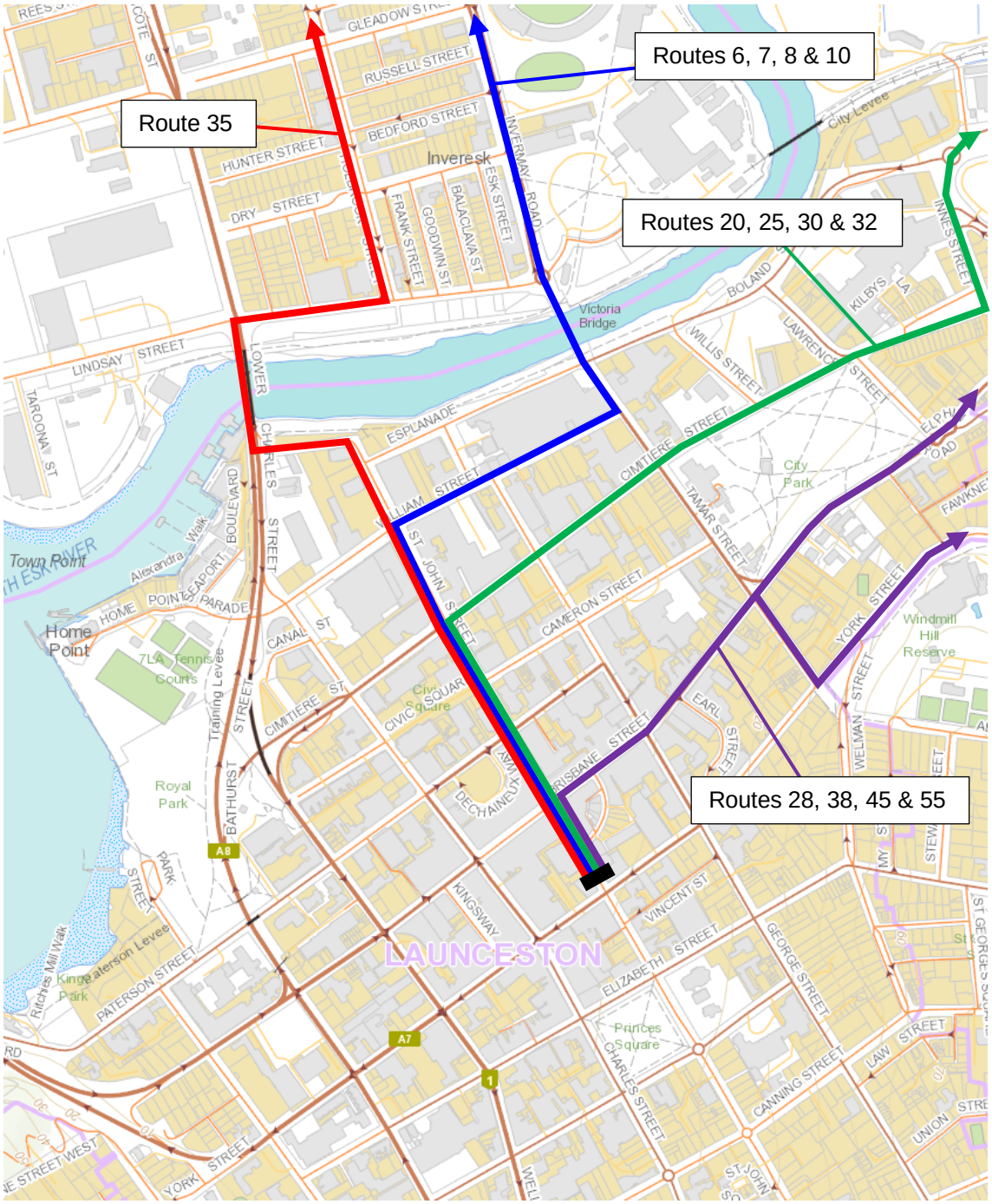



**Figure 2 Existing Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

## 2.4 Kerb Space

The amount of kerb space required for practical bus stop operations is based on the design standards given in Table 1.

**Table 1 Design Standards for Bus Zones**

| Bus Stop Dimension (m) | Standard | Long Rigid | Articulated |
|---|---|---|---|
| Length of Bus | 12.5 m | 14.5 m | 18.0 m |
| Minimum draw-out length | 6.0 m | 6.5 m | 8.0 m |
| Minimum draw-in length | 11.5 m | 14.0 m | 14.0 m |
| ***Bus Zone length for one bus*** | ***30.0 m*** | ***35.0 m*** | ***40.0 m*** |

For multiple buses, the clear distance between parked buses must be equal to the minimum draw-in length as defined in Table 1 to allow for independent operation. Where buses are subject to "nose-to-tail" operation, a distance of 1.0 metres may be used. This is shown diagrammatically in Figure 3.

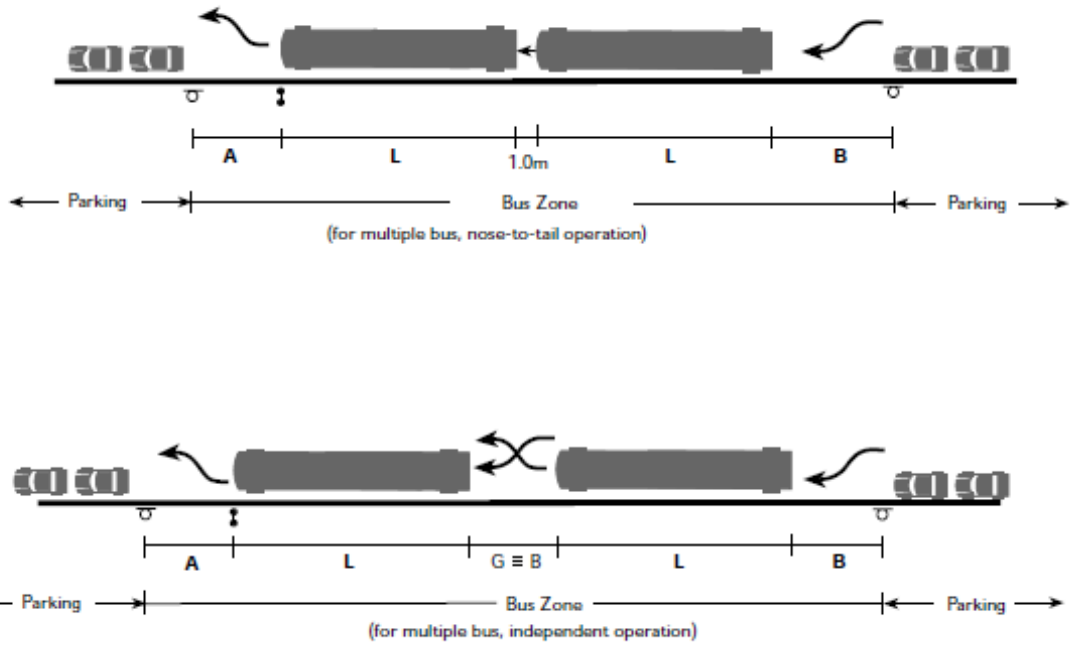



**Figure 3 Bus Zone Design Standards**

*Extract from State Transit Bus Stop Style Guide: Part 1 – Design Manual*

Based on the above design standards, the minimum kerb space required for two independent stops is 36.5 metres. Note that this excludes the initial draw-in length required for the rear stop and the draw-out length required for the front stop and assumes that these areas are clear.

An additional, short-term layover stop is currently provided at St John Street (south). This is considered a critical component of these bus stops to manage arrival of buses in the event the bus stops are occupied, without blockage of the roadway. The additional layover will require a minimum of 1.0 metres separation from the end of the rear stop.

## 2.5 Minimum Operating Requirements

The minimum requirements for bus operations as used in this technical feasibility review have been broken down into two main components for each option:

- Roadway Cross Section
- Operating Space

In order for the proposed option to be considered feasible, it must comply with all of the requirements of *both* of these assessments. Additionally, the potential impacts of each option have also been discussed including the impacts on traffic performance at key intersections, road safety, parking supply and the Tiger Bus service.

### 2.5.1 Roadway Cross Section

*Refers to the physical ability of the road width to accommodate footpaths, bus stop infrastructure (shelters etc.), bus parking bays and traffic lanes.*

The absolute minimum allowable footpath width and the desirable minimum footpath width for the proposed bus stops are summarised below:

- Absolute Minimum
  - The absolute minimum footpath width to accommodate pedestrian movement and bus passenger waiting areas is considered to be 4.3 metres. This includes a minimum 1.8 metre clear footpath plus 2.5 metres for bus infrastructure, passenger waiting areas and to allow adequate clearance to the edge of the roadway.
- Desirable Minimum
  - The desirable minimum footpath width is 5.6 metres, including a clear width of 2.7 metres and 2.9 metres for bus stop infrastructure and passenger waiting areas. This is the existing provision at St John Street (south) and represents no loss in level of service for passengers with respect to waiting areas.

It is noted that use of the absolute minimum footpath width may not provide a good level of service for either pedestrians or passengers and is likely to represent a significant reduction in performance when compared to the existing situation. Therefore, the desirable minimum has been adopted for this assessment.

The minimum width for bus stops is 3.0 metres.

The minimum width for on-street parking bays is 2.3 metres in accordance with Australian Standard AS2890.5, *Parking facilities - Part 5: On-street parking,* 1993.

The minimum lane width is 3.5 metres which includes a 3.0 metre absolute minimum traffic lane with an additional 0.5 metres clearance to on-street parking bays in accordance with AS2890.5.

### 2.5.2 Operating Space

*The physical ability of the buses to manoeuvre into and out of spaces given the constraints imposed by the road environment.*

The minimum operating space requirements have been determined through the application of Autodesk Vehicle Tracking software for the design vehicle.

# 3. List of Options

A total of 12 options have been investigated in this report. These are as follows:

- Option 1 – St John Street North

  *Located between Paterson Street and Cameron Street (Civic Square) on the northbound side of the road.*

- Option 2 – Paterson Street Central

  *Located between Charles Street and St John Street opposite Dechaineux Way with Paterson Street reduced to one lane.*

- Option 3 – Paterson Street East

  *Located between St John Street and George Street on the left-hand side of the road with Paterson Street reduced to one lane.*

- Option 4 – Charles Street North A

  *Located between Cameron Street (Civic Square) and Paterson Street on the southbound side of the road.*

- Option 5 – Brisbane Street West

  *Located between Wellington Street and Charles Street on the left-hand side of the road with Brisbane Street reduced to one lane.*

- Option 6 – Dechaineux Way

  *Located off-street on Dechaineux Way adjacent to the car park.*

- Option 7 – Cameron Street East

  *Located between St John Street and George Street on the eastbound side of the road.*

- Option 8 – Cameron Street West

  *Located on Cameron Street, west of Charles Street, on the eastbound side of the road and includes a new slip lane off Wellington Street for access.*

- Option 9 – Charles Street North B

  *Located between Cimitiere Street and Cameron Street (Civic Square) on the southbound side of the road.*

- Option 10 – Paterson Street West

  *Located between Wellington Street and Charles Street on the eastbound side of the road.*

- Option 11 – Kingsway Northbound

  *Located on Kingsway, between York Street and Brisbane Street, on the northbound side of the road.*

- Option 12 – Kingsway Southbound

  *Located on Kingsway, between Brisbane Street and York Street, on the southbound side of the road.*

The locations of each are presented in Figure 4.

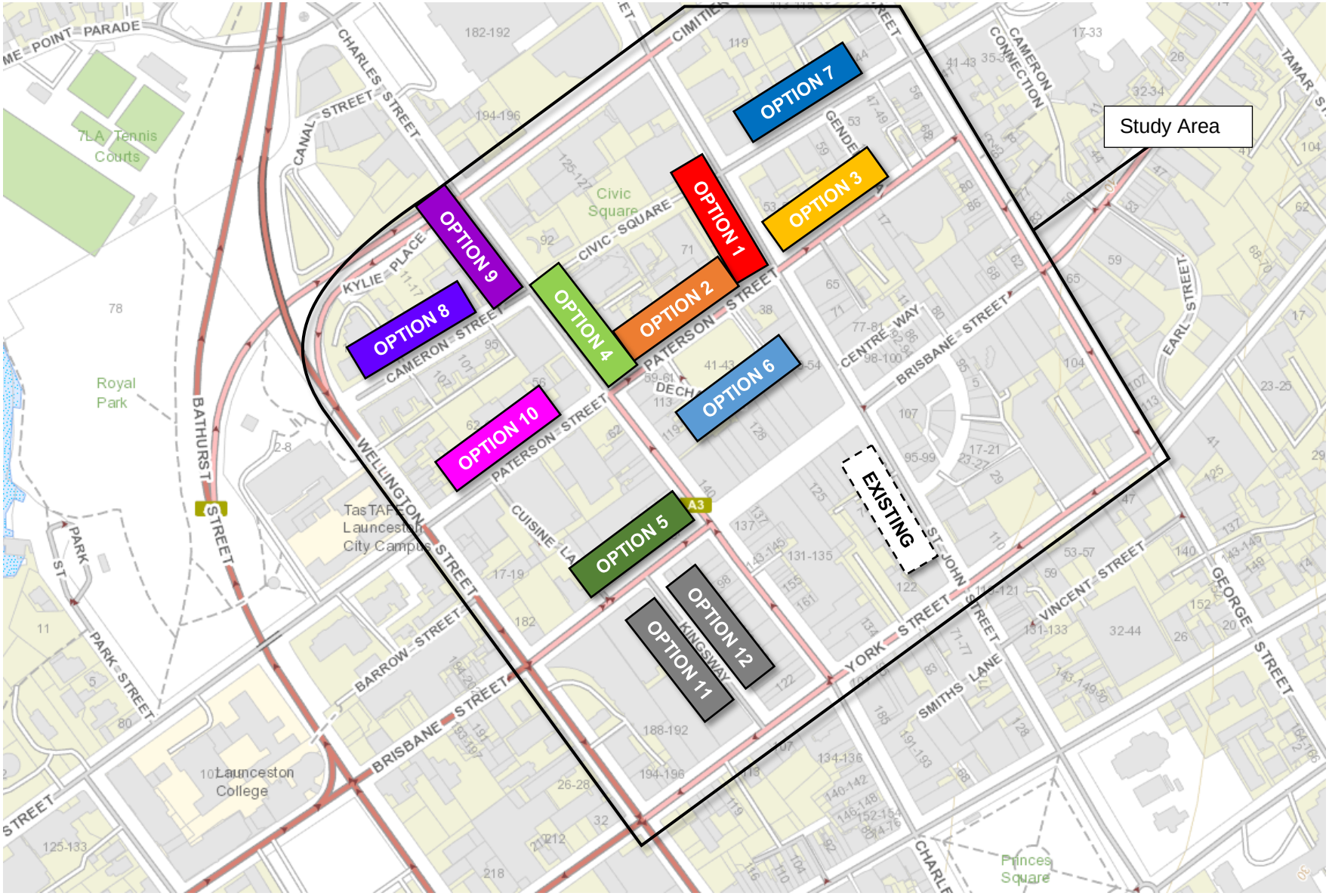



**Figure 4 Location of Options Assessed in This Report**

*Base map obtained from TheLIST © State of Tasmania*

# 4. Technical Feasibility Review

## 4.1 Option 1 – St John Street North

### 4.1.1 Location and Bus Routing

Option 1 is located at St John Street North, between Paterson Street and Cameron Street (Civic Square), adjacent to the existing St Andrews Presbyterian Church, as shown in Figure 5.


**Figure 5 Option 1 St John Street Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Bus routing will be as per the existing situation, with the exception of Routes 28, 38, 45 and 55 which travel via Elphin Road and High Street. These routes will require redirection via Cameron Street with right turn onto Tamar Street as presented in Figure 6.

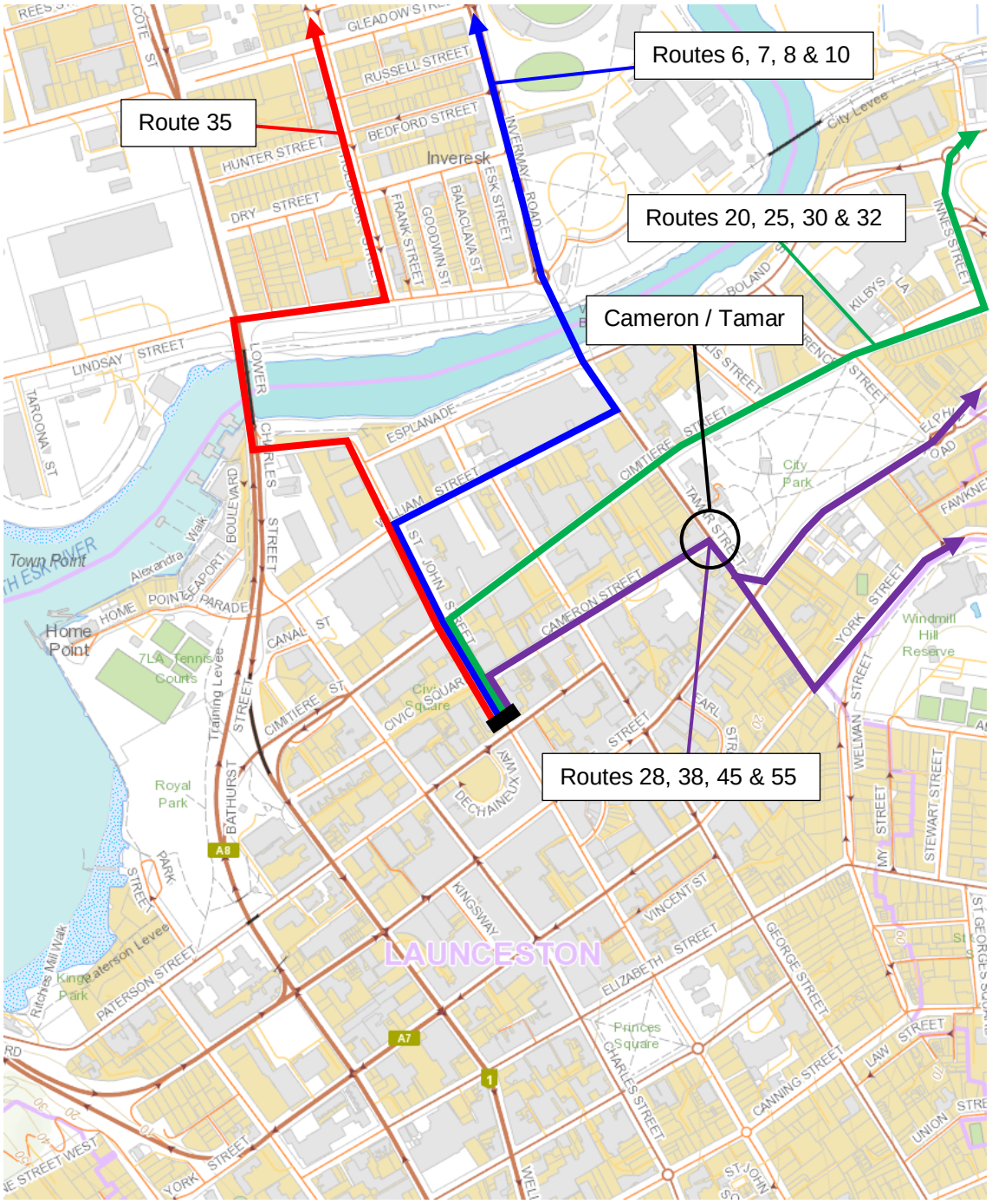



**Figure 6 Option 1 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.1.2 Technical Feasibility Review

#### *Roadway Cross Section*

St John Street, between Paterson Street and Cameron Street, has a total road reserve width of 18 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section is presented in Figure 7.

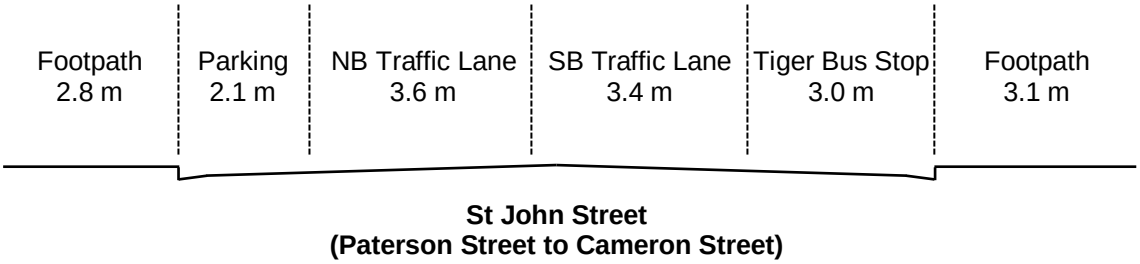



**Figure 7 St John Street Cross Section**

The minimum requirements are summarised in Table 2.

**Table 2 St John Street Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (west side) | 2.8 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.1 m | 9.5 m | Minimum includes 3.0 m bus stop, 3.0 m traffic lane and 3.5 m traffic lane. Requires relocation of Tiger Bus. |
| Footpath (east side) | 3.1 m | 2.9 m | Reduced to match road reserve width. |
| ***Total*** | ***18.0 m*** | ***18.0 m*** | |

Based on Table 2, there would be sufficient space within the road reserve cross section to accommodate the minimum widths required for the proposed bus stops subject to:

- Relocation of the existing Tiger Bus Stop D (discussed in Section 4.1.3 of this report)
- Reduction in footpath width on the east side of St John Street by 0.2 metres
- Realignment of the southbound traffic lane to match new footpath alignment

#### *Operating Space*

The proposed bus stops should not prohibit key movements at either the St John Street / Paterson Street junction or the St John Street / Cameron Street junction. This includes buses turning into and out of St John Street as well as buses entering and exiting bus stops. The minimum clearances are summarised as follows:

- Cameron Street
  - The key movement is the left turn from Cameron Street into St John Street, avoiding a vehicle propped at the stop line on St John Street.
- Front Bus Stop
  - The location of the front bus stop must allow for realignment of the northbound traffic lane to avoid conflict with vehicles turning left from Cameron Street.

- Rear Bus Stop
  - The location of the rear bus stop must allow a minimum of 11.5 metres separation to the front bus stop for draw-in and draw-out.
- Paterson Street
  - The key movement is the left turn from Paterson Street into St John Street, bypassing a stopped bus at the bus interchange.

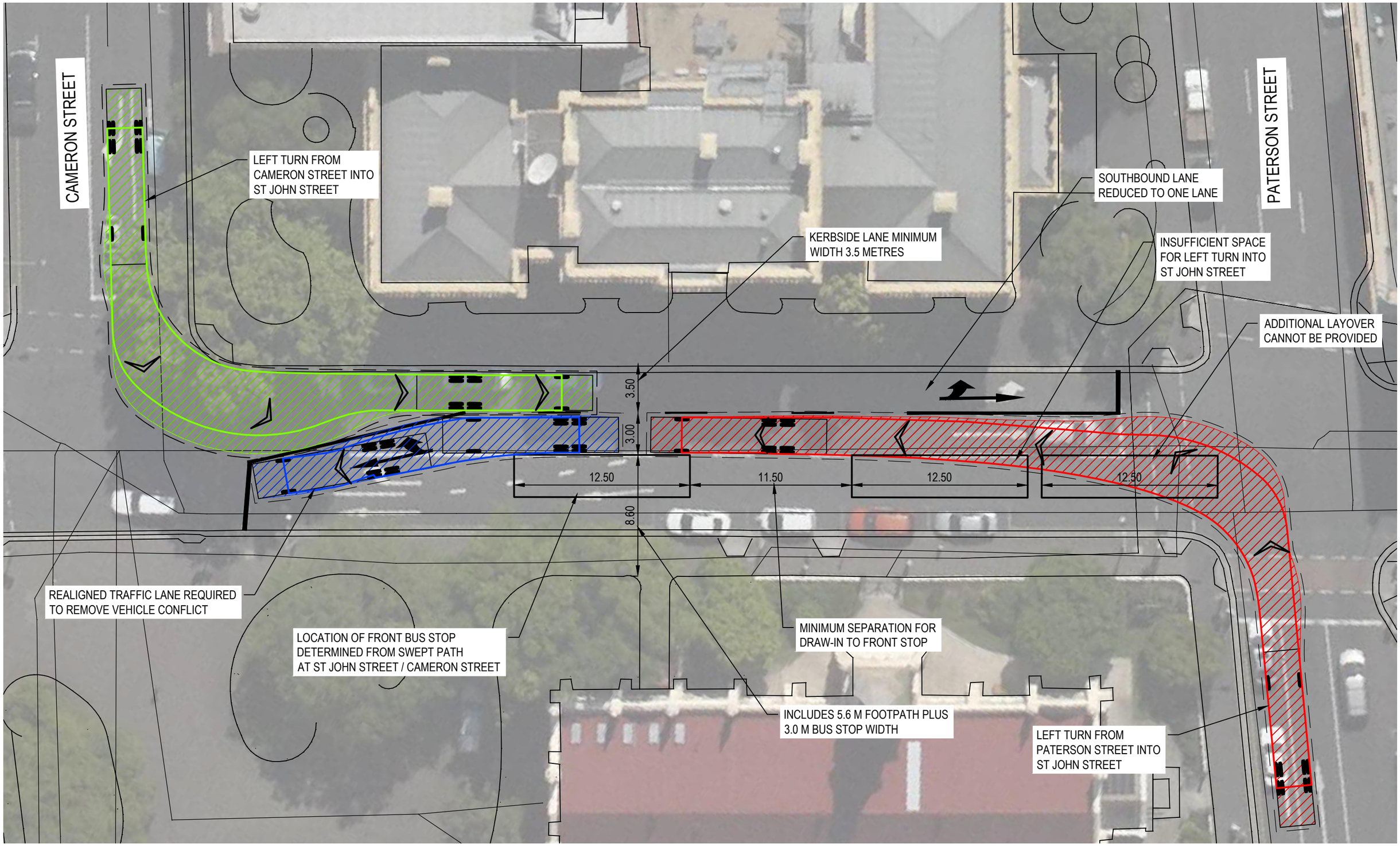
The above turning movements and operating space requirements are demonstrated in Figure 8. It is clear that there is insufficient space to allow for two, independently operating bus stops within St John Street, between Paterson Street and Cameron Street, with reference to the minimum design standards adopted in this report.

### *Discussion*

It is acknowledged that there are a range of alternative configurations that could be further explored for St John Street, Paterson Street to Cameron Street. Some of these are examined in the following sections. Each alternative configuration would create new issues, or exacerbate existing issues, including but not necessarily limited to compromising pedestrian access and safety, increased traffic congestion, bus routing and wider road network impacts.

- Reduce footpath widths to allow more space for turning
  - The absolute minimum footpath width is 4.3 metres as described in Section 2.5.1 of this report. If this footpath width is adopted, there may be sufficient room to allow for two, independently operating bus stops however this would result in poor service for pedestrians and passengers.
  - This is contrary to the key goals of the Launceston City Heart Project to improve pedestrian connectivity throughout the City Heart and will reduce pedestrian access between Civic Square and the Launceston CBD.
  - The additional layover behind the rear stop is considered critical to manage bus arrivals to avoid potential blockage of the Paterson Street junction (see Section 4.1.3) and cannot be provided in the space between Paterson Street and Cameron Street given the minimum footpath width requirement.
- Move stops further north (towards Cameron Street)
  - If the bus stops are moved further north towards Cameron Street, access at this intersection would be severely restricted. It is likely that the existing traffic signals at this location would need to be removed and replaced with left-in / left-out only at Cameron Street.
  - There is an existing layover at Cameron Street currently used by Metro services. Buses and large vehicles would be restricted from turning left from Cameron Street into St John Street and therefore this layover would no longer be practical.
  - Removal of the traffic signals would remove a key pedestrian crossing point between Civic Square and other parts of the Launceston CBD including the GPO and City Park.

Based on the above discussion, it is considered that there are no practical alternative configurations for the design of bus stops at St John Street, between Paterson Street and Cameron Street.




0 2.5 5.0 7.5m

SCALE 1:250 AT ORIGINAL SIZE

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CITY OF LAUNCESTON
LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 1 ST JOHN ST NORTH OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 8

23 Paterson St, Launceston TAS 7250 Australia **T** 61 3 6332 5500 **F** 61 3 6332 5555 **E** lstmail@ghd.com **W** www.ghd.com

Plot Date: 31 October 2017 - 1:03 PM Plotted by: Mark Petrusma Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg

### 4.1.3 Impacts Assessment

Given the issues associated with turning movements at both the St John Street / Paterson Street and St John Street / Cameron Street junctions, it is unlikely that the proposal will be considered feasible. Notwithstanding, if bus stops were to be provided as per this proposal, or one of the alternative configurations discussed in Section 4.1.2, there would be a range of impacts on the efficiency and safety of the road network, including those summarised in the following sections.

#### *Bus Routing*

Based on Figure 6, outbound services using Brisbane Street (to Elphin Road) and York Street (to High Street) will need to travel via Cameron Street and Tamar Street. This represents some additional circulation with a minor increase in travel distances.

Furthermore, the existing bus stop on Brisbane Street, between George Street and Tamar Street, would be bypassed by the revised route, reducing bus stop coverage of the Launceston CBD.

#### *Dead Running Services*

There would be a very minor impact on dead running services with buses required to continue straight along St John Street after turning from York Street, past the Paterson Street junction, to access the new Option 1 departure points. It is noted that Option 1 would open up new opportunities for dead running routes with potential direct access from the Paterson Street layover to the departure points on St John Street as shown in Figure 9.

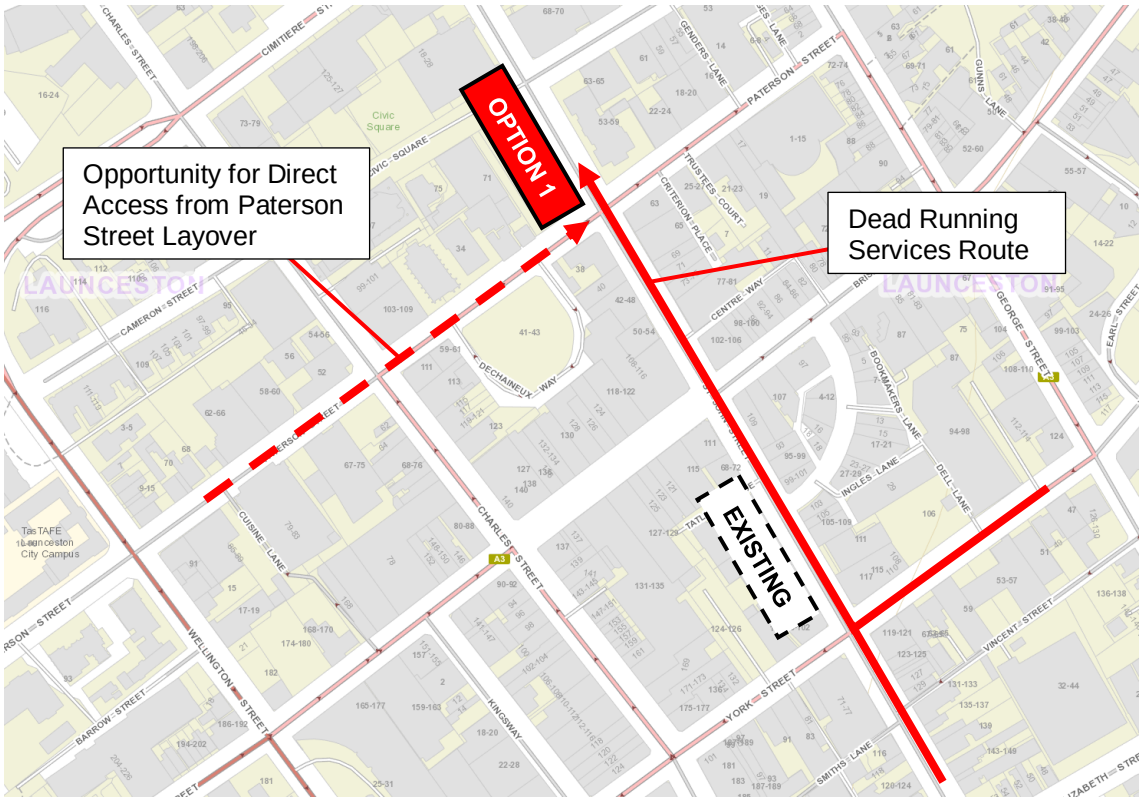



**Figure 9 Option 1 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The Option would be located in close proximity to toilet facilities at Civic Square.

### *Intersection Operation*

The proposal would result in a minor impact to the performance of the Paterson Street / St John Street intersection due to buses turning left into St John Street being required to straddle the left and middle lanes on the Paterson Street approach (as shown in Figure 8). This would reduce the available queue storage on Paterson Street, increasing queue lengths and delays on this approach.

It is clear that an additional layover would not be able to be provided behind the rear stop at St John Street. This layover is currently available at the existing location (St John Street South) and is considered critical to manage bus arrivals during peak times without blockage of the roadway.

There exists the potential for a bus to arrive while the bus stops are fully occupied, particularly during the peak periods. This would cause full blockage of the St John Street corridor and potential blockage of the St John Street / Paterson Street junction, resulting in significant congestion at this location and detriment to road safety performance.

The existing left turn lane on the St John Street (southbound) approach to Paterson Street would need to be removed and combined into a single lane for this approach in order to allow sufficient room for turning buses. This would reduce the overall capacity of the junction due to:

- Reduced capacity for southbound movements
- Reduced capacity for northbound right-turn movements into Paterson Street (required to give way to southbound traffic)
- Reduced capacity for Paterson Street approach due to green time reallocation as required to allow for reduced St John Street capacity

*It is noted that the junction of St John Street and Paterson Street has not been modelled in detail as part of this project. Notwithstanding, it is highly likely that increased delays and queuing would result on all approaches as a result of the changed traffic movements and lane configuration. In addition, there is the potential for total blockage of the intersection due to bus stop operation which could create significant short-term congestion at this location.*

### *Road Safety*

There is increased risk that the signalised pedestrian crossing at the St John Street / Paterson Street intersection would be obstructed due to queued vehicles at St John Street. This presents a significant safety concern as pedestrians would typically walk around vehicles, potentially long vehicles such as buses, stopped over the crossing during the crossing phase.

### *Tiger Bus*

The Launceston Tiger Bus is a free service operated by Metro and City of Launceston. The Launceston CBD stop (Stop D) is currently located on St John Street, directly opposite the proposed Option 1 location of the relocated Bus Interchange Stops E and F.

The Tiger Bus currently runs between 7:30 am and 6:35 pm weekdays on three one-way loops as follows:

- Commuter Run
  - A 15 minute loop running between Inveresk and the Launceston CBD from 7:30 am to 9:50 am and from 4:15 pm to 6:35 pm.
- City Explorer Loop
  - A 30 minute loop running between Inveresk, Launceston CBD (Stop D), Launceston General Hospital, Launceston Aquatic Centre and City Park.

- River Explorer Loop
  - A 30 minute loop running between Inveresk, Launceston CBD (Stop D), Princes Square, Royal Park and Home point.

The Launceston CBD Stop D at St John Street southbound is common to all of the above routes as shown in Figure 10.

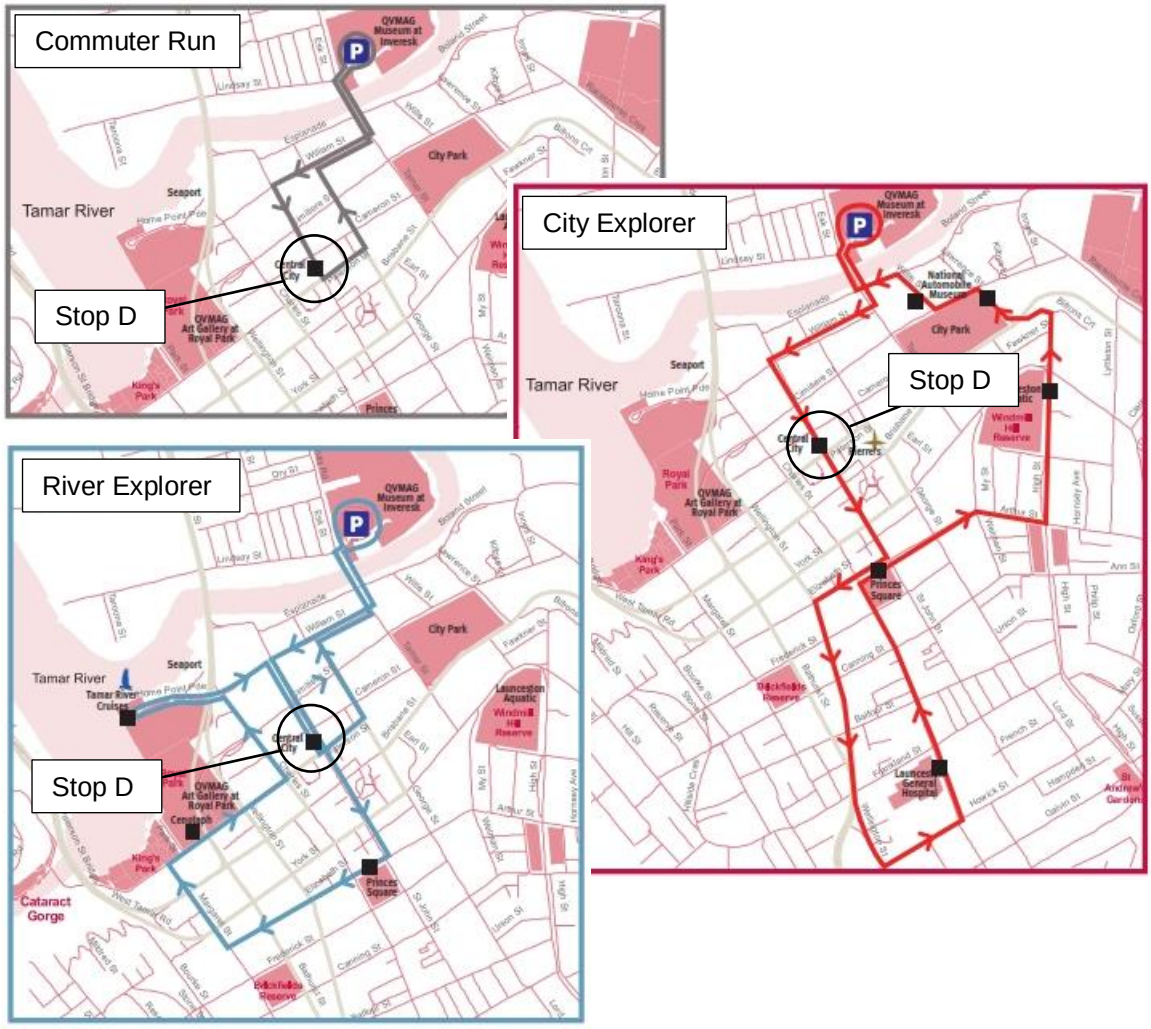



**Figure 10 Launceston Tiger Bus Routes**

*Source: Metro Tasmania*

The existing Tiger Bus Stop D could no longer be accommodated at its current location on St John Street, between Cameron Street and Paterson Street, and would need to be relocated. There are no convenient locations for the CBD Stop that are common to all three Tiger Bus routes as described above.

A potential alternative at St John Street, immediately south of Paterson Street, has previously been identified by Council. This may not be feasible based on the following:

- The swept path of buses turning right from Paterson Street into St John Street requires the full existing width of pavement on St John Street
- The existing Commuter Run and River Explorer loops would be required to reroute via Brisbane Street (The Avenue) and Tamar Street for return journey to Inveresk
- Rerouting as described above increases the total travel distance by up to 200 metres with 5 additional signalised intersections and may result in an increase to total loop time and impact on timetabling for these two services.

The ultimate impact of relocating the Tiger Bus Stop would be an increased loop time, resulting in a less frequent service, particularly during the commuter peak periods.

### *Parking*

There would be a loss of 7 short-term, on-street car parking spaces on St John Street, between Paterson Street and Cameron Street, as a result of the proposal. This includes two accessible car parking spaces which would need to be reinstated in the immediate surrounding area.

It is noted that the removal of bus stops at St John Street (south) may allow for the provision of new short-term, on-street car parking at this location. While the overall supply of on-street parking across Launceston may not change significantly, the amount of parking in the local area would be reduced.

St Andrews Presbyterian Church is located at 36 St John Street, on the corner of Paterson Street, with frontage on St John Street at the location of the proposed bus stops. The church relies on existing car parking for normal operation including accessible car parking, hearse parking during funerals and weddings cars. The operation of the Church would be impacted by the loss of these car parking spaces and alternative arrangements would need to be investigated.

### *Accessibility*

The level of accessibility afforded by each option can be defined with regard to its proximity to the CBD centroid (taken as the eastern end of Brisbane Street Mall) and with regard to the average gradient at the proposed bus stop location. A poor level of accessibility would not result in an acceptable outcome for public transport services.

The proposed St John Street North option is located approximately 180 metres walking distance from the CBD centroid as shown in Figure 11. This represents a minor increase compared to the existing location approximately 100 metres from the CBD centroid.

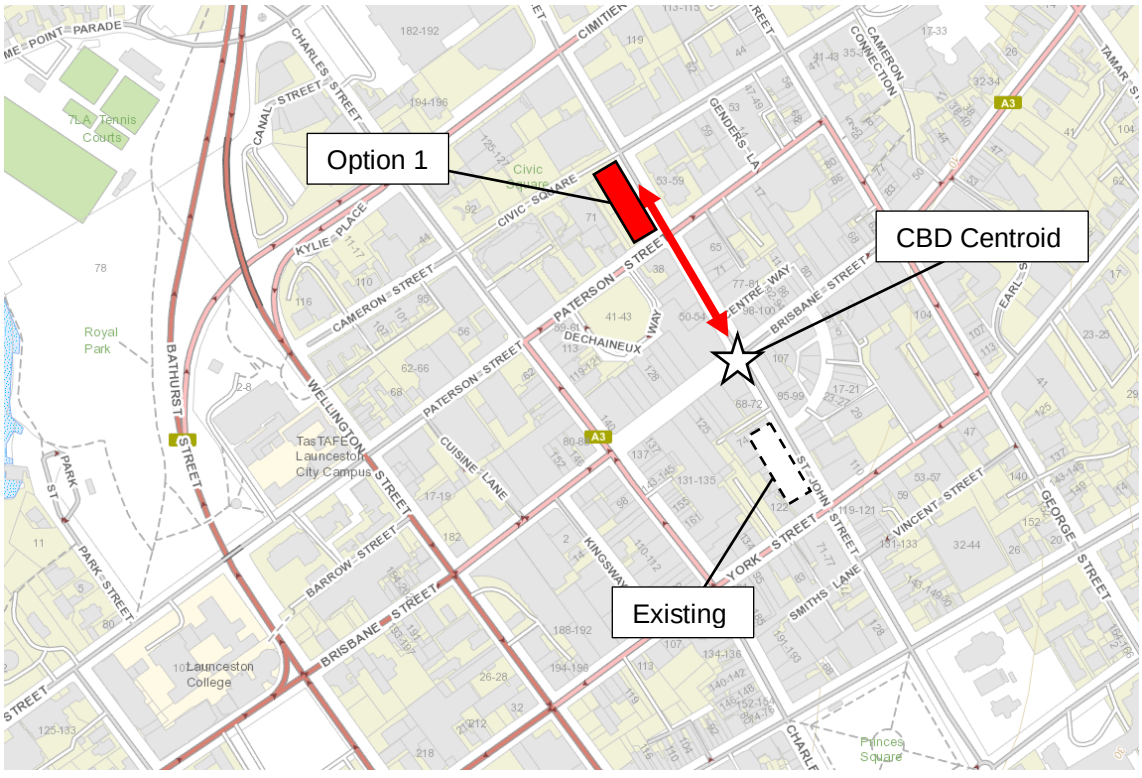



**Figure 11 Option 1 St John Street North Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at St John Street North is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.1.4 Summary

A summary of the technical feasibility assessment for Option 1 St John Street North is provided in Table 3.

**Table 3 Option 1 St John Street North Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | No | Inadequate space for manoeuvring. |
| Accessibility | Yes | Level grade, close to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Minor | Minor impact on bus routing due to changed route. |
| Dead Running Services | Moderate | Additional travel required for dead running services. |
| Intersection Operation | Major | Potential full blockage of Paterson Street junction. |
| Road Safety | Major | Safety issues including pedestrian safety at Paterson Street junction due to potential blockage. |
| Parking | Major | All on-street parking spaces removed including 2x accessible parking spaces. |
| Other Bus Operators | Major | Major impacts to Tiger Bus operation due to relocation of bus stop required. |

## 4.2 Option 2 – Paterson Street Central

### 4.2.1 Location and Bus Routing

Option 2 is located at Paterson Street Central, between Charles Street and St John Street, adjacent to the existing Pilgrim Uniting Church and opposite the public car park at Dechaineux Way. The location is provided in Figure 12.


**Figure 12 Option 2 Paterson Street Central Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Bus routing will be as per the existing situation, with buses turning onto St John Street, to travel either northbound or southbound, from Paterson Street near the Option 2 departure points. The Option 2 departure routes are presented in Figure 13.

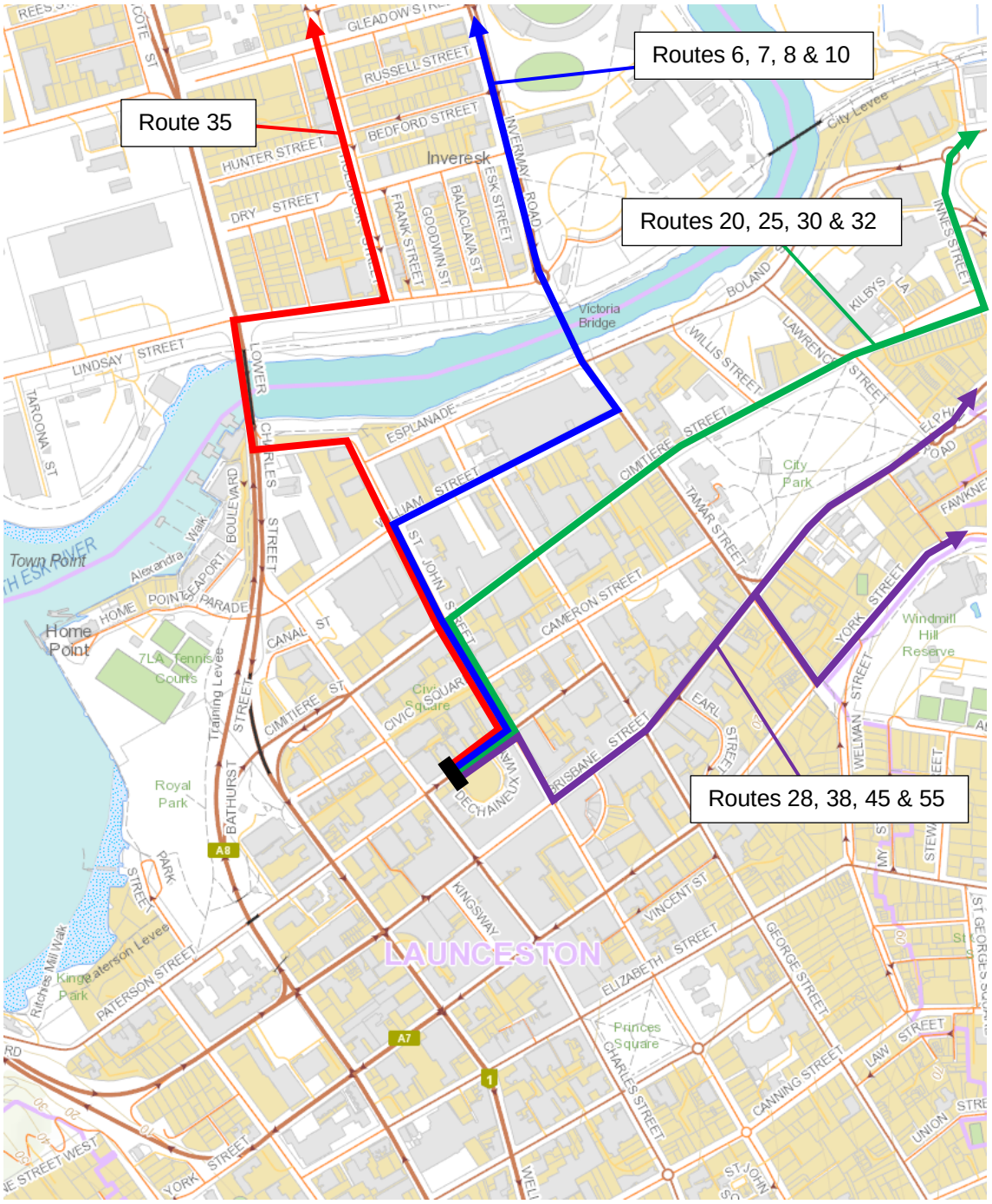



**Figure 13 Option 2 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.2.2 Technical Feasibility Review

#### *Roadway Cross Section*

Paterson Street, between Charles Street and St John Street, has a total road reserve width of between 17 and 18 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section (approximate) is presented in Figure 14.

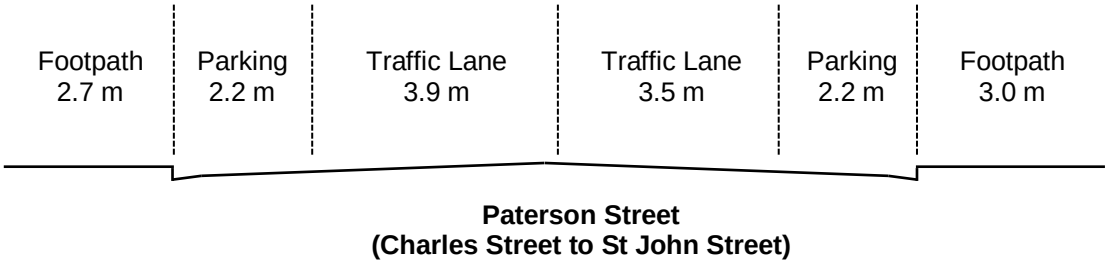



**Figure 14 Paterson Street Central Cross Section**

The minimum requirements are summarised in Table 4.

**Table 4 Paterson Street Central Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (north side) | 2.7 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 11.8 m | 8.8 m | Minimum includes 3.0 m bus stop, 3.5 m traffic lane and 2.3 m on-street parking. |
| Footpath (south side) | 3.0 m | 3.0 m | To match existing. |
| ***Total*** | ***17.5 m*** | ***17.4 m*** | |

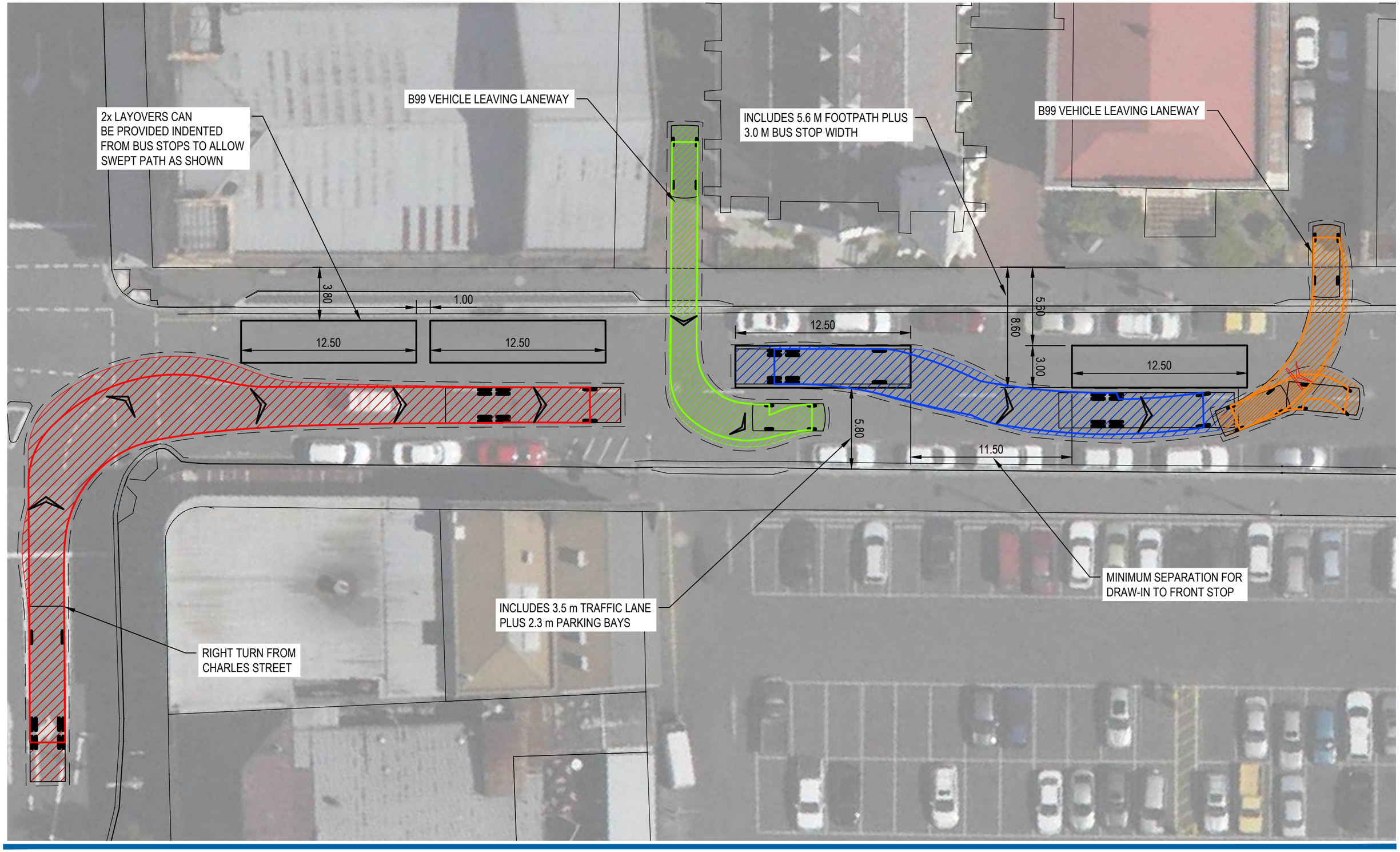
Based on Table 4, there would be sufficient space within the road reserve cross section to accommodate the bus stops, based on a single through lane of traffic on Paterson Street.

#### *Operating Space*

The Paterson Street Central option involves providing two independently operating bus stops between the two laneways approximately mid-way between Charles Street and St John Street. The existing layover on Paterson Street can be retained to improve timetabling and reduce any potential for roadway blockage. A potential arrangement is presented in Figure 15.

The option requires the following:

- The layover should be set back to allow the swept path of a standard bus from Charles Street into Paterson Street.
- The location of the rear bus stop is determined by the movement of vehicles turning left out of the existing laneway.
- The front bus stop should be set back as far as practicable from the laneway to maximize the available sight distance.

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LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT
OPTION 2 PATERSON ST CENTRAL
OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 15

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Plot Date: 31 October 2017 - 1:03 PM Plotted by: Mark Petrusma Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg

### 4.2.3 Impacts Assessment

#### *Bus Routing*

There are two options for the routing of departing services travelling to the northern suburbs from the proposed bus stops:

- Paterson Street → St John Street → Cimitiere Street or William Street
- Paterson Street → George Street → Cimitiere Street or William Street

The use of St John Street is preferred due to Metro Route 35 (Invermay-Mowbray-Ravenswood Loop) utilising Holbrook Street. In both cases, the intersections of Paterson Street / St John Street and/or Paterson Street / George Street will likely require kerb-line adjustments and other minor modifications to accommodate the swept path of left-turning buses *without* encroachment into the oncoming traffic lane.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street to Paterson Street, between Charles Street and St John Street, will result in additional circulation for dead running services traveling to the departure points. Buses would be required to divert via York Street and Charles Street rather than simply turning from York Street directly into St John Street.

The proposed circulation route is presented in Figure 16.

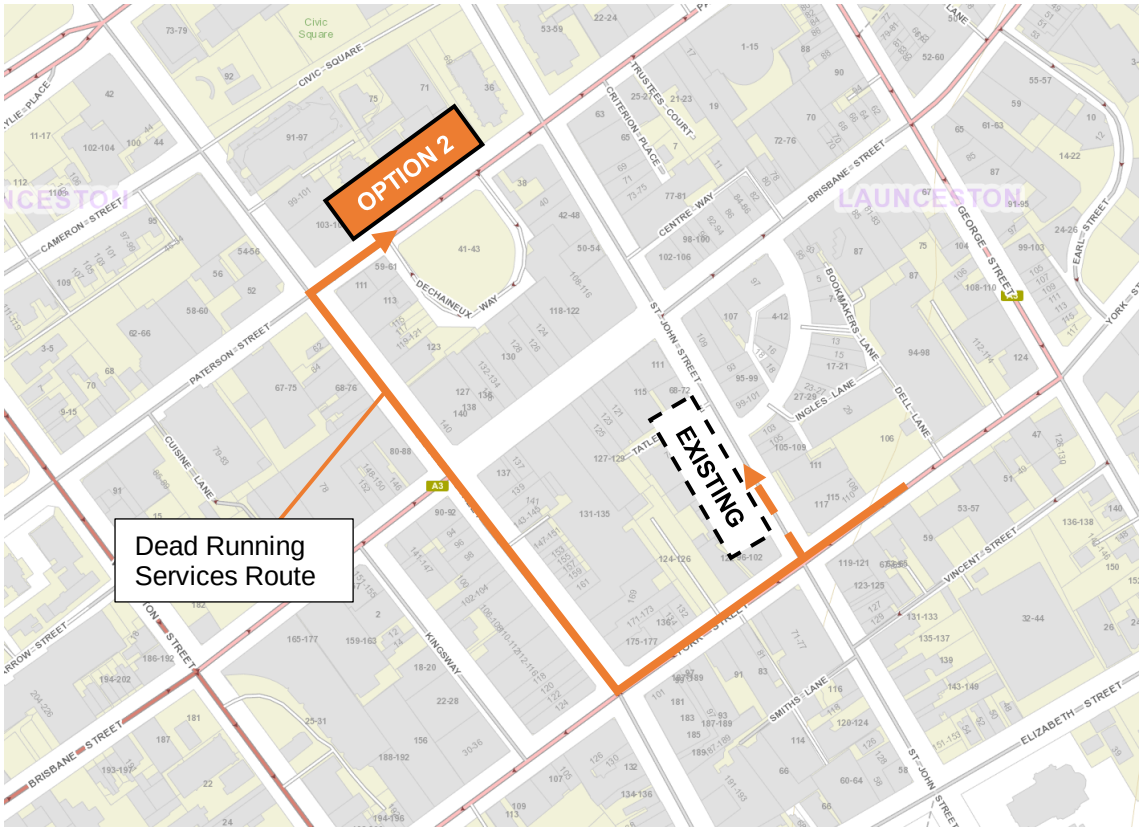



**Figure 16 Option 2 Dead Running Service Routes**

*Base map obtained from TheList © State of Tasmania*

The Option would be located in relatively close proximity to toilet facilities at Civic Square.

### *Intersection Operation*

There will be up to an additional 10 buses per hour utilising Charles Street to access relocated bus stops resulting in a minor increase in bus movements turning right from Charles Street onto Paterson Street. The largest impact to intersection operation at this location would be due to the introduction of a calmed, single-lane "avenue treatment" on Paterson Street, between Charles Street and St John Street.

There are currently around 800 vehicles per hour using Paterson Street, between Charles Street and St John Street, during the morning peak period and 550 vehicles per hour during the evening peak. It is desirable that a single-lane "avenue treatment" would approximately represent current operation at Brisbane Street ("The Avenue") between St John Street and George Street. The target traffic volumes would therefore be around 200-300 vehicles per hour, which is representative of existing traffic volumes at Brisbane Street.

The nominal capacity of this section could range from 500 to 1,000 vehicles per hour depending on traffic signal operation at St John Street. It is likely that some redirection of traffic via other routes would result from the capacity reduction on Paterson Street.

Detailed traffic modelling would be required to ascertain the change in network performance as a result of the single-lane "avenue treatment" to accommodate the relocated bus stops. Notwithstanding, any significant capacity reduction on Paterson Street impacting on downstream capacity at the Paterson Street / Charles Street junction will cause additional delays and queuing at this junction, potentially propagating backwards and impacting other junctions including:

- Paterson Street / Wellington Street
- Charles Street / Cimitiere Street
- Charles Street / Brisbane Street

### *Road Safety*

Vehicles are currently required to reverse out of the laneway at 34 Paterson Street (Pilgrim Uniting Church). This laneway is located a short distance in front of the proposed bus stop at Paterson Street West. A stopped bus at this location would severely restrict sight distances for vehicles reversing out onto Paterson Street.

No other road safety issues were identified that are specific to the Paterson Street Central option.

### *Tiger Bus*

No impacts to the Tiger Bus service are anticipated as a result of the Paterson Street Central option.

### *Parking*

The Paterson Street Central option will result in a net loss of 6 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking. It is assumed that all existing car parking spaces opposite the proposed bus stops can be retained.

### *Accessibility*

The proposed Paterson Street Central option is located approximately 200 metres walking distance from the CBD centroid as shown in Figure 17. This represents a minor increase compared to the existing location approximately 100 metres from the CBD centroid.

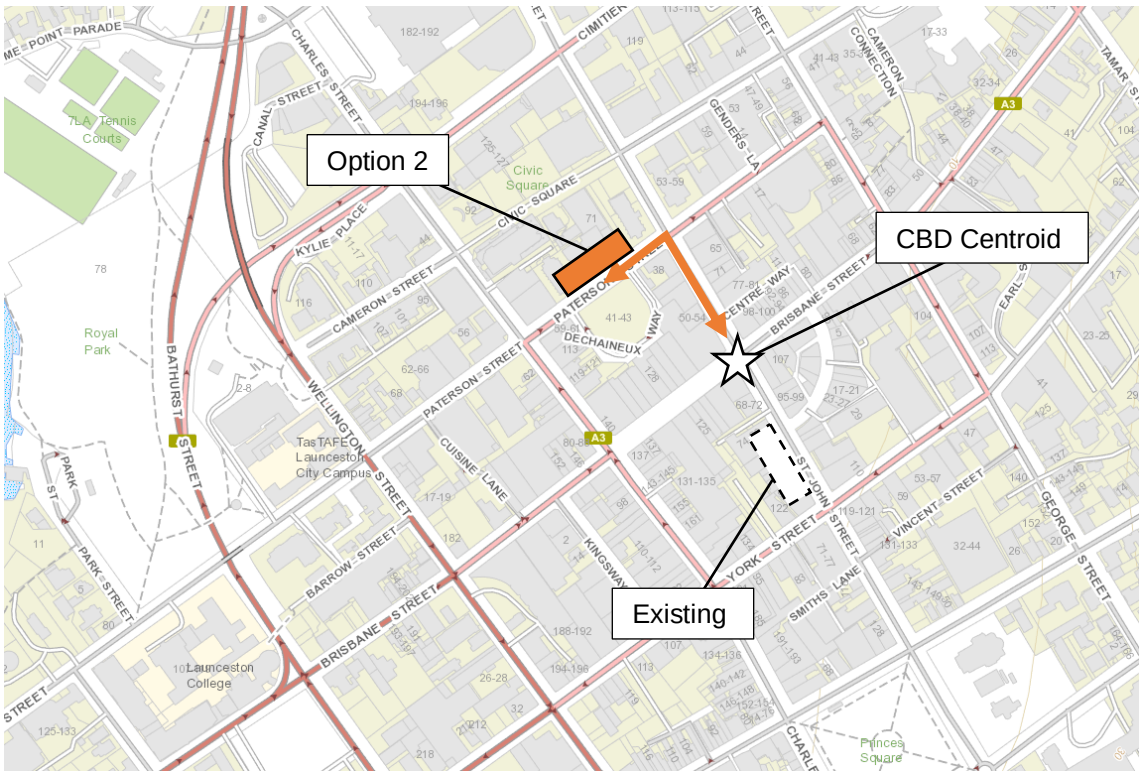



**Figure 17 Option 2 Paterson Street Central Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Paterson Street Central is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.2.4 Summary

A summary of the technical feasibility assessment for Option 2 Paterson Street Central is provided in Table 5.

**Table 5 Option 2 Paterson Street Central Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Yes | Adequate space for manoeuvring. |
| Accessibility | Yes | Level grade, close proximity to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Nil | Effectively no changes to bus routing. |
| Dead Running Services | Moderate | Buses required to circulate via Charles Street to access stops. |
| Intersection Operation | Moderate | Moderate impacts due to reduction to one lane. |
| Road Safety | Moderate | Potential sight distance issues at existing driveway. |
| Parking | Minor | Loss of 6 on-street car parking spaces. |
| Other Bus Operators | Nil | No impacts to other bus services/operators |

## 4.3 Option 3 – Paterson Street East

### 4.3.1 Location and Bus Routing

Option 3 is located at Paterson Street East, between St John Street and George Street, immediately downstream of the St John Street traffic signals. The location is shown in Figure 18. It is noted that any works which require modification to the existing heritage listed kerbs within Paterson Street East must be undertaken in accordance with Council's *"works on Stone Kerbs and Gutters Policy".*


**Figure 18 Option 3 Paterson Street East Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Under Option 3, buses would be required to reroute via George Street rather than St John Street as shown in Figure 19. Several intersections will experience changed bus movements including Paterson Street / George Street, Cimitiere Street / George Street, Cimitiere Street / Tamar Street, Cameron Street / Tamar Street, William Street / George Street and William Street / St John Street.

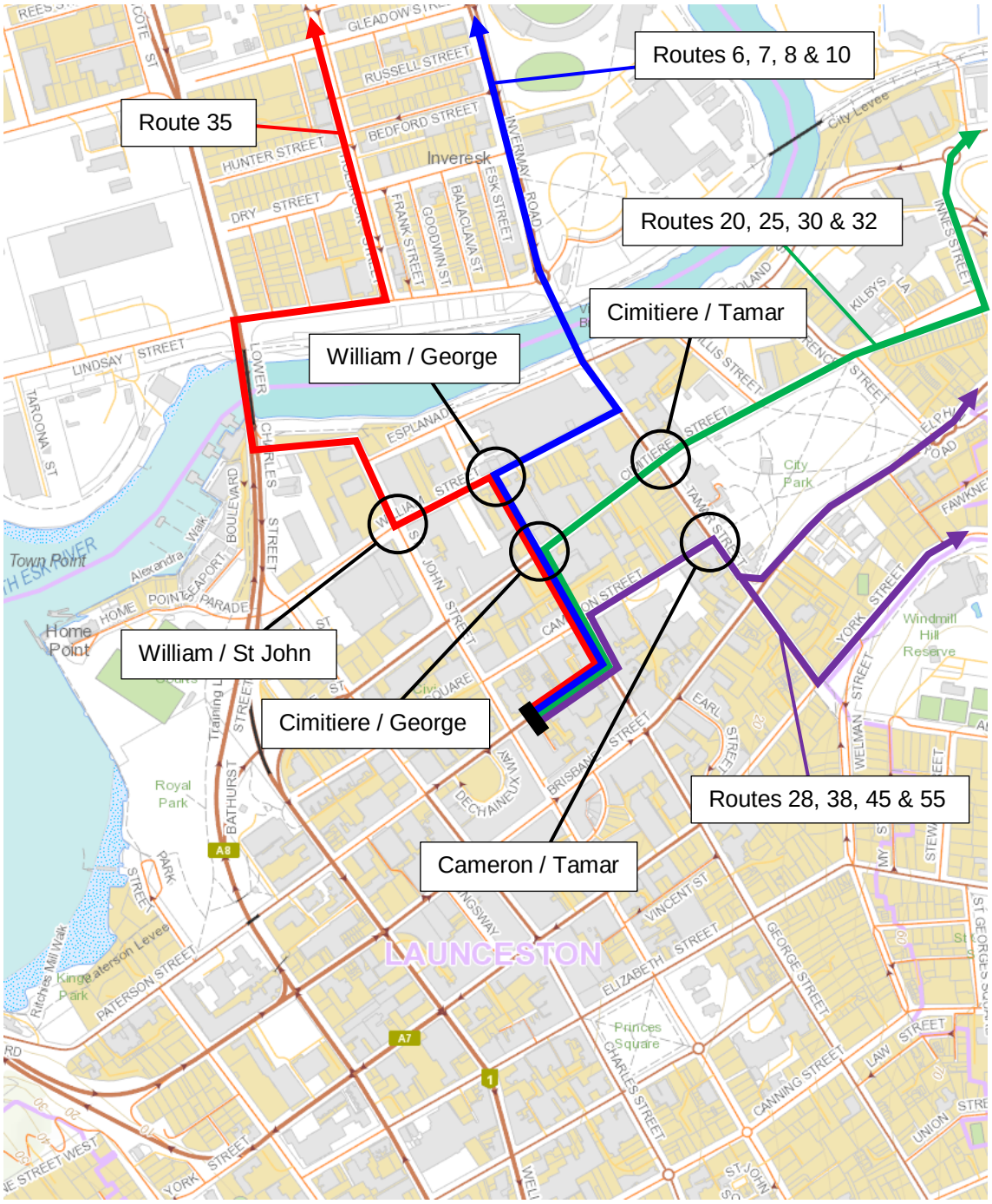



**Figure 19 Option 3 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

Note that buses travelling to Elphin Road (via Brisbane Street) and High Street (via York Street) would be required to use Cimitiere Street and Tamar Street due to geometric limitations at the intersection of George Street and Brisbane Street restricting left turn movements by buses (see Section 4.3.3).

### 4.3.2 Technical Feasibility Review

#### *Roadway Cross Section*

Paterson Street, between St John Street and George Street, has a total road reserve width of 18.2 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section is presented in Figure 20.

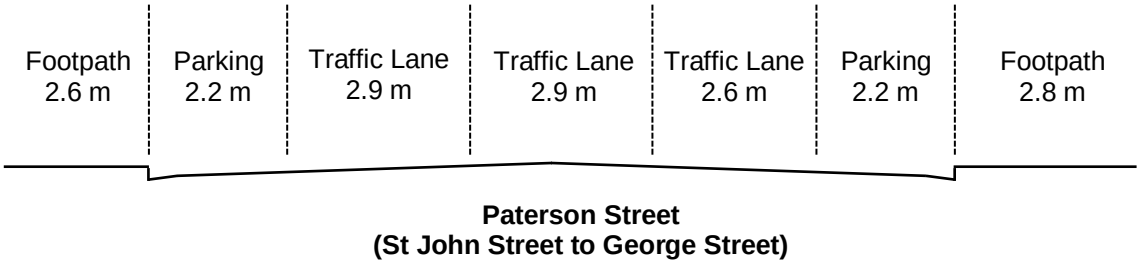



**Figure 20 Paterson Street East Cross Section**

The minimum requirements are summarised in Table 6.

**Table 6 Paterson Street East Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (north side) | 2.6 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.8 m | 8.8 m | Minimum includes 3.0 m bus stop, 3.5 m traffic lane and 2.3 m on-street parking. |
| Footpath (south side) | 2.8 m | 2.8 m | To match existing. |
| ***Total*** | ***18.2 m*** | ***17.2 m*** | |

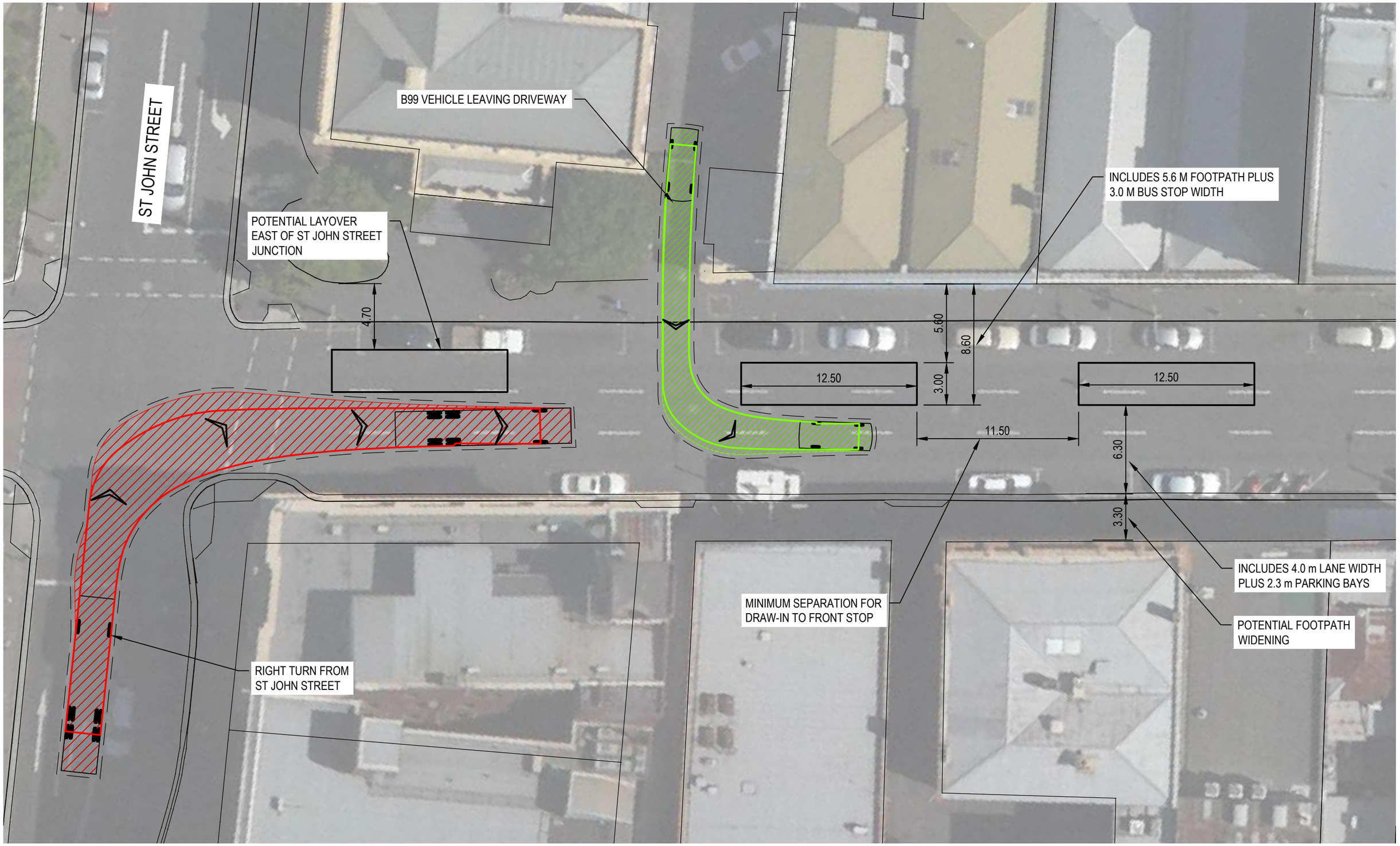
Based on Table 6, there would be sufficient space within the road reserve cross section to accommodate the option based on a single through lane travelling in the eastbound direction. A lane width of 4.0 metres could be adopted to provide an additional 0.5 metres clearance to the bus stop if desired. Additionally, the existing footpath on the south side of the road could be widened by 0.5 metres.

#### *Operating Space*

The Paterson Street East option involves providing two independently operating bus stops located east of the existing car park access at 53-59 St John Street (State offices). A short-term layover space can be provided immediately downstream of the Paterson Street / St John Street traffic signals. A potential arrangement is presented in Figure 21.

The option requires the following:

- The layover should be set back to allow the swept path of a standard bus from St John Street into Paterson Street (both left and right turns).
- The location of the rear bus stop is determined by the movement of vehicles turning left out of the existing driveway at 53-59 St John Street.

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LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT
OPTION 3 PATERSON ST EAST
OPERATING SPACE REQUIREMENTS

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Date OCT 2017

Figure 21

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### 4.3.3 Impacts Assessment

#### *Bus Routing*

Buses would be required to route via George Street, rather than St John Street, as shown in Figure 19 of this report. It is noted that those services travelling via Brisbane Street (to Elphin Road) and York Street (to High Street) may need to redirect via Cameron Street and Tamar Street. This is due to buses being physically unable to turn left from George Street into Brisbane Street as demonstrated in Figure 22.

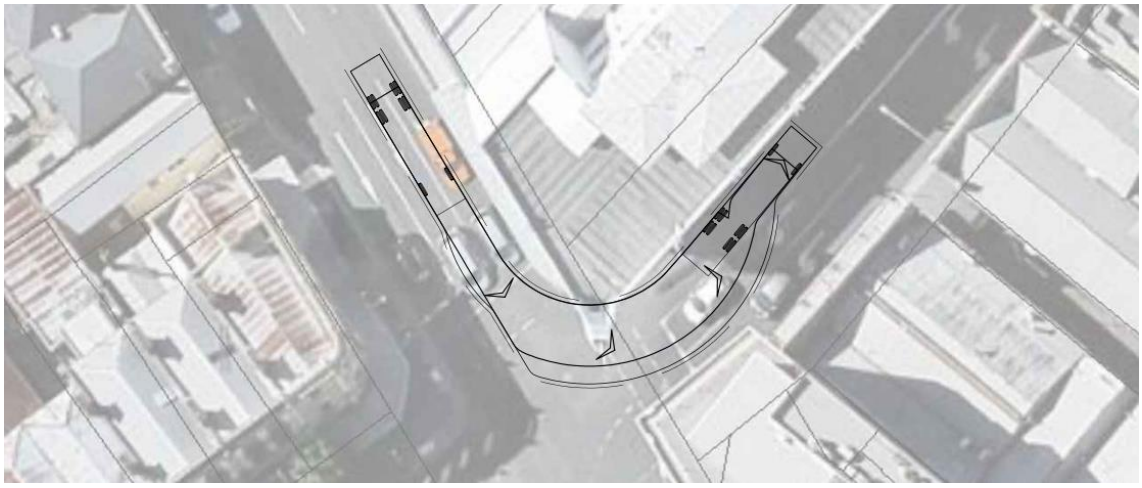


**Figure 22 George Street / Brisbane Street Left Turn Movement**

*Base imagery obtained from TheLIST © State of Tasmania*

Given the changed route, the existing outbound bus stop on Brisbane Street (Bus Stop 1) will be inaccessible and would need to be relocated.

#### *Dead Running Services*

There would be a very minor impact on dead running services with buses required to continue straight along St John Street and turn onto Paterson Street to access the new Option 3 departure points. It is noted that Option 3 would open up new opportunities for dead running routes with potential direct access from the Paterson Street layover to the departure points on Paterson Street as shown in Figure 23.


**Figure 23 Option 3 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The Option would be located in close proximity to toilet facilities at the Paterson Street East public multi-storey car park.

### *Intersection Operation*

There will be up to an additional 10 buses per hour turning right from St John Street onto Paterson Street compared to the existing situation where buses continue along St John Street to connect to William Street. The largest impact to intersection operation at this location would be due to the introduction of a calmed, single-lane "avenue treatment" on Paterson Street, between St John Street and George Street.

There are currently around 800 vehicles per hour using Paterson Street, between St John Street and Charles Street, during the morning peak period and 550 vehicles per hour during the evening peak. It is desirable that a single-lane "avenue treatment" would approximately represent current operation at Brisbane Street ("The Avenue") between St John Street and George Street. The target traffic volumes would therefore be around 200-300 vehicles per hour, which is representative of existing traffic volumes at Brisbane Street.

The nominal capacity of this section could range from 500 to 1,000 vehicles per hour depending on intersection capacity at George Street and St John Street. It is likely that some redirection of traffic via other routes would result from the capacity reduction on Paterson Street.

Detailed traffic modelling would be required to ascertain the change in network performance as a result of the single-lane "avenue treatment" to accommodate the relocated bus stops. Notwithstanding, any significant capacity reduction on Paterson Street impacting on downstream capacity at the Paterson Street / St John Street junction will cause additional delays and queuing at this junction, potentially propagating backwards and impacting other junctions including:

- Paterson Street / Charles Street
- St John Street / Brisbane Street (The Avenue)
- St John Street / Cameron Street

All intersections affected by rerouted services are considered to be capable of accommodating the additional bus movements due to this option. The largest impact would be at the intersection of Paterson Street and George Street which will have left turn movements by buses introduced. A detailed risk assessment would be required at this junction due to existing traffic islands and adjacent building infrastructure (awnings).

### *Road Safety*

Sight distances for vehicles exiting the 53-59 St John Street driveway may be impacted by the proposal. A bus parked immediately upstream of the junction would obstruct the available sight distance. It is recommended that any bus stop or layover be set back a minimum of 10 metres from the edge of the driveway so as to maintain sight distances.

This situation is considered comparable to many other locations around Launceston, including Tatler Arcade at St John Street south, and therefore is not considered to be a significant safety concern with this option.

### *Tiger Bus*

No impacts to the Tiger Bus service are anticipated as a result of the Paterson Street East option.

### *Parking*

The Paterson Street East option will result in a net loss of 9 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking. It is assumed that all existing car parking spaces opposite the proposed bus stops can be retained.

### *Accessibility*

The proposed Paterson Street East option is located approximately 200 metres walking distance from the CBD centroid as shown in Figure 24. This represents a minor increase compared to the existing location approximately 100 metres from the CBD centroid.

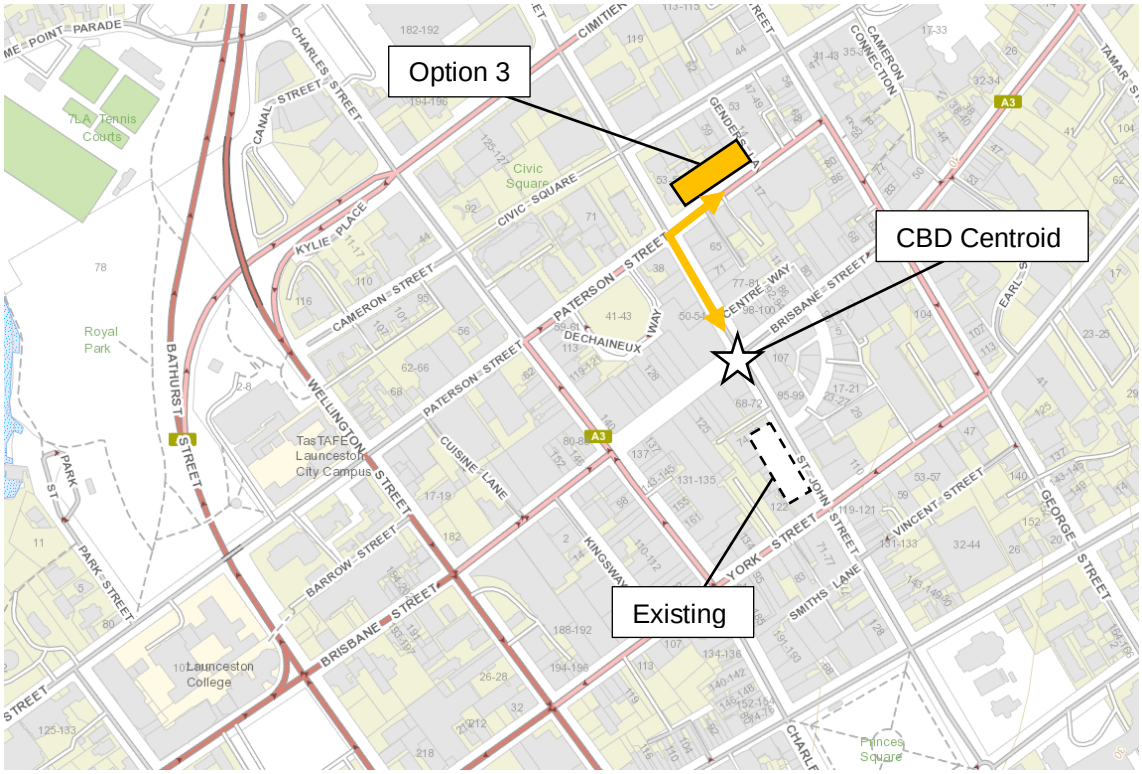



**Figure 24 Option 3 Paterson Street East Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Paterson Street East is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.3.4 Summary

A summary of the technical feasibility assessment for Option 3 Paterson Street East is provided in Table 7.

**Table 7 Option 3 Paterson Street East Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Yes | Adequate space for manoeuvring. |
| Accessibility | Yes | Level grade, close proximity to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Moderate | Bus routes via George Street rather than St John. |
| Dead Running Services | Minor | Minor increase in travel required to access stops. |
| Intersection Operation | Moderate | Impacts primarily due to reduction to one lane. |
| Road Safety | Nil | No safety issues identified. |
| Parking | Minor | Loss of 9 car parking spaces. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.4 Option 4 – Charles Street North A

### 4.4.1 Location and Bus Routing

Option 4 is located at Charles Street, between Cameron Street (Civic Square) and Paterson Street, as shown in Figure 25.

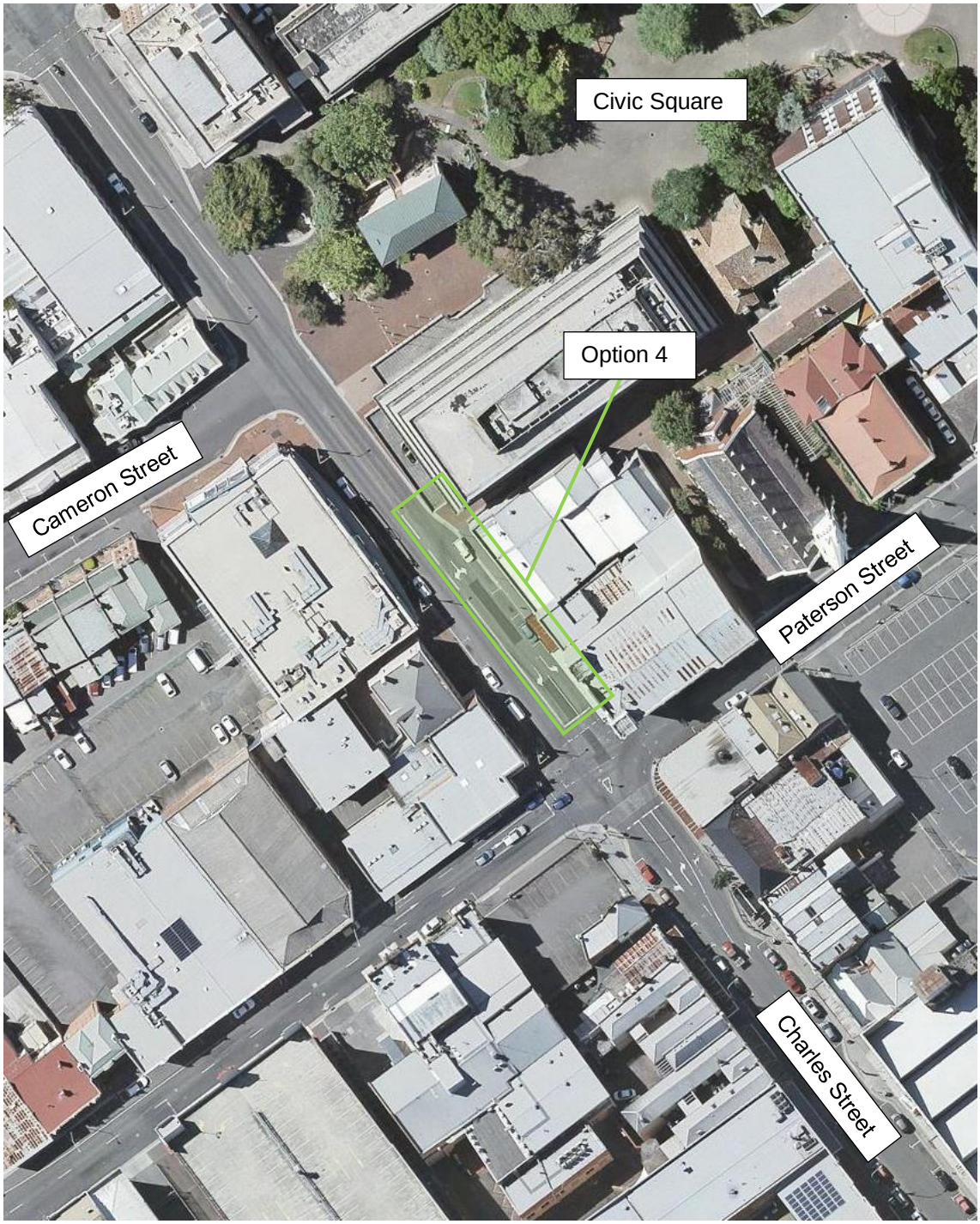



**Figure 25 Option 4 – Charles Street North A Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn onto Paterson Street and then either left or right onto St John Street before continuing as per the existing situation. The Option 4 departure routes are presented in Figure 26.

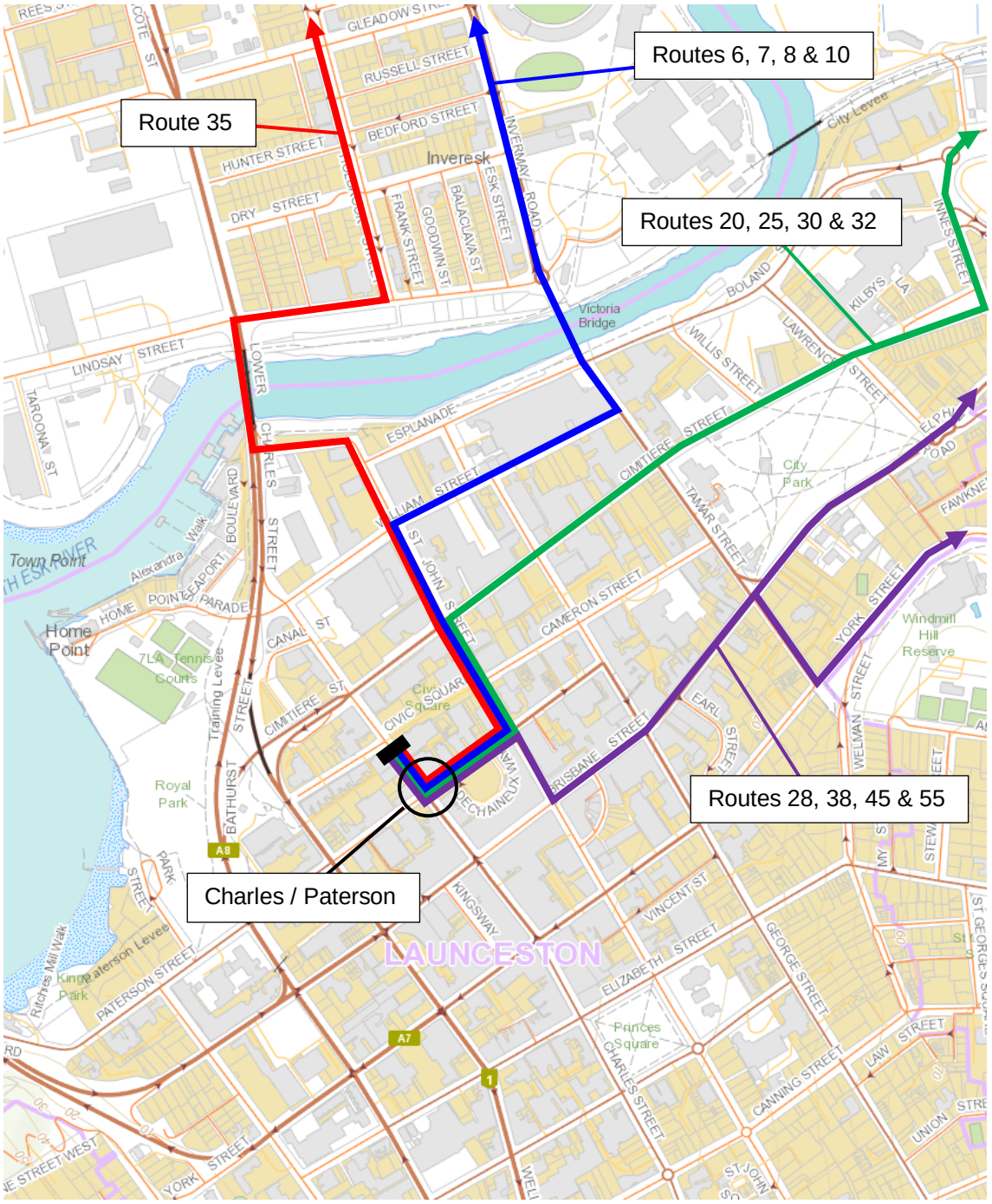



**Figure 26 Option 4 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.4.2 Technical Feasibility Review

#### *Roadway Cross Section*

Charles Street, between Paterson Street and Cameron Street has a total road reserve width varying between 18.3 and 19.1 metres, at the Paterson Street end, reducing to around 14.6 metres near Henty House. A diagram of the existing cross section (approximate) is presented in Figure 27.

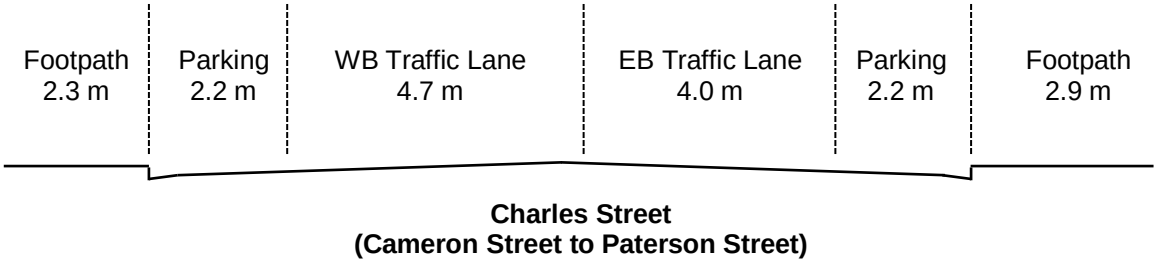



**Figure 27 Charles Street North Cross Section**

The minimum requirements are summarised in Table 8.

**Table 8 Charles Street North A Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (east side) | 2.3 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 13.1 m | 10.0 m | Minimum includes 3.0 m bus stop and two 3.5 m traffic lanes. |
| Footpath (west side) | 2.9 m | 2.9 m | To match existing. |
| ***Total*** | ***18.3 m*** | ***18.5 m*** | |

Based on Table 8, there would be sufficient space within the road reserve cross section to accommodate the minimum widths required for the proposed bus stops towards the Paterson Street end of the segment, however minimum standards for lane widths would have to be reduced to 3.4 metres at the north end of the stops where the road reserve is narrower.

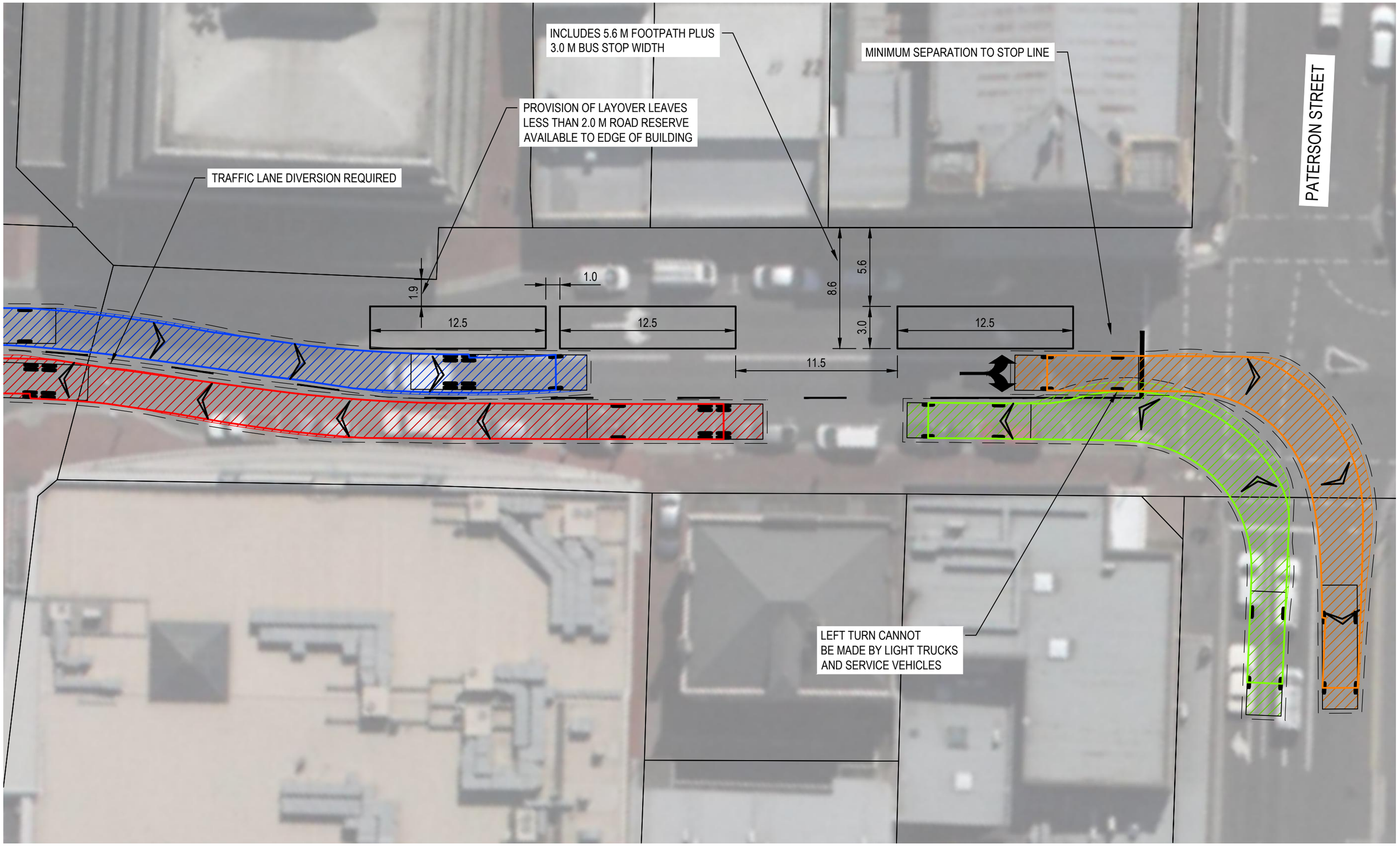
#### *Operating Space*

While there is sufficient space within Charles Street, between Civic Square (Cameron Street) and Paterson Street, to provide two independently operating bus stops with an additional layover, this cannot be achieved without realigning the Charles Street traffic lanes. The realignment of lanes requires:

- Sufficient space on the northern side of the stops to allow an appropriate rate of lateral movement around the proposed bus stops
- Sufficient space on the southern side of the stops to allow all movements at the Charles Street / Paterson Street junction.

The realignment of traffic lanes on Charles Street impacts on movements at its intersection with Paterson Street.

Operating space requirements for Option 4 are demonstrated in Figure 28.

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CITY OF LAUNCESTON
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TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 4 CHARLES ST NORTH A OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 28

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Version: 1, Version Date: 25/10/2019

The proposed option will have significant impacts on the following movements at the Charles Street / Paterson Street junction:

- Left turn from Paterson Street into Charles Street cannot be made by light trucks and service vehicles
- Through movement along Charles Street northbound would require significant deflection through the junction and create potential conflict with right-turning vehicles

It is clear that there is insufficient space within Charles Street, between Cameron Street and Paterson Street, to allow for two, independently operating bus stops, with reference to the minimum design standards adopted in this report.

### *Discussion*

An alternative configuration was also investigated involving provision of bus stops on the western side of the road rather than on the eastern side of the road. This was considered not to be a workable solution due to the following:

- Bus stops would need additional clearance to the upstream junction (Paterson Street) in order to allow for the swept path of service vehicles undertaking left turns into Charles Street.
- The road reserve width restrictions at Henty House would prohibit the provision of two traffic lanes in addition to bus stops and footpaths.
- Vehicles undertaking right turns from Charles Street into Paterson Street would be required to turn from the far left side of the road, creating potential conflict with other vehicles using this junction (including right turns from the opposing approach).

The above issues are demonstrated in Figure 29.

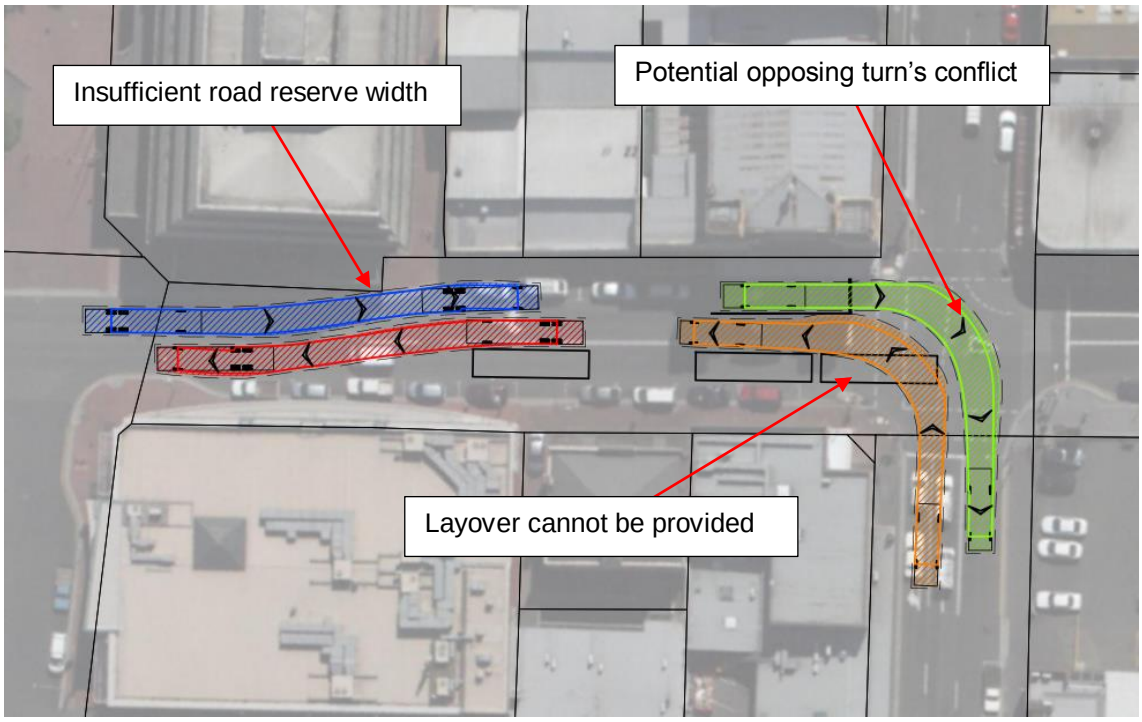


**Figure 29 Option 4 Alternative Configuration**

*Base imagery obtained from TheLIST © State of Tasmania*

### 4.4.3 Impacts Assessment

#### *Bus Routing*

There would be only a very minor impact on travel times for departing services using stops at Charles Street, between Cameron Street and Paterson Street, due to the minor increase in travel required to access St John Street. It is noted that the intersection of Paterson Street / St John Street will likely require kerb-line adjustments and other minor modifications to accommodate the swept path of left-turning buses without encroachment into the oncoming traffic lane.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street to Charles Street, between Cameron Street and Paterson Street, will result in significant changes to dead running routes. Buses would be required to drive past the existing stops and circulate through the road network to enter Charles Street from the north at Cimitiere Street. It is noted that any right turn ban from Cimitiere Street onto Charles Street may limit access opportunities for buses coming from the other direction.

The changed dead running service routes are presented in Figure 30.


**Figure 30 Option 4 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The Option would be located in close proximity to toilet facilities at Civic Square.

### *Intersection Operation*

The Option 4 proposal would result in a major impact to the overall operation of the Charles Street / Paterson Street intersection due to the realignment of the southbound Charles Street approach required to accommodate bus stop infrastructure.

This would also cause the southbound approach to be reduced to a single lane providing for both left and right turns, resulting in all traffic using Charles Street traveling southbound (including buses) to be delayed by right-turning vehicles giving way to northbound traffic.

In addition the additional circulation for dead running services will result in the following intersections experience increased use by buses (left turns):

- Cimitiere Street / St John Street
- Cimitiere Street / Charles Street

Buses making left turns are often required to straddle both the left and middle traffic lanes, thereby delaying other traffic travelling westbound on Cimitiere Street. Detailed traffic modelling would be required to determine the change in performance of Option 4 due to the additional bus circulation.

### *Road Safety*

The traffic lanes in both the northbound and southbound direction are required to deflect rapidly immediately north of the proposed bus stops creating the potential for head on collisions. This is also located in the vicinity of a regularly used pedestrian crossing point, which further increases the risk of an incident.

The realigned approach to the Paterson Street junction requires northbound through traffic to deflect through the junction creating potential head-on conflict with opposing traffic as shown in Figure 31.

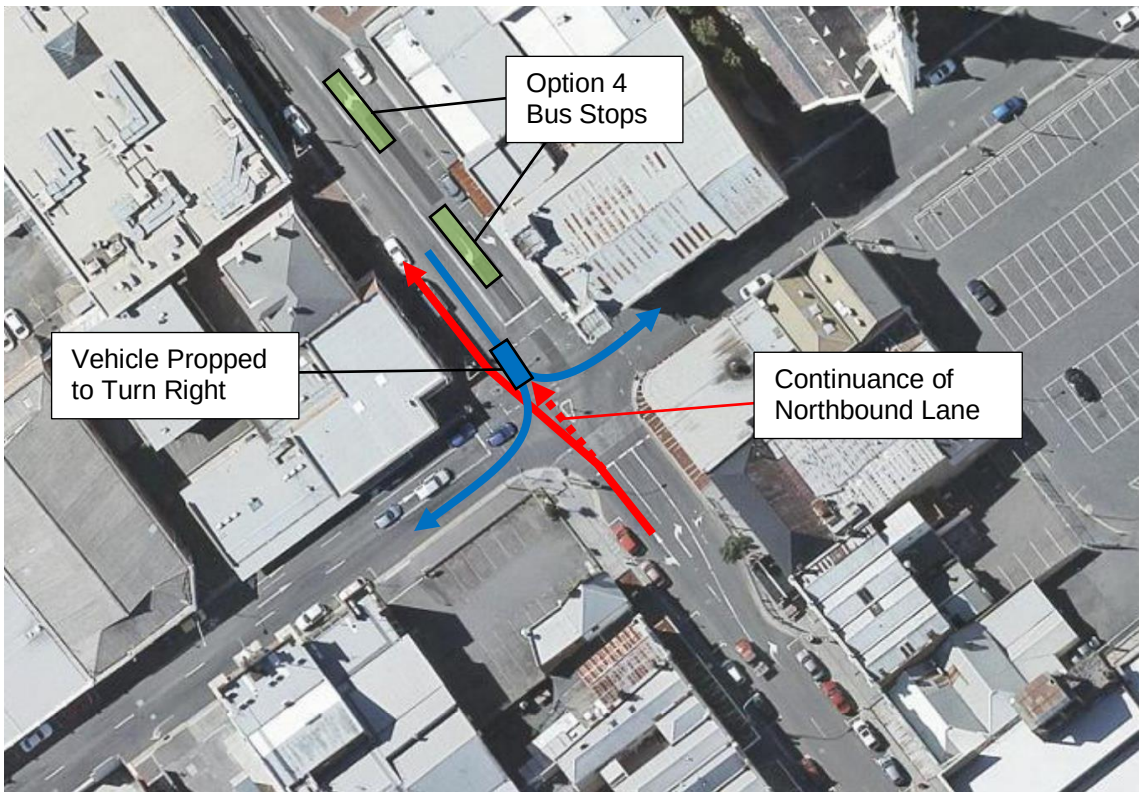


**Figure 31 Option 4 Junction Conflict**

*Base imagery obtained from TheLIST © State of Tasmania*

### *Parking*

All existing car parking on Charles Street between Cameron Street and Paterson Street would need to be removed to accommodate the option. This includes a total of 9 short-term car parking spaces. These spaces are 1-hour (1P) metered parking. The existing loading bay outside Foot & Playsted would also need to be removed.

### *Accessibility*

The proposed Charles Street North A option is located approximately 320 metres walking distance from the CBD centroid as shown in Figure 32. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

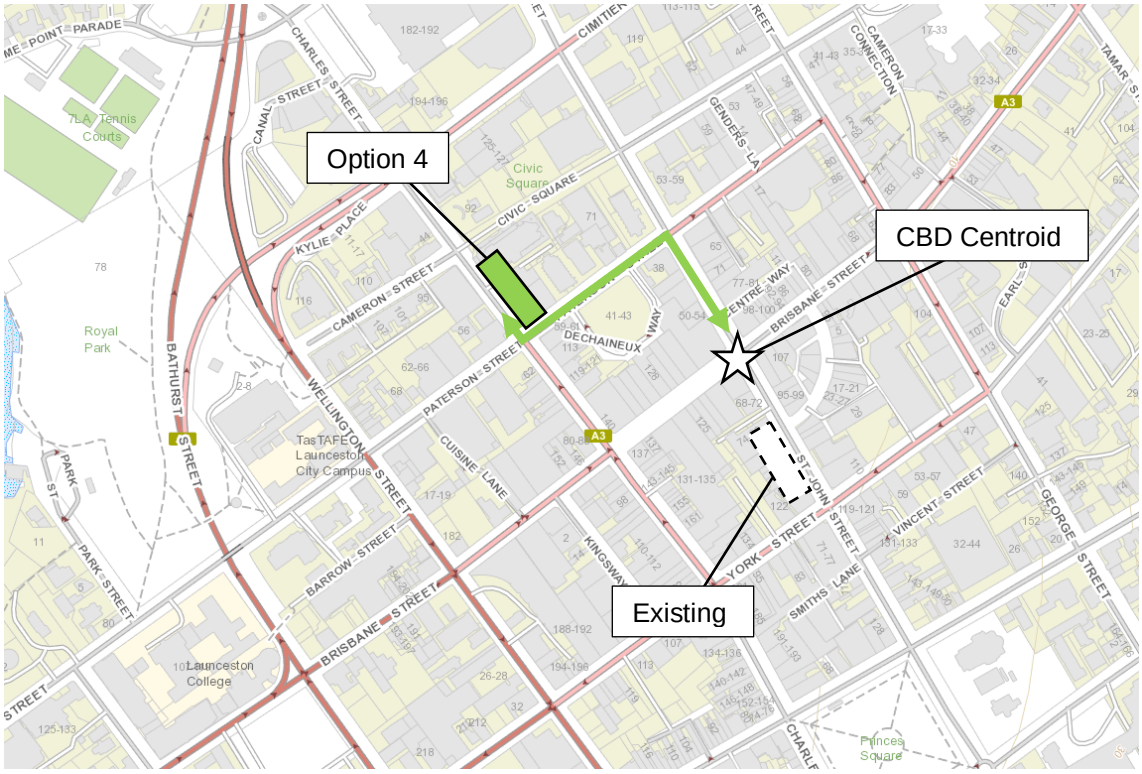


**Figure 32 Option 4 Charles Street North A Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Charles Street North A is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.4.4 Summary

A summary of the technical feasibility assessment for Option 4 Charles Street North A is provided in Table 9.

**Table 9 Option 4 Charles Street North A Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Maybe | Requires reduced minimum design standards. |
| Operating Space | Maybe | Requires reduced minimum design standards. |
| Accessibility | Maybe | Located moderate distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Moderate | Increased travel through local CBD road network. |
| Dead Running Services | Major | Major increase in circulation time required. |
| Intersection Operation | Major | Major impacts to operation of Paterson Street / Charles Street junction. |
| Road Safety | Major | Major impacts to safety of Paterson Street / Charles Street junction due to lane realignment. |
| Parking | Major | Requires removal of all spaces including existing loading bay. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.5 Option 5 – Brisbane Street West

### 4.5.1 Location and Bus Routing

Option 5 is located at Brisbane Street West, between Kingsway and Charles Street. The location is shown in Figure 33.


**Figure 33 Option 5 Brisbane Street West Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn left onto Charles Street, right onto Paterson Street and then either left or right into St John Street before continuing as per the existing situation. The Option 5 departure routes are presented in Figure 34.

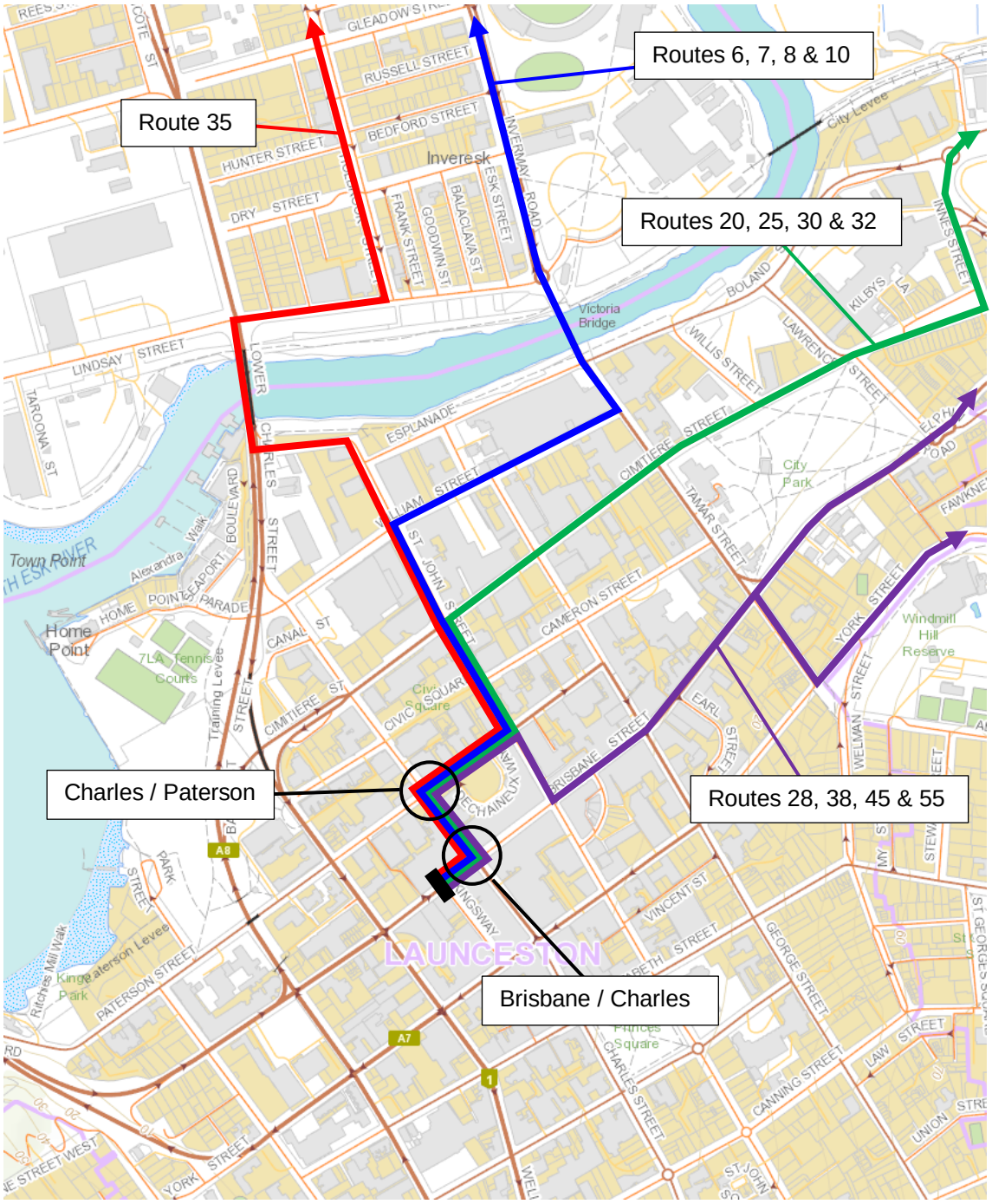


**Figure 34 Option 5 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.5.2 Technical Feasibility Review

#### *Roadway Cross Section*

Brisbane Street, between Kingsway and Charles Street, has a total road reserve width of approximately 17.7 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section (approximate) is presented in Figure 35.

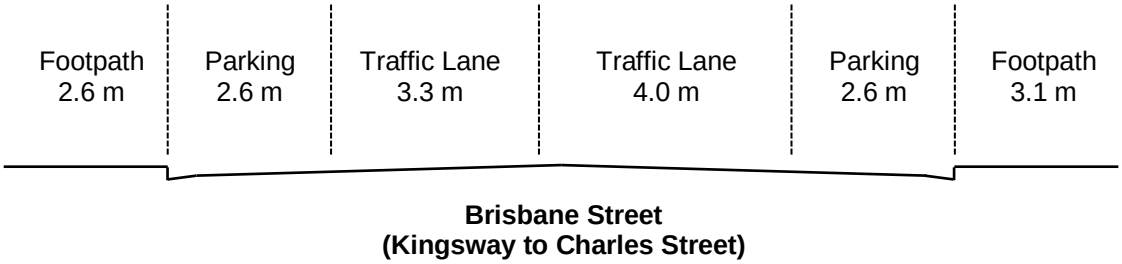


**Figure 35 Brisbane Street West Cross Section**

The minimum requirements are summarised in Table 10.

**Table 10 Brisbane Street West Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (north side) | 2.6 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.5 m | 8.8 m | Minimum includes 3.0 m bus stop, 3.5 m traffic lane and 2.3 m on-street parking. |
| Footpath (south side) | 2.6 m | 2.6 m | To match existing. |
| ***Total*** | ***17.7 m*** | ***17.0 m*** | |

Based on Table 10, there would be sufficient space within the road reserve cross section to accommodate the option based on a single through lane traveling in the eastbound direction. A lane width of 4.0 metres could be adopted to provide an additional 0.5 metres clearance to the bus stop if desired.

#### *Operating Space*

The Brisbane Street West option involves providing two independently operating bus stops located between Kingsway and Charles Street plus an additional short-term layover immediately behind the rear stop. The existing bus zone for West Tamar regional services, located upstream can be retained.

A potential arrangement is presented in Figure 36.

RETAIN EXISTING WEST TAMAR SERVICES BUS STOP

RIGHT TURN INTO KINGSWAY CAN ONLY BE MADE WHEN LAYOVER SPACE IS CLEAR

RIGHT TURN REQUIRES ENCROACHMENT INTO ONCOMING TRAFFIC LANE AS PER EXISTING SITUATION

REDUCE TRAFFIC ISLAND TO ALLOW SERVICE VEHICLE SWEPT PATH FROM KINGSWAY

4.1
12.5
10.2
1.0
12.5
12.5
8.6
5.6
3.0
12.5
11.5

KINGSWAY

CHARLES STREET

0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

N

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TECHNICAL FEASIBILITY ASSESSMENT
OPTION 5 BRISBANE ST WEST
OPERATING SPACE REQUIREMENTS

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Figure 36

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Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg
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Version: 1, Version Date: 25/10/2019

It is noted that the proposed option may impact on the use of the upstream bus stop by West Tamar Services. This stop will be retained, however buses will only be able to turn right from Brisbane Street into Kingsway if the proposed layover space is clear. The proposed layover should only be used in the event a bus arrives at Stop E or F while both stops are occupied.

Buses turning right into Kingsway are required to encroach into the oncoming traffic lane as demonstrated in Figure 36. This movement currently occurs as shown in the photo provided in Figure 37 below.


**Figure 37 Bus Turning from Brisbane Street into Kingsway**

*Base image obtained from Google Earth Pro © 2017 Google*

### 4.5.3 Impacts Assessment

#### *Bus Routing*

There would be a moderate impact on travel times for departing services using stops at Brisbane Street, between Kingsway and Charles Street, due to the minor increase in travel required to access St John St. It is noted that the intersection of Paterson Street/St John Street will likely require kerb-line adjustments and other minor modifications to accommodate the swept path of left-turning buses without encroachment into the oncoming traffic lane.

It is further noted that the existing drop-off stop for Metro Riverside and Trevallyn services may need to be relocated as a result of Option 5. This may impact on inbound routes depending on the location of the relocated drop-off point.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street to Brisbane Street, between Kingsway and Charles Street, will require buses to circulate via Bathurst Street or Wellington Street in order to access these stops. This will introduce additional time for dead running services.

The likely circulation route is presented in Figure 38.


**Figure 38 Option 5 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

It is noted that buses would not be able to use Kingsway for dead running routes as they will be unable to turn right from Kingsway to access the proposed bus stops. This is demonstrated in Figure 39.

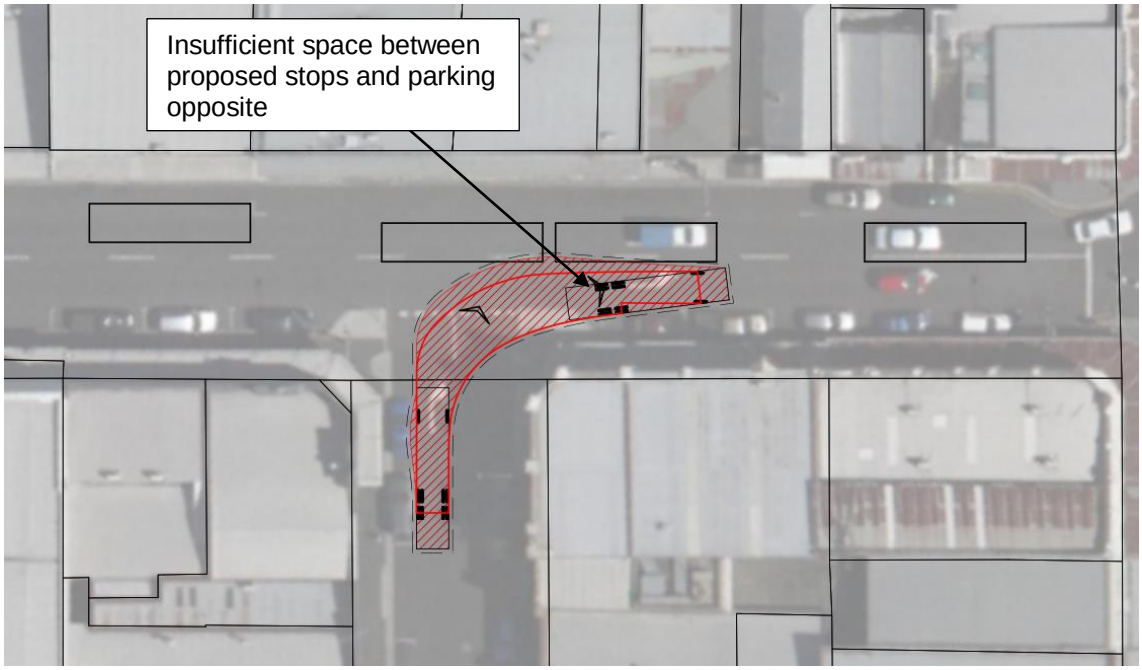



**Figure 39 Right Turn – Kingsway into Brisbane Street**

*Base imagery obtained from TheLIST © State of Tasmania*

The nearest toilet facilities are located at Paterson Street West public multi-storey car park.

### *Intersection Operation*

No significant intersection performance issues are anticipated to result from the proposed Option 5 bus stop relocation. Notwithstanding, some intersections will experience a net increase in bus activity including the following:

- Brisbane Street / Charles Street
- Charles Street / Paterson Street
- York Street / Bathurst Street
- Bathurst Street / Brisbane Street

The impacts of additional bus movements on the above intersections are likely to be minor.

### *Road Safety*

There is a potential safety issue associated with right turns from the existing West Tamar Services stop into Kingsway. In order to make this turn, buses are required to encroach into the oncoming traffic lane on Kingsway. It is noted that this situation occurs in the existing case, including buses crossing two lanes on Brisbane Street.

### *Parking*

The Brisbane Street West option will result in a net loss of 2 short-term car parking spaces. These spaces are 15-minute (1/4P) parking and service the adjacent businesses and the post box. It is assumed that all existing car parking spaces opposite the proposed bus stops can be retained. Note that the existing Metro bus zone at this location, which is currently used for drop-off, may also need to be relocated, resulting in potential removal of parking at another location in the CBD.

### *Accessibility*

The proposed Brisbane Street West option is located approximately 200 metres walking distance from the CBD centroid as shown in Figure 40. This represents a minor increase compared to the existing location approximately 100 metres from the CBD centroid.

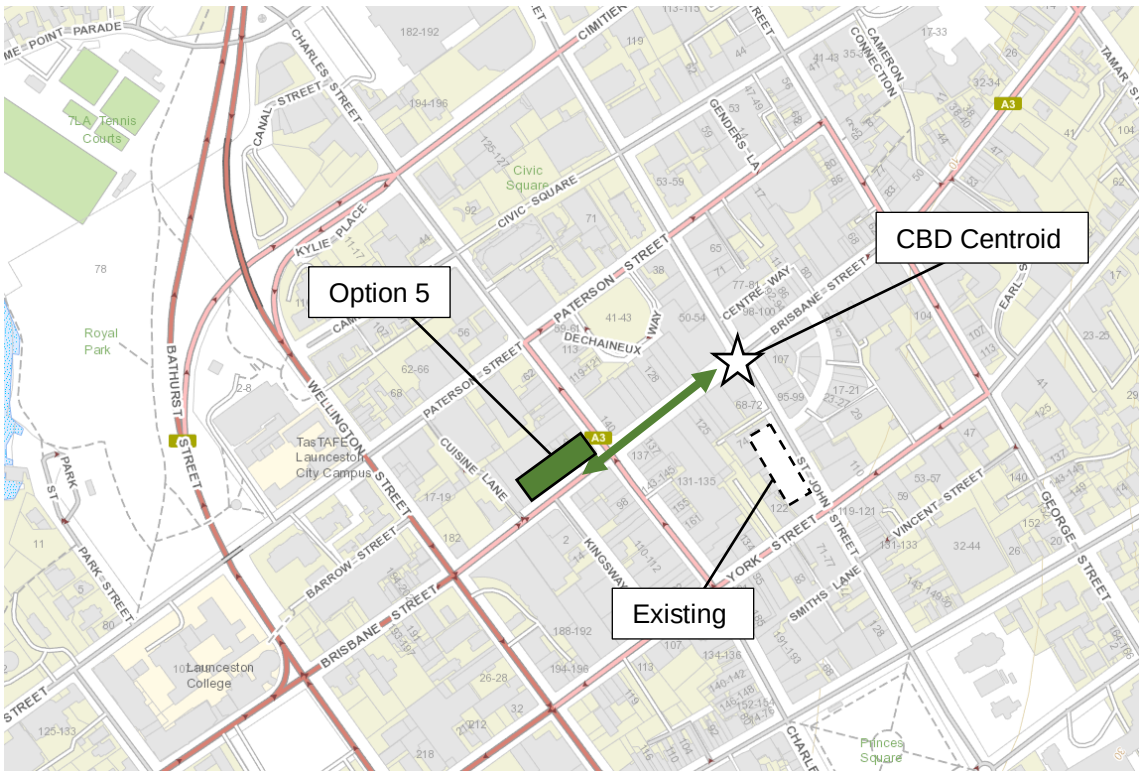



**Figure 40 Option 5 Brisbane Street West Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Paterson Street West is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.5.4 Summary

A summary of the technical feasibility assessment for Option 5 Brisbane Street West is provided in Table 11.

**Table 11 Option 5 Brisbane Street West Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Yes | Adequate space for manoeuvring. |
| Accessibility | Yes | Level grade, located close to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Moderate | Increased travel through local CBD road network. |
| Dead Running Services | Major | Major increase in circulation time required. |
| Intersection Operation | Minor | No significant impacts to intersection operation. |
| Road Safety | Moderate | Right turns from West Tamar stop into Kingsway. |
| Parking | Moderate | Loss of 2x parking spaces adjacent to post box. |
| Other Bus Operators | Major | May requires relocation of existing drop-off point for Riverside / Trevallyn services. |

## 4.6 Option 6 – Dechaineux Way

### 4.6.1 Location and Bus Routing

Option 6 is located at Dechaineux Way, at the rear of the open air car park accessed via Paterson Street. Dechaineux Way is a one-way road circulating in the clockwise direction. The location is provided in Figure 41.


**Figure 41 Option 6 – Dechaineux Way Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Bus routing will be similar to the existing situation, with buses departing Dechaineux Way onto Paterson Street before turning left or right onto St John Street. The Option 6 departure routes are presented in Figure 42.

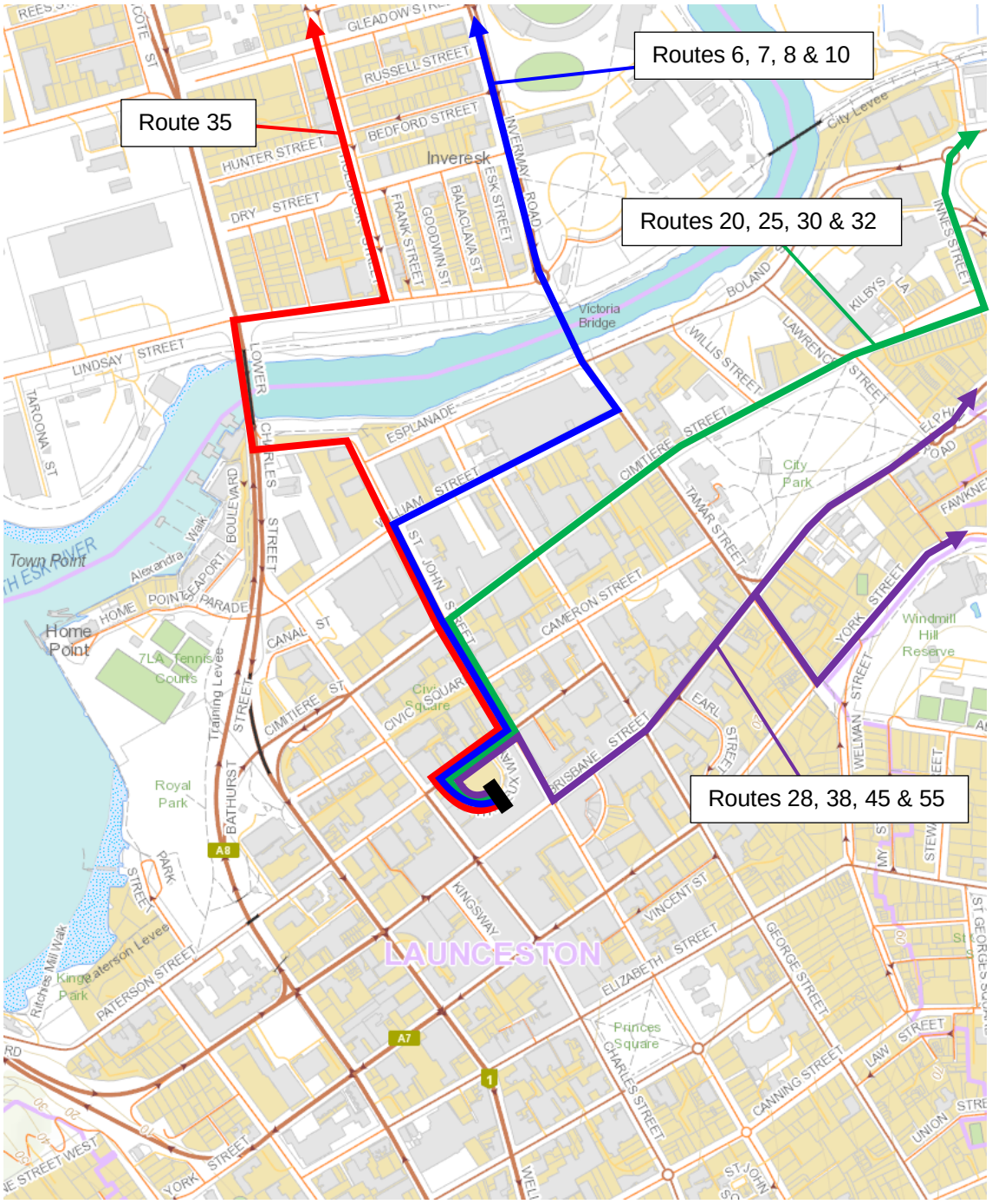



**Figure 42 Option 6 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.6.2 Technical Feasibility Review

#### *Roadway Cross Section*

Dechaineux Way has a nominal width of between 8.0 and 8.5 metres. There is a pinch point as its passes the Myer building where the road width reduces to approximately 6.0 metres. This option is unique, compared to the other options investigated in this report, in that Dechaineux Way is not a formalised road and does not include formal footpaths or kerbing.

Therefore, the requirements for provision of bus stops are primarily concerned with adequate space for bus shelters and passenger waiting areas and the physical ability for buses to manoeuvre into and out of stops. For the purpose of this assessment, and with reference to Section 2.5 of this report, the minimum requirements are:

- Shelters and waiting area 2.5 metres
- Bus stops 3.0 metres
- Through lane 3.0 metres
- Total 8.5 metres

Based on the above assessment, there *may* be sufficient room within Dechaineux Way to accommodate bus movements without the need to acquire additional land from the adjacent car park.

#### *Operating Space*

In considering operating space requirements for Option 6 at Dechaineux Way, the following constraints have been set:

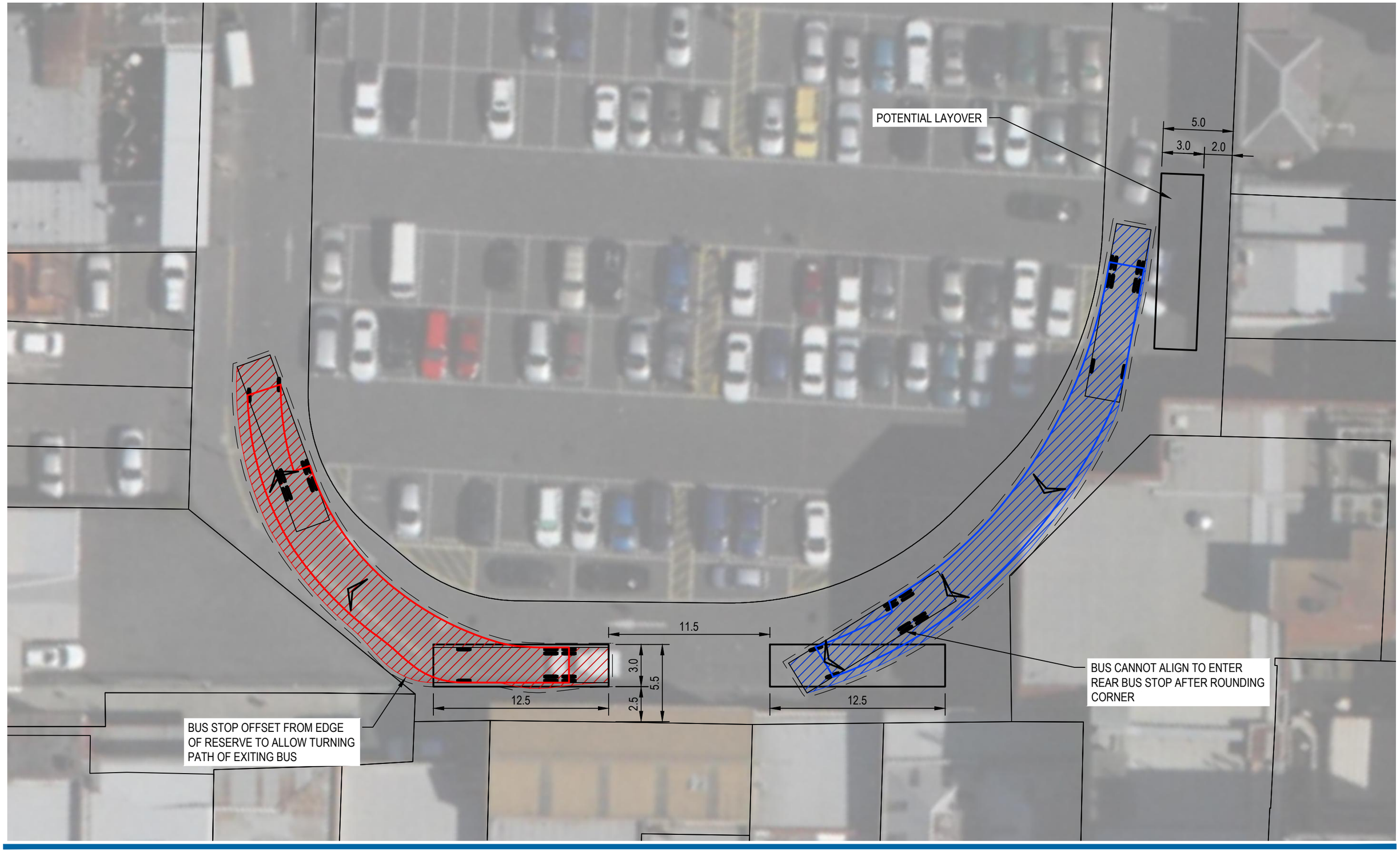
- Minimum of two, independently operating bus stops
- All bus infrastructure and bus movements contained within Dechaineux Way
- No encroachment onto private land

Operating space requirements are demonstrated in Figure 43. It is clear that there is insufficient length within the straight section of Dechaineux Way to accommodate two, independently operating bus stops. Buses are unable to enter the rear stop after turning the corner as shown.

#### *Discussion*

A range of alternative configurations were identified with various alignment of the rear bus stop, however none were found to be practical solutions. The 'pinch point' located immediately upstream of the option limits the ability for buses to turn and enter the rear bus stop in the forward direction. Furthermore, the road width requirements for bus movements turning the corner is greater than the minimum 3.0 metres adopted for straight roads to account for the swept path.

If Option 6 is adopted, it would require acquisition of private land at 41-43 Paterson Street, including around 18 car parking spaces.




0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT
OPTION 6 DECHAINEUX WAY
OPERATING SPACE REQUIREMENTS

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Figure 43

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Document Set ID: 4164477
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### 4.6.3 Impacts Assessment

#### *Bus Routing*

There would be only a minor impact to bus routing due to the proposed Option 6 arrangement at Dechaineux Way, caused by buses needing to turn onto Paterson Street before turning onto St John Street. It is likely that the intersection of Paterson Street / St John Street will require kerb-line adjustments and other minor modifications to accommodate the swept path of left-turning buses *without* encroachment into the oncoming traffic lane.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street to Dechaineux Way as per Option 6, will result in additional circulation for dead running services traveling to the departure points. Buses would be required to divert via York Street, Charles Street and Paterson Street rather than simply turning from York Street directly into St John Street.

It is noted that Option 6 would open up new opportunities for dead running routes with potential direct access from the Paterson Street layover to the departure points on Dechaineux Way as shown in Figure 44.

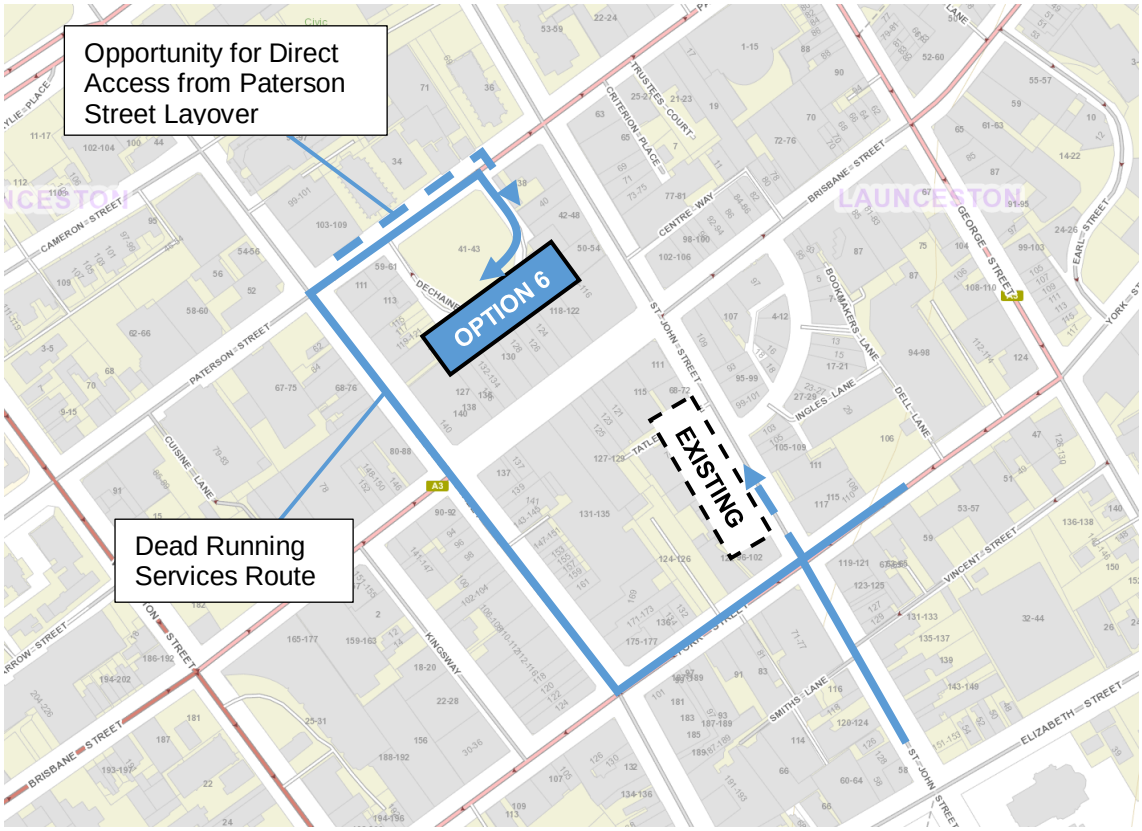



**Figure 44 Option 6 Dead Running Service Routes**

*Base map obtained from TheList © State of Tasmania*

The Option is not located close to existing public toilet facilities. The nearest facilities are located at Paterson Street East public multi-storey car park or Civic Square.

#### *Intersection Operation*

There will be up to an additional 10 buses per hour utilising Charles Street to access relocated bus stops resulting in a minor increase in bus movements turning right from Charles Street onto Paterson Street. The largest impacts would be due to the two intersections on Paterson Street

for right turns into Dechaineux Way and right turns out of Dechaineux Way. These junctions would experience some additional delays due to bus movements.

### *Road Safety*

The Dechaineux Way option would introduce regular bus movements to the Paterson Street Central car park at 41-43 Paterson Street. This area is used heavily by pedestrians using short-term car parking. The addition of bus movements significantly increases the risk of conflict between buses and pedestrians, particularly given the general lack of formal pedestrian facilities, including footpaths and crossings, resulting in poor separation between pedestrian and vehicular traffic.

### *Parking*

If adopted, Option 6 will require some acquisition of private land at 41-43 Paterson Street. This would result in a net loss of 18 car parking spaces from the Paterson Street Central car park, including 2 accessible car parking spaces.

### *Accessibility*

The proposed Dechaineux Way option is located approximately 250 metres walking distance from the CBD centroid as shown in Figure 45. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

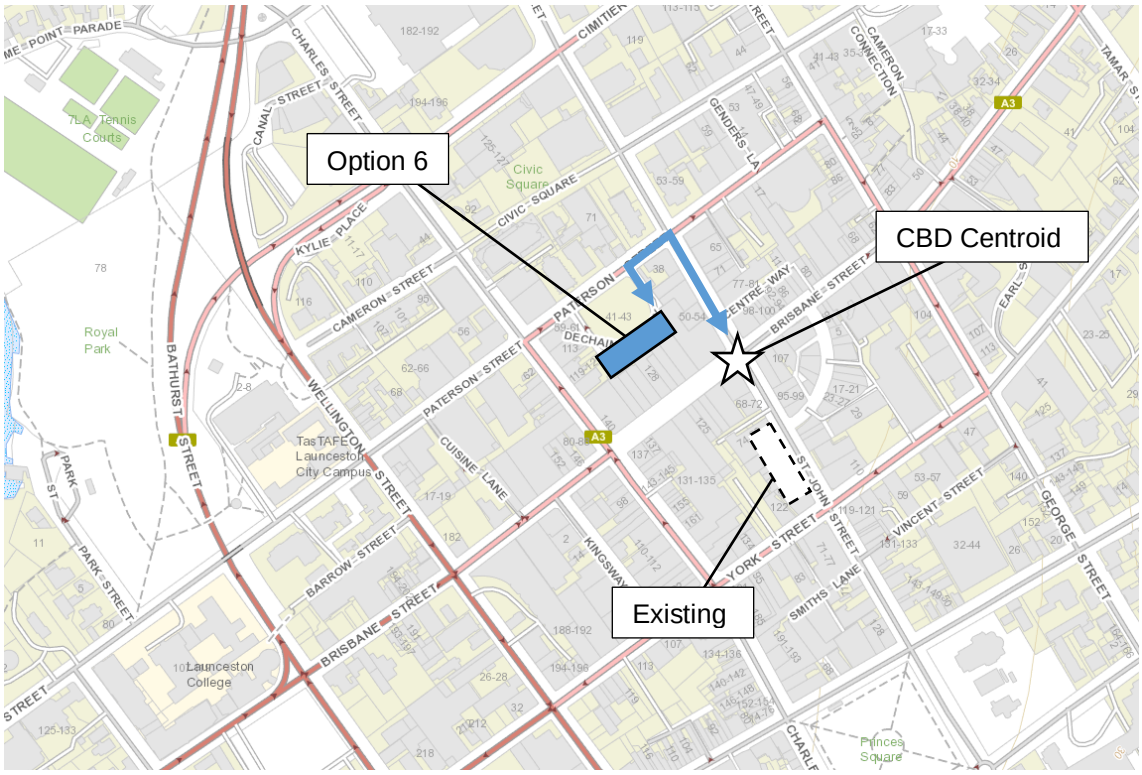



**Figure 45 Option 6 Dechaineux Way Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Dechaineux Way is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.6.4 Summary

A summary of the technical feasibility assessment for Option 6 Dechaineux Way is provided in Table 12.

**Table 12 Option 6 Dechaineux Way Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Maybe | Requires relaxation of minimum design standards. |
| Operating Space | No | Inadequate space for manoeuvring. |
| Accessibility | Yes | Level grade, located close to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Minor | Minor increase in travel times to access existing routes. |
| Dead Running Services | Moderate | Requires additional circulation via Charles Street. |
| Intersection Operation | Nil | No significant impacts to intersection operation. |
| Road Safety | Major | Pedestrian safety within the Paterson Street Central car park will be compromised by the option. |
| Parking | Major | Would require removal of up to 18 car parking spaces within the car park to accommodate option. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.7 Option 7 – Cameron Street East

### 4.7.1 Location and Bus Routing

Option 7 is located at Cameron Street, between St John Street and George Street, outside the General Post Office as shown in Figure 46. It is noted that any works which require modification to the existing heritage listed kerbs within Cameron Street East, must be undertaken in accordance with Council's *"works on Stone Kerbs and Gutters Policy".*

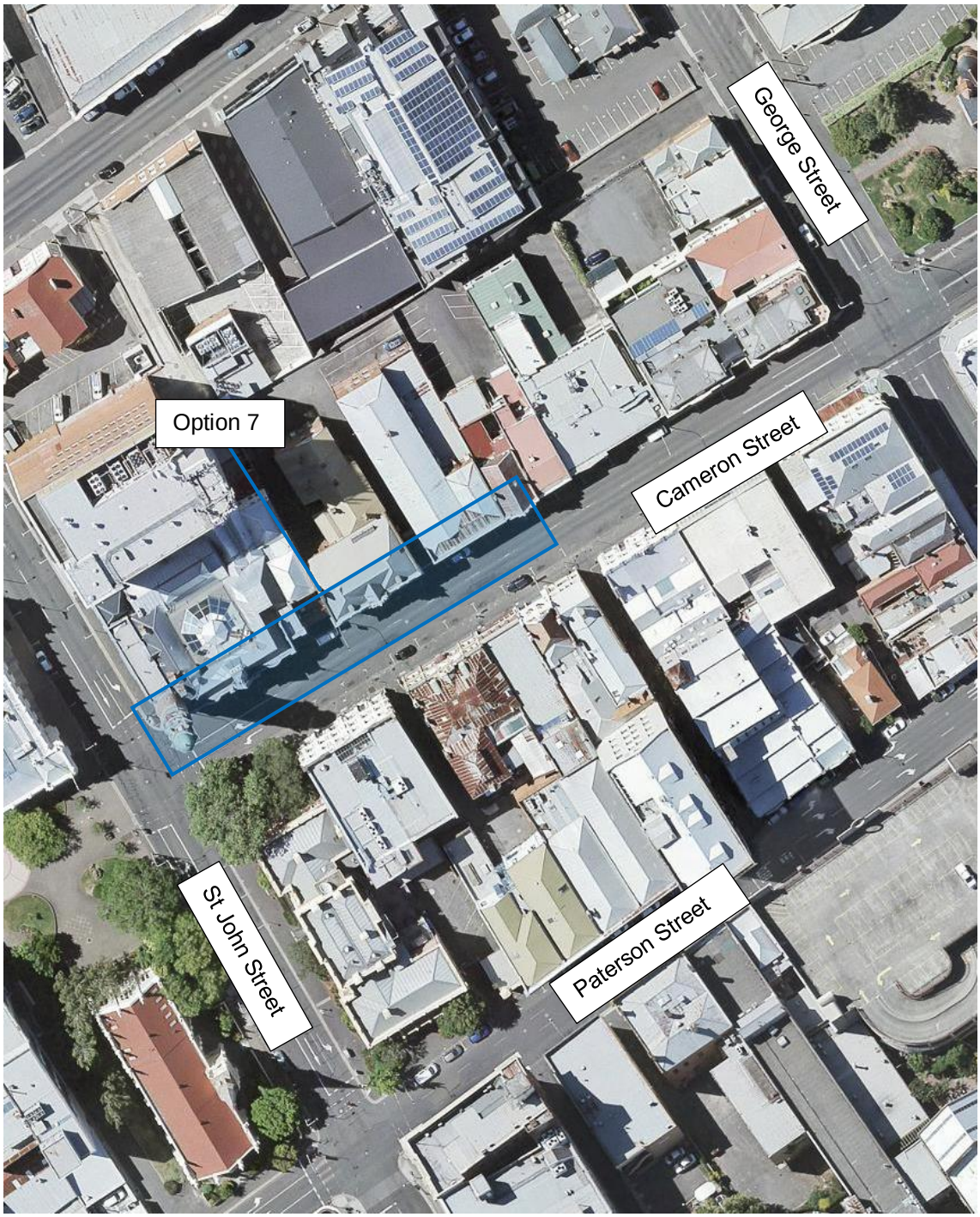



**Figure 46 Option 7 Cameron Street East Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Under Option 7, buses would be required to reroute via George Street rather than St John Street as shown in Figure 47. Several intersections will experience changed bus movements including Cameron Street/George Street, Cimitiere Street/George Street, Cameron Street/Tamar Street, William Street/George Street and William Street/St John Street.

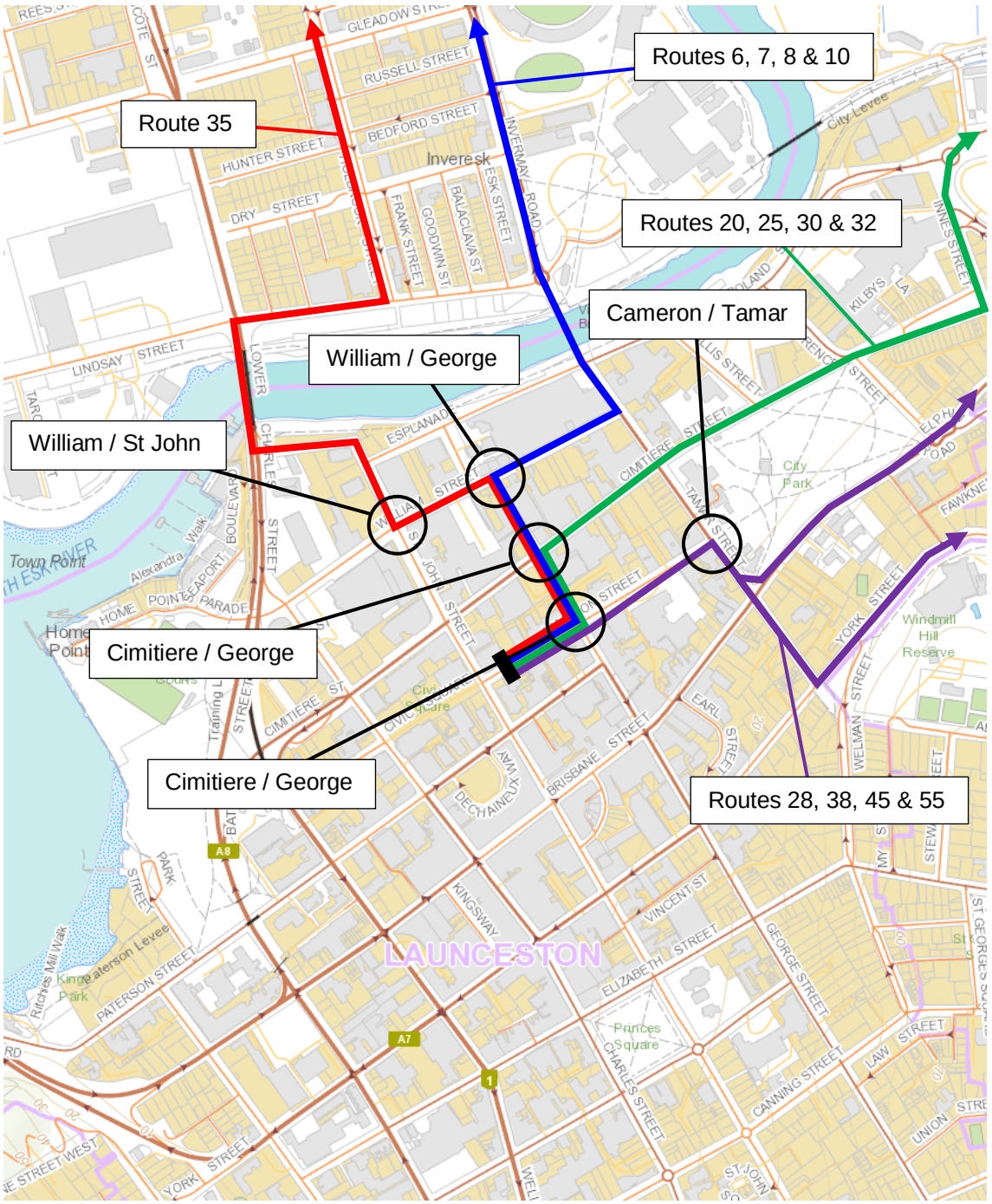



**Figure 47 Option 7 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

Note that buses traveling to Elphin Road (via Brisbane Street) and High Street (via York Street) would be required to use Cimitiere Street and Tamar Street due to geometric limitations at the intersection of George Street and Brisbane Street restricting left turn movements by buses (see Section 4.7.3).

### 4.7.2 Technical Feasibility Review

#### *Roadway Cross Section*

Cameron Street, between St John Street and George Street, has a total road reserve width of 18.5 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section is presented in Figure 48.

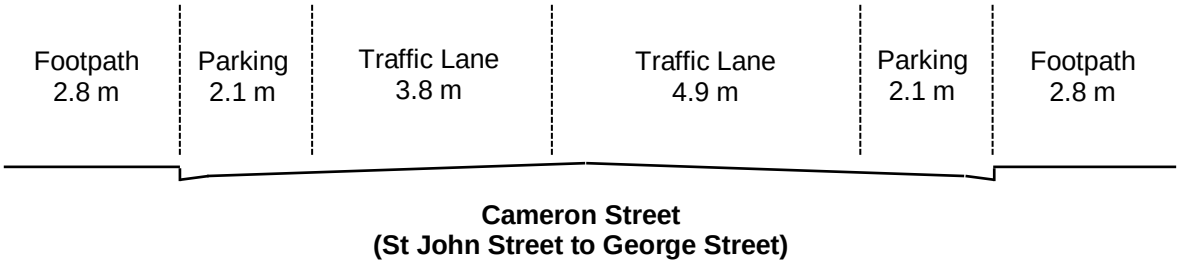



**Figure 48 Cameron Street East Cross Section**

The minimum requirements are summarised in Table 13.

**Table 13 Cameron Street East Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (north side) | 2.8 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.9 m | 10.0 m | Minimum includes 3.0 m bus stop and two 3.5 m traffic lanes. |
| Footpath (south side) | 2.8 m | 2.8 m | To match existing. |
| ***Total*** | ***18.5 m*** | ***18.4 m*** | |

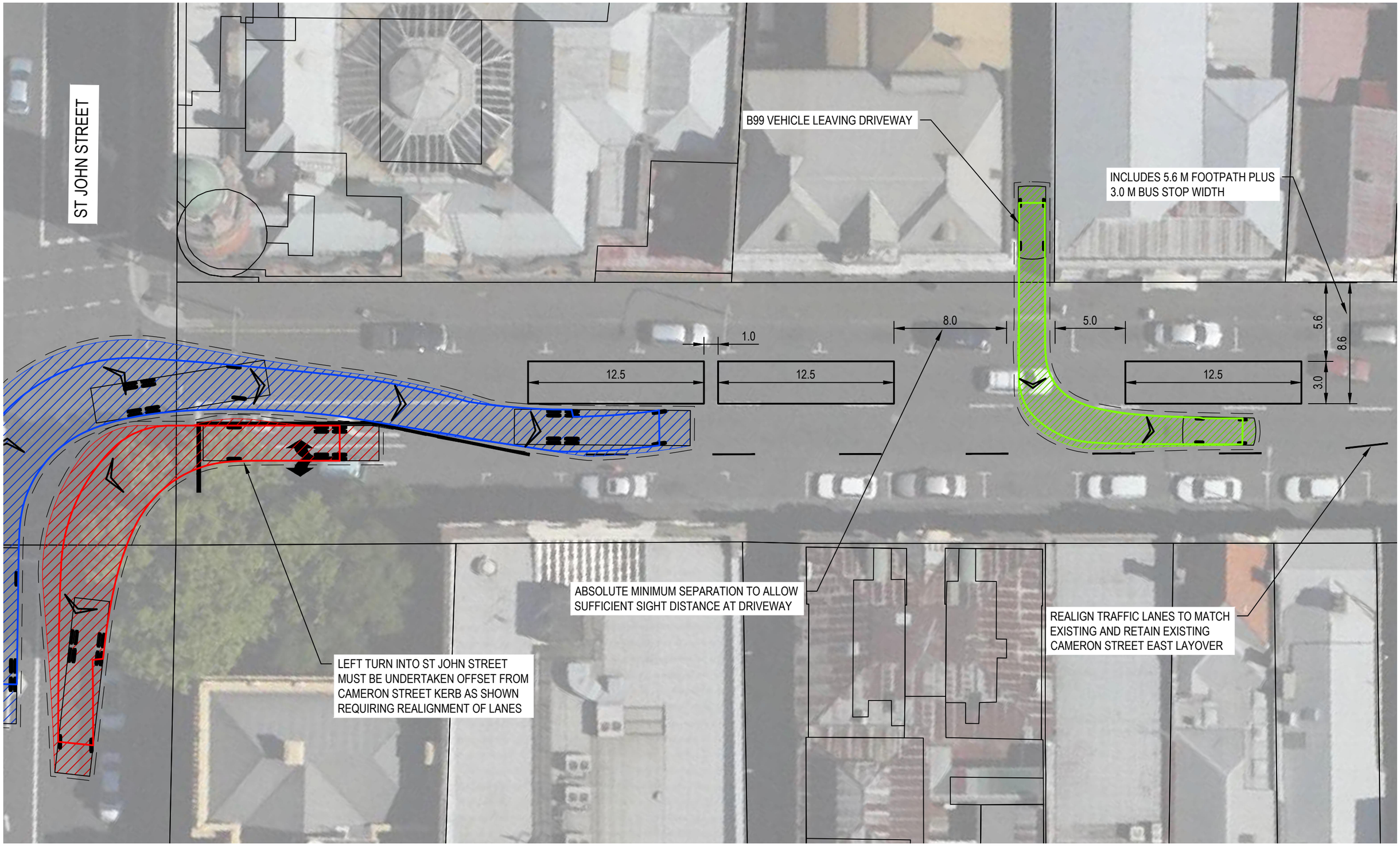
Based on Table 13, there would be sufficient space within the road reserve cross section to accommodate the option based on a single lane traveling in each direction.

#### *Operating Space*

The Cameron Street East option involves providing two independently operating bus stops located outside the General Post Office, east of the St John Street junction. There are few property accesses in this area with the exception of a driveway at 66 Cameron Street which is required to be kept clear with adequate sight distance.

The left turn from Cameron Street into St John Street is currently undertaken regularly by buses departing the existing layover on Cameron Street. These turns must be made offset from the kerb (i.e. straddling the left and right turn lanes). This limits the potential for lane realignment near the St John Street intersection.

Therefore, it would be required to provide the rear stop and layover west of the driveway at 66 Cameron Street, and the front stop east of the driveway. This arrangement would allow for sufficient sight distance at 66 Cameron Street, and minimise the amount of lane realignment at the St John Street junction, and is presented in Figure 49.




0 2.5 5.0 7.5m

SCALE 1:250 AT ORIGINAL SIZE

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TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 7 CAMERON ST EAST OPERATING SPACE REQUIREMENTS

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Figure 49

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### 4.7.3 Impacts Assessment

#### *Bus Routing*

Buses would be required to route via George Street, rather than St John Street, as shown in Figure 49 of this report. It is noted that those services traveling via Brisbane Street (to Elphin Road) and York Street (to High Street) will need to redirect via Cimitiere Street. This is due to buses being physically unable to turn left from George Street into Brisbane Street as demonstrated in Figure 50.

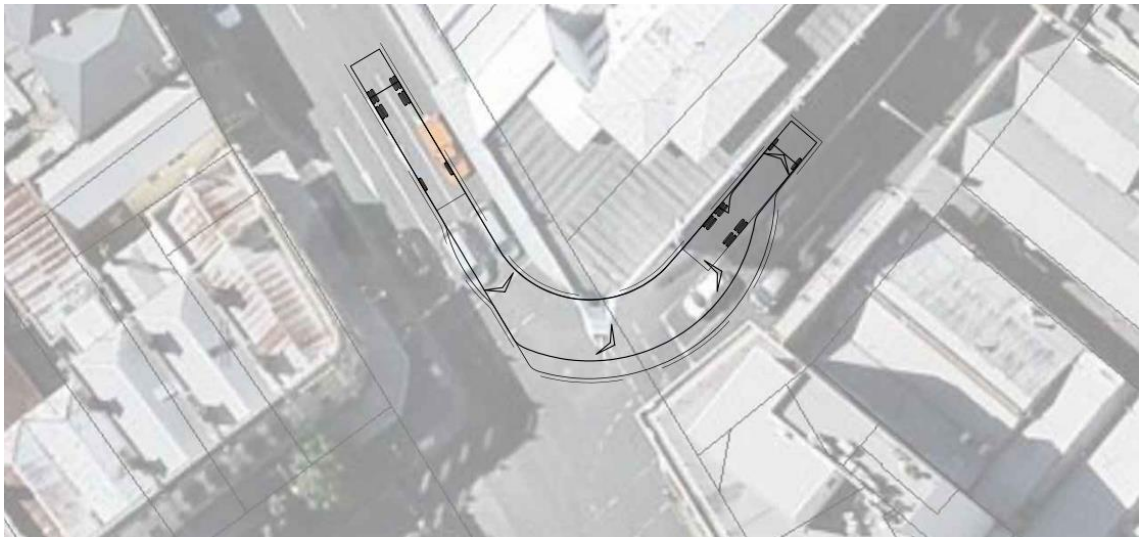


**Figure 50 George Street / Brisbane Street Left Turn Movement**

*Base imagery obtained from TheLIST © State of Tasmania*

#### *Dead Running Services*

There would be a minor impact on dead running services with buses required to continue straight along St John Street and turn onto Cameron Street to access the new Option 7 departure points. It is noted that Option 7 would open up new opportunities for dead running routes with potential improved access from the Paterson Street layover to the departure points on Cameron Street as shown in Figure 51.

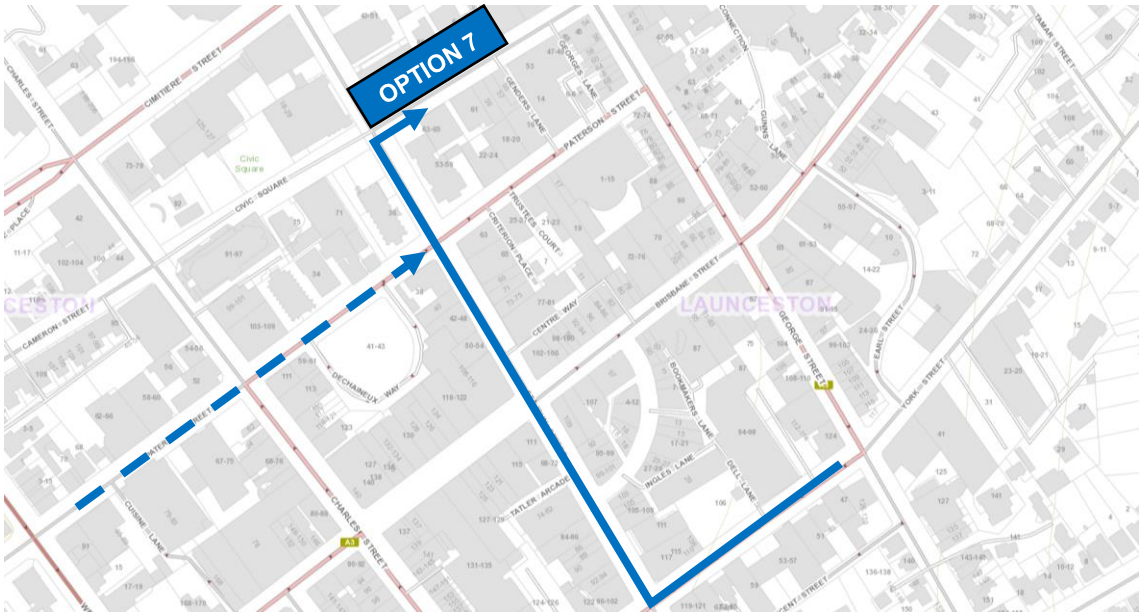



**Figure 51 Option 7 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

It is noted that the existing layover on Cameron Street westbound can be retained, although its length may need to be reduced to accommodate the proposed stops.

The Option is located relatively close to toilet facilities at Civic Square.

### *Intersection Operation*

The impacts on intersection performance in the external road network are likely to be very minor. There will be an impact on the Cameron Street / St John Street junction due to a reduction to a single approach lane on Cameron Street, however this intersection currently has relatively low traffic volumes and there is considered sufficient capacity for this movement in a single lane.

The network impacts will generally be limited to those associated with bus turning movements at junctions. The following intersections will experience additional, or changed, bus movements:

- Cameron Street/George Street
- Cimitiere Street/George Street
- Cimitiere Street/Tamar Street
- William Street/George Street
- William Street/St John Street

All intersections affected are considered to be capable of accommodating the additional bus movements due to this option.

### *Road Safety*

Sufficient sight distance can be provided for vehicles exiting the 66 Cameron Street driveway by setting back the rear stop by an appropriate distance. No significant road safety issues were identified with the Cameron Street East option.

### *Tiger Bus*

No impacts to the Tiger Bus service are anticipated as a result of the Cameron Street East option.

### *Parking*

The Cameron Street East option will require removal of on-street car parking on both sides of the road in order to accommodate the bus stops and two traffic lanes resulting in a net loss of 22 short-term car parking spaces at a minimum. These spaces are a mix of 5-15 minute (P5 and 1/4P) and 1-hour (1P) metered parking.

The majority of car parking along this section of Cameron Street will be lost due to this proposed option. In particular, this includes short-term car parking outside the General Post Office.

### *Accessibility*

The proposed Cameron Street East option is located approximately 270 metres walking distance from the CBD centroid as shown in Figure 52. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

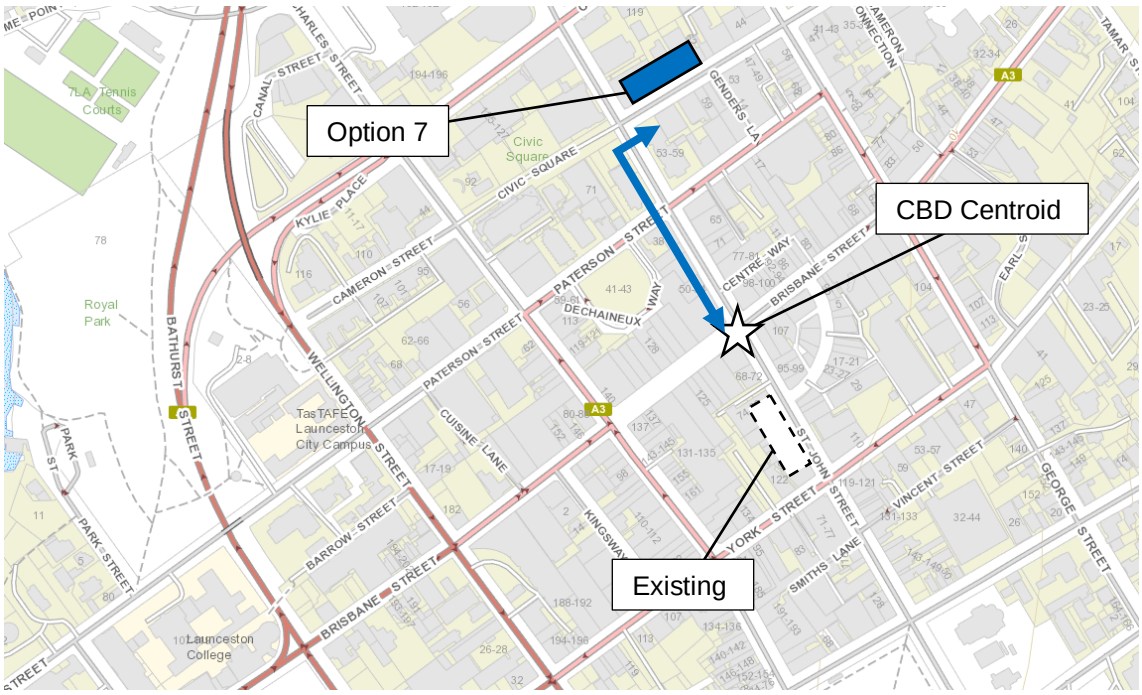



**Figure 52 Option 7 Cameron Street East Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Cameron Street East is less than 2.5%, however there are parts of this section of Cameron Street which exceed 2.5%, which may not be suitable for public transport accessibility.

### 4.7.4 Summary

A summary of the technical feasibility assessment for Option 7 Cameron Street East is provided in Table 14.

**Table 14 Option 7 Cameron Street East Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Maybe | Requires relaxation of minimum design standards. |
| Operating Space | Maybe | Requires relaxation of minimum design standards. |
| Accessibility | Yes | Level grade, located close to CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Moderate | Buses route vis George Street rather than St John. |
| Dead Running Services | Moderate | Increase in travel for dead running services. |
| Intersection Operation | Minor | Minor impacts to Cameron Street / St John Street intersection expected. |
| Road Safety | Nil | No significant safety issues identified. |
| Parking | Major | Loss of approximately 22 car parking spaces. |
| Other Bus Operators | Moderate | Requires reduction in length of existing Cameron Street layover. |

## 4.8 Option 8 – Cameron Street West

### 4.8.1 Location and Bus Routing

Option 8 is located at Cameron Street West, between Wellington Street and Charles Street. This option will require the provision of a new left turn slip lane from Wellington Street into Cameron Street at its western end. The location is provided in Figure 53.


**Figure 53 Option 8 – Cameron Street West Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn onto Charles Street and Cimitiere Street to access outbound routes. The Option 8 departure routes are presented in Figure 54. Several intersections will experience changed bus movements including Cameron Street / Charles Street and Charles Street / Cimitiere Street.

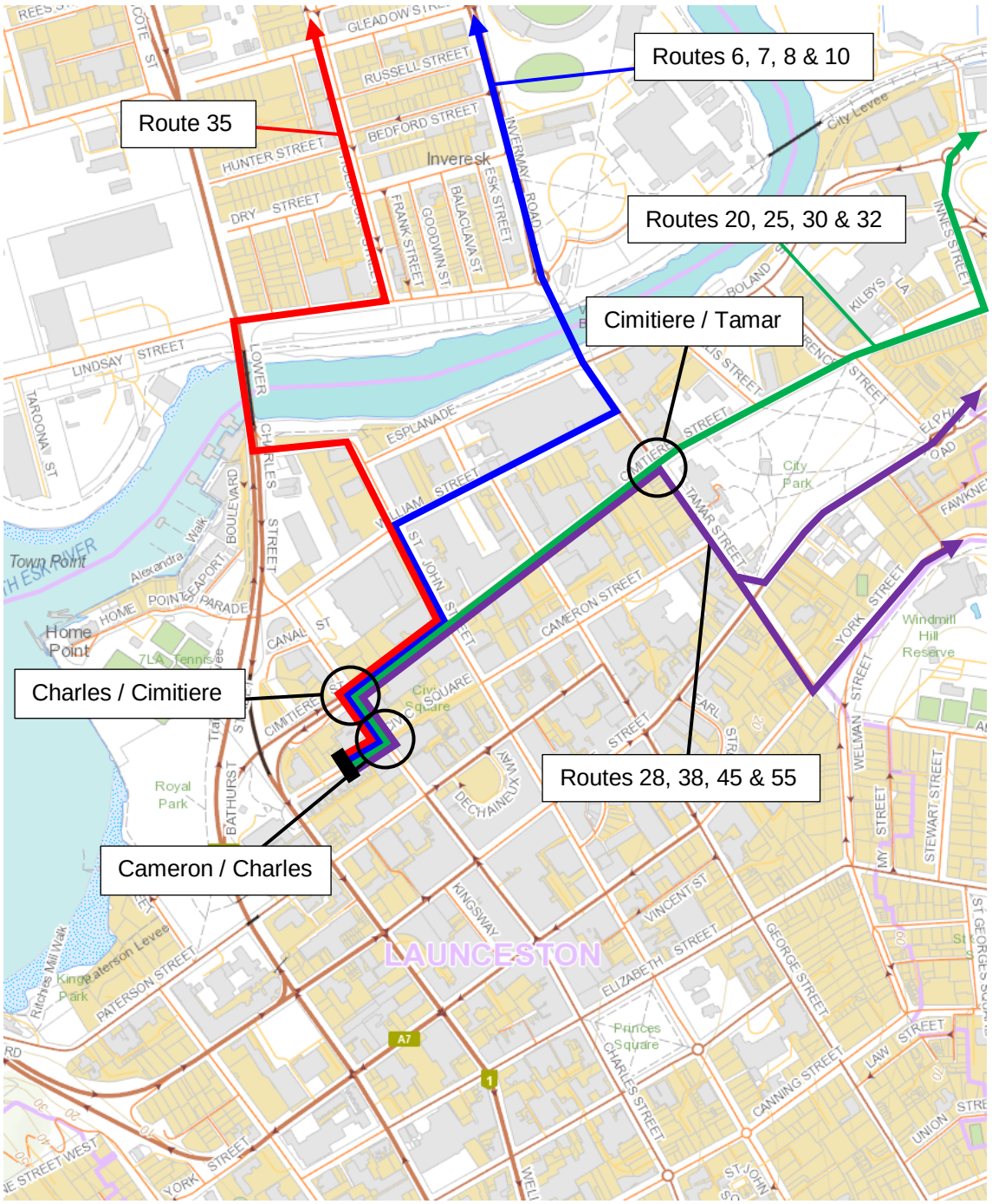



**Figure 54 Option 8 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.8.2 Technical Feasibility Review

#### *Roadway Cross Section*

Cameron Street, between Wellington Street and Charles Street, has a total road reserve width of approximately 17.9 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section is presented in Figure 55.

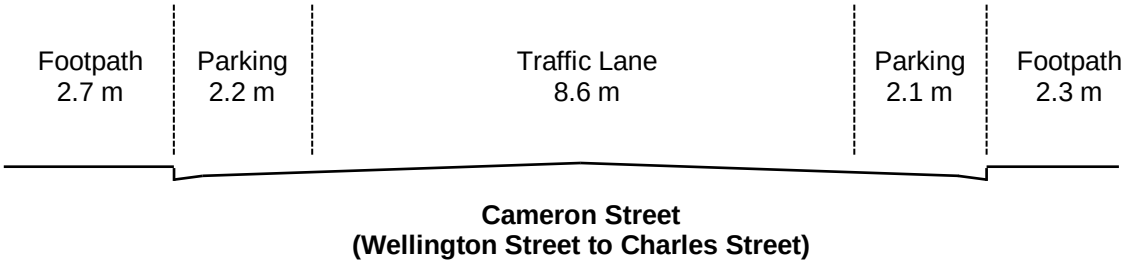



**Figure 55 Cameron Street West Cross Section**

Given Cameron Street West's function as a minor access road, with a dead end at its western end, the minimum requirements for traffic lanes and footpaths could potentially be reduced. For this option, the adopted design standards are as follows:

- 2.5 metres for bus infrastructure
- 1.8 metre clear footpath
- 3.0 metre near side traffic lane
- 3.0 metre far side traffic lane

The minimum requirements are summarised in Table 15.

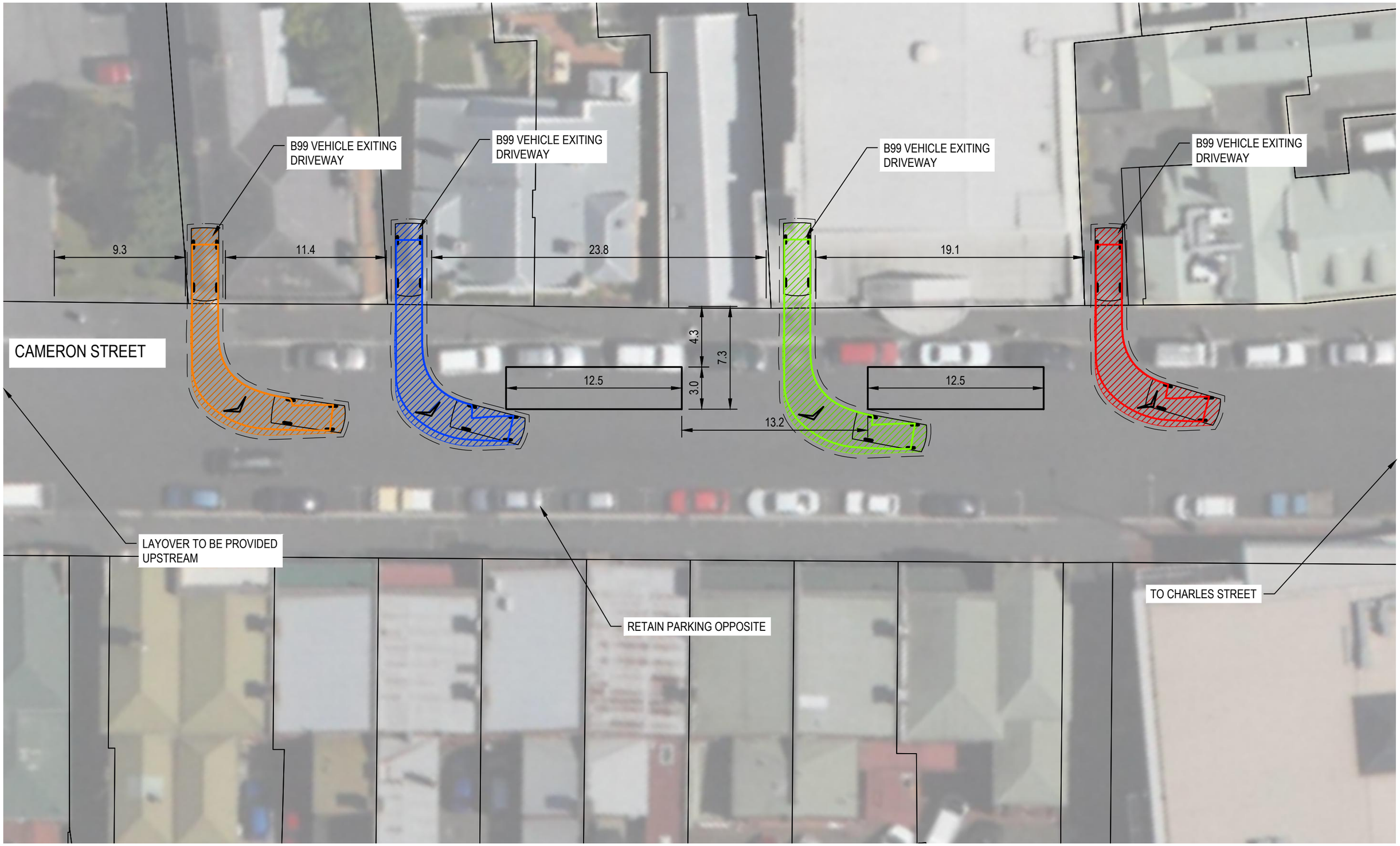
**Table 15 Cameron Street West Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (west side) | 2.7 m | 4.3 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.9 m | 9.0 m | Minimum includes 3.0 m bus stop and 6.0 m roadway |
| Footpath (east side) | 2.3 m | 2.3 m | To match existing |
| ***Total*** | ***17.9 m*** | ***15.6 m*** | |

Based on Table 15, there would be sufficient space within the road reserve cross section to accommodate the option based on one traffic lane traveling in each direction. On-street car parking could be retained on the opposite side of the road.

#### *Operating Space*

The Cameron Street West option involves providing two independently operating bus stops located west of the Charles Street junction with a short-term layover space upstream. The stops should ideally be provided as close as possible to Charles Street for proximity to the Launceston CBD. A potential arrangement is presented in Figure 56.

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SCALE 1:250 AT ORIGINAL SIZE

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CITY OF LAUNCESTON
LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT
OPTION 8 CAMERON ST WEST
OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 56

23 Paterson St, Launceston TAS 7250 Australia **T** 61 3 6332 5500 **F** 61 3 6332 5555 **E** lstmail@ghd.com **W** www.ghd.com

Plot Date: 31 October 2017 - 1:04 PM Plotted by: Mark Petrusma Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg
Document Set ID: 4164477
Version: 1, Version Date: 25/10/2019

### *Discussion*

There are several existing driveway crossovers along the Northern side of Cameron Street, west of Charles Street, with spacing in the range of 9.3 metres to 23.8 metres. There is insufficient space between any two crossovers to provide multiple bus parking bays. Therefore, the arrangement provided in Figure 56 shows one bus stop in each gap, with the layover required to be provided a significant distance upstream towards Wellington Street.

It is noted that this arrangement may introduce sight distance issues for existing driveways when buses are parked, however there would be minimal through traffic on Cameron Street West if access from Wellington Street is limited to buses only.

## 4.8.3 Impacts Assessment

### *Bus Routing*

There would be a minimal impact on overall travel times with buses having good access to Cimitiere Street via Charles Street.

### *Dead Running Services*

For access to the proposed Cameron Street West departure points a new access will be required on Wellington Street, downstream of Cimitiere Street, to allow buses to enter the western end of Cameron Street. The impacts of this new connection are discussed in the sections below. Dead running services would be required to circulate via Cimitiere Street westbound to access Wellington Street. The required dead running services routes are shown in Figure 57.

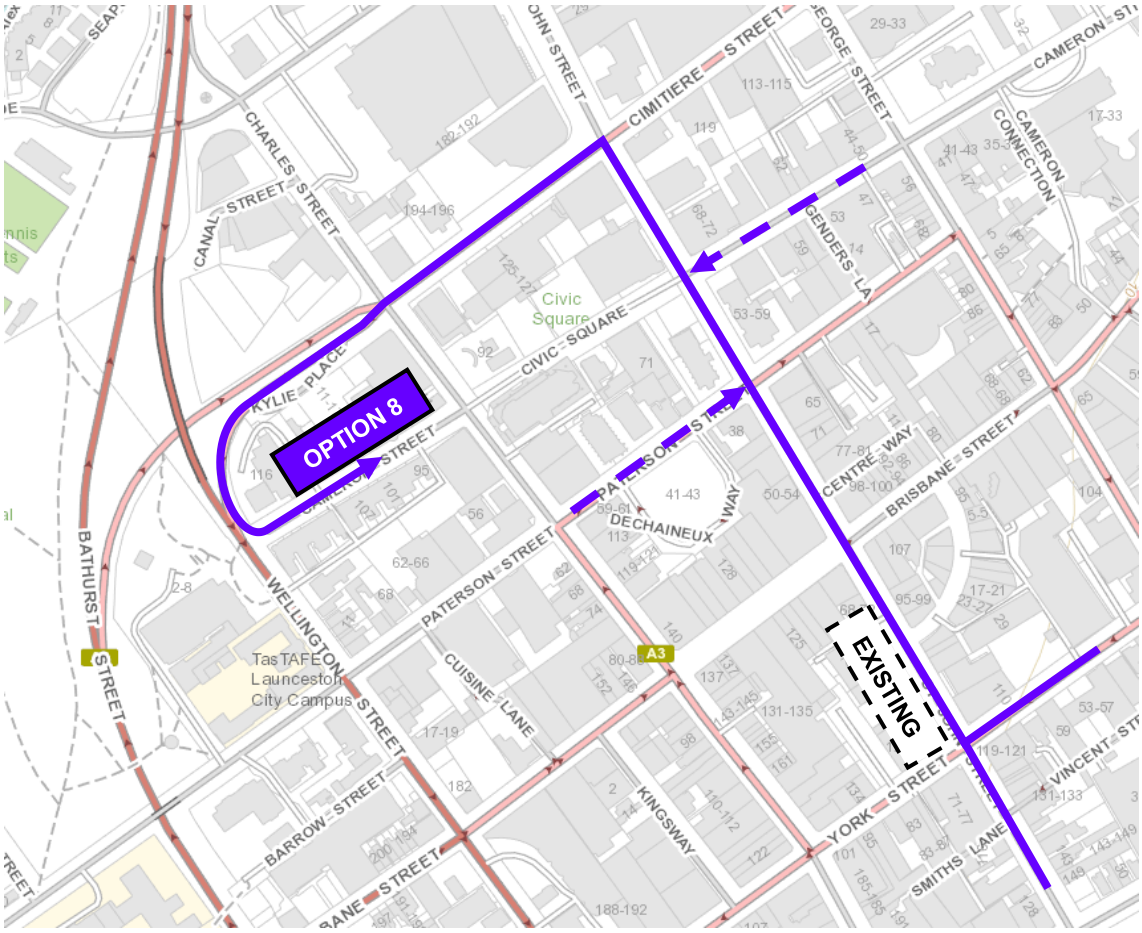



**Figure 57 Option 8 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The closest toilet facilities would be located at Civic Square.

### *Intersection Operation*

The proposed Cameron Street West option will require buses to turn left from Cameron Street into Charles Street and then right from Charles Street into Cimitiere Street. Buses undertaking these movements will impact on the capacity of these junctions. In particular, the intersection of Charles Street and Cimitiere Street has limited green time allocated to the Charles Street approaches due to heavy traffic flows on Cimitiere Street during peak times.

For access to the western end of Cameron Street, a new intersection comprising a left turn into Cameron Street will be required at Wellington Street a short distance downstream of the existing signalised intersection at Cimitiere Street. A potential arrangement is provided in Figure 58.

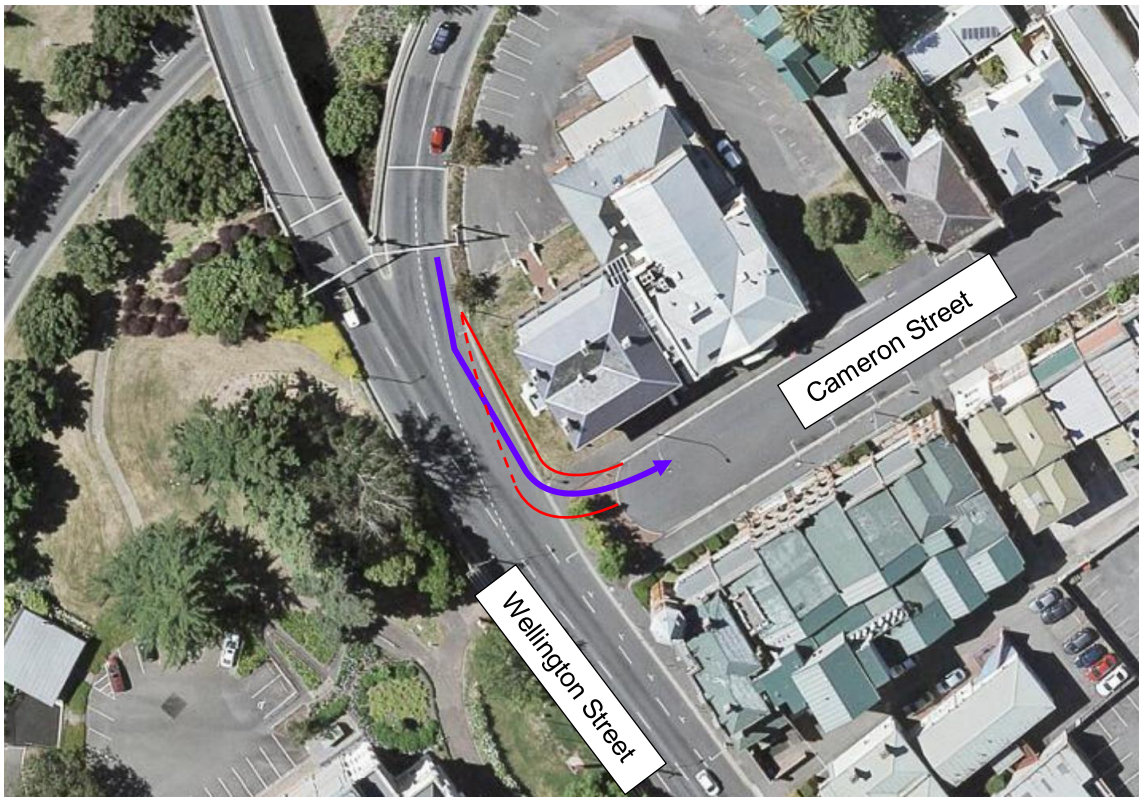



**Figure 58 New Connection to Cameron Street West**

*Base imagery obtained from TheLIST © State of Tasmania*

It is unlikely that a full length deceleration lane could be provided for the new connection, and therefore buses and other vehicles slowing to turn into Cameron Street may impact on the capacity of Wellington Street and the downstream capacity of the Wellington Street / Cimitiere Street junction.

### *Road Safety*

A range of potential road safety issues have been identified with Option 8 at Cameron Street West including the following:

- A full length deceleration lane would be unable to be provided on Wellington Street for turns into Cameron Street, resulting in a potential increase in rear end collisions as vehicles slow to turn left.
- Limited approach sight distance to the new connection.

- The new connection may attract significant use by the general public, even if signage is erected limiting use to buses, due to difficulties enforcing any turn ban at this location.
- The location of the bus stops on Cameron Street West is likely to increase pedestrian crossing demand mid-block on Wellington Street along the Cameron Street alignment.
- Several driveways along Cameron Street will have sight distance compromised by parked buses.

It is considered that the potential safety issues associated with Option 8, Cameron Street West, are prohibitive.

### *Parking*

The Cameron Street West option will require removal of on-street car parking on the northern side of the road in order to accommodate the bus stops and two traffic Lanes resulting in a net loss of 11 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking.

### *Accessibility*

The proposed Cameron Street West option is located approximately 430 metres walking distance from the CBD centroid as shown in Figure 59. This represents a significant increase compared to the existing location approximately 100 metres from the CBD centroid.

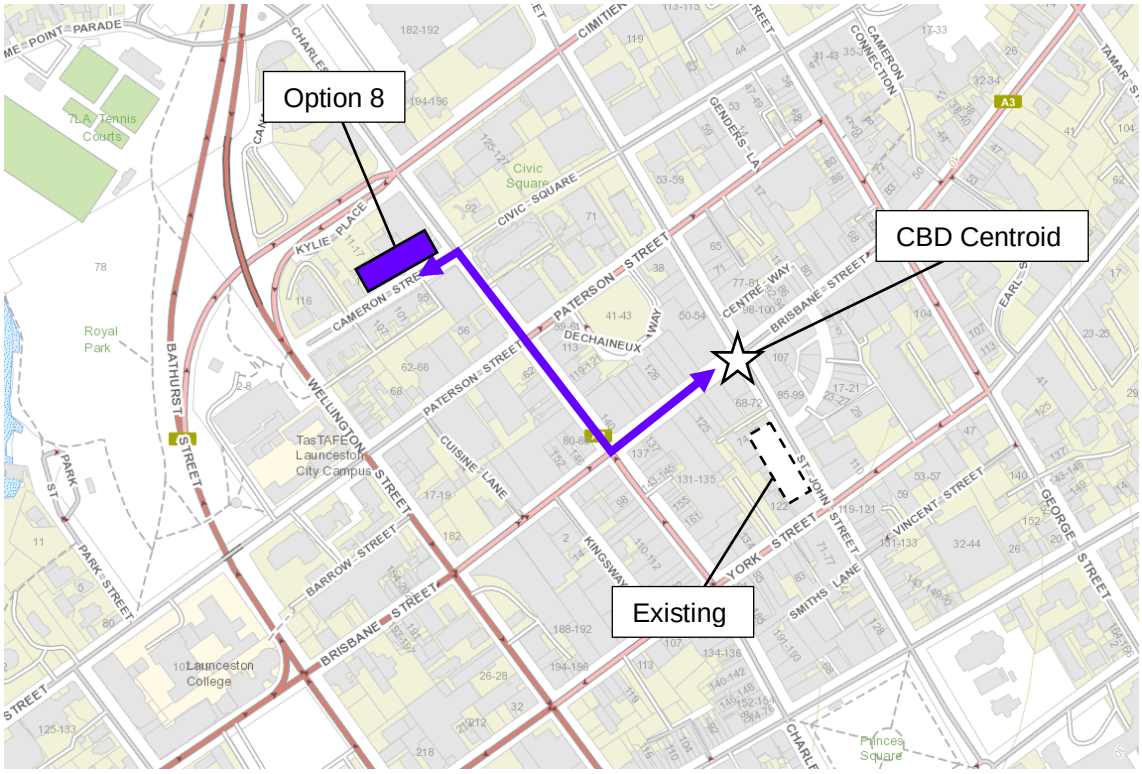



**Figure 59 Option 8 Cameron Street West Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Cameron Street West is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.8.4 Summary

A summary of the technical feasibility assessment for Option 8 Cameron Street West is provided in Table 16.

**Table 16 Option 8 Cameron Street West Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Maybe | Requires relaxation of minimum design standards. |
| Accessibility | No | Located significant distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Minor | Requires changed route via Cimitiere Street. |
| Dead Running Services | Major | Significant increase in circulation required. |
| Intersection Operation | Moderate | Impacts to Charles Street / Cimitiere Street junction and due to new left turn at Wellington Street. |
| Road Safety | Major | Potential safety issues created by left turn from Wellington Street. Limited sight distance at driveways. |
| Parking | Moderate | Loss of approximately 11 car parking spaces. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.9 Option 9 – Charles Street North B

### 4.9.1 Location and Bus Routing

Option 9 is located at Charles Street, between Cameron Street (Civic Square) and Cimitiere Street, as shown in Figure 60.


**Figure 60 Option 9 Charles Street North B Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn right onto Cimitiere Street to access outbound routes. The Option 9 departure routes are presented in Figure 61. Several intersections will experience changed bus movements including Charles Street / Cimitiere Street and Cimitiere Street / Tamar Street.

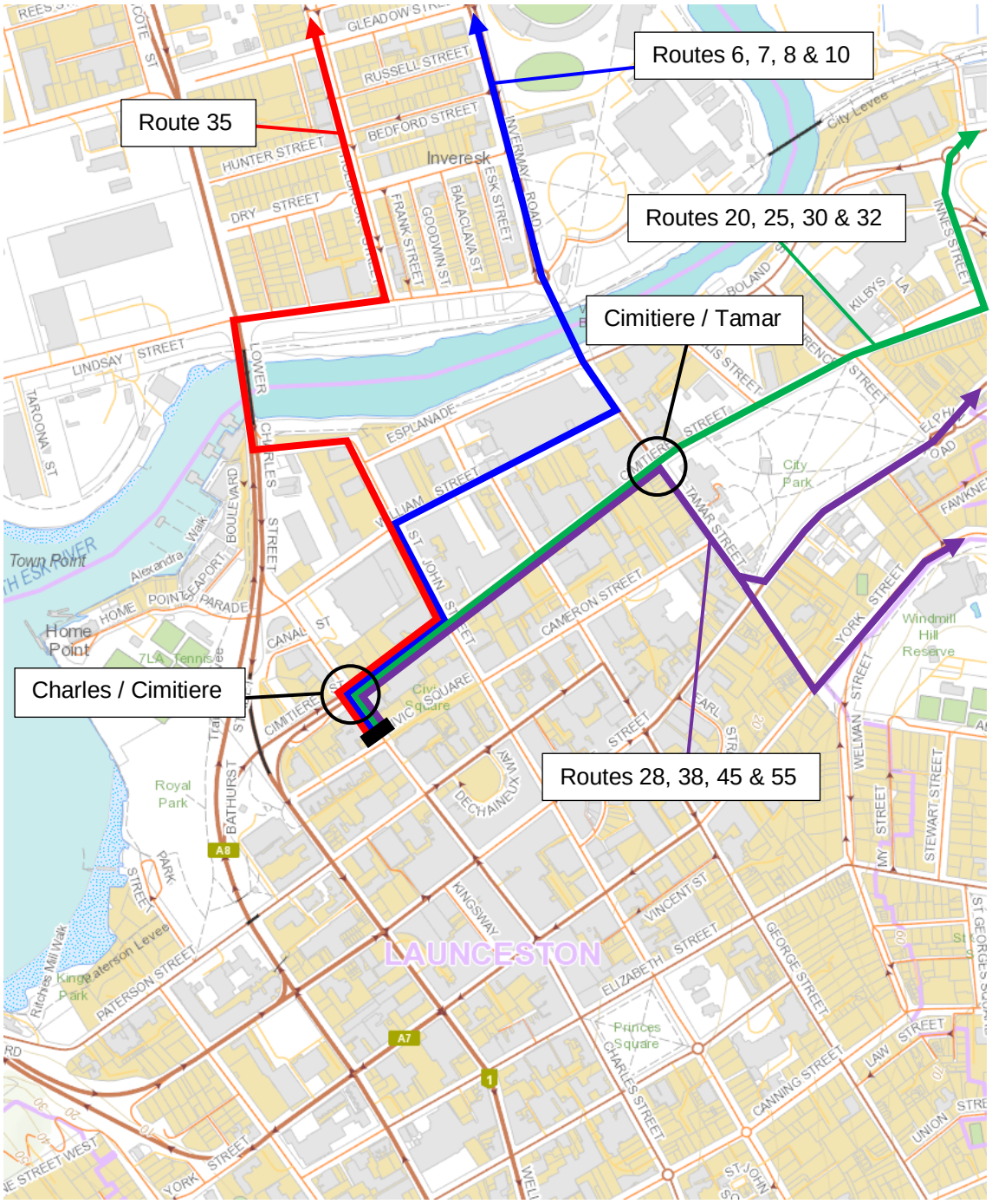



**Figure 61 Option 9 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.9.2 Technical Feasibility Review

#### *Roadway Cross Section*

Charles Street has a total road reserve width of between 18.8 metres, near Charles Street, and 19.6 metres, near Cimitiere Street, comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section (approximate) is presented in Figure 62.

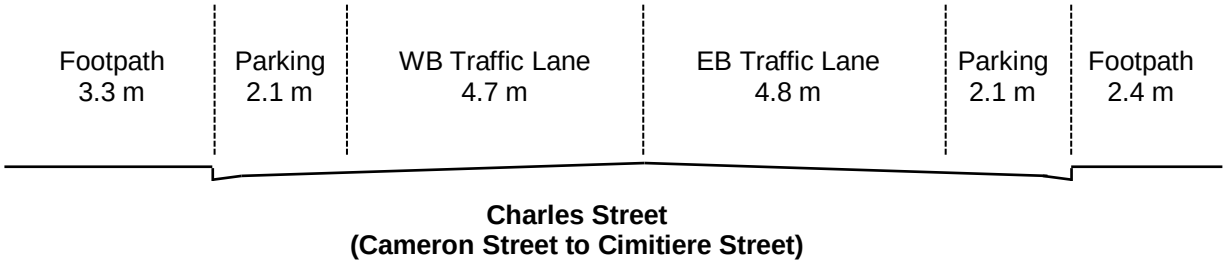



**Figure 62 Charles Street North Cross Section**

The minimum requirements are summarised in Table 17.

**Table 17 Charles Street North B Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (west side) | 3.3 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | Varies | 10.0 m | Minimum includes 3.0 m bus stop and two 3.5 m traffic lanes. |
| Footpath (east side) | Varies | 2.9 m | To match existing. |
| ***Total*** | ***18.8+ m*** | ***18.5 m*** | |

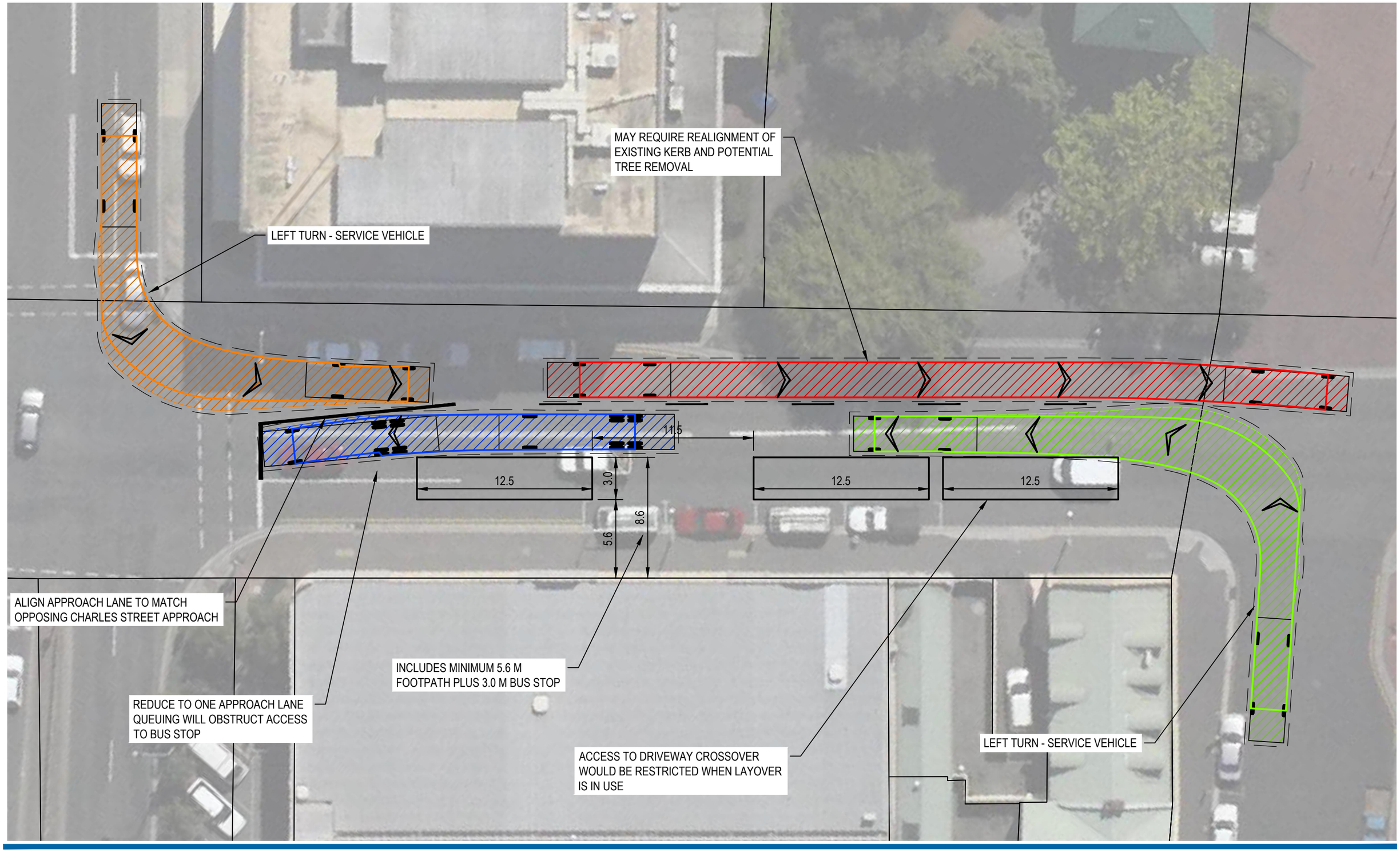
Based on Table 17, there would be sufficient space within the road reserve cross section to accommodate the option based on one traffic lane traveling in each direction. There is the opportunity to provide wider traffic lanes or footpaths if desired.

#### *Operating Space*

The proposed bus stops should not prohibit key movements at either the Cimitiere Street / Charles Street junction or the Cameron Street / Charles Street junction. This includes buses turning into and out of Charles Street as well as buses entering and exiting bus stops.

In addition, there is an existing driveway crossover located at 44 Charles Street. The proposed bus stops (and associated infrastructure) must maintain access to this crossover and not significantly limit the available sight distance.

Operating space requirements are demonstrated in Figure 63. Use of the proposed layover would restrict access to the driveway crossover at 44 Charles Street. The available sight distance will also be compromised when a bus is waiting at the rear bus stop.

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CITY OF LAUNCESTON
LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 9 CHARLES ST NORTH B OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 63

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### 4.9.3 Impacts Assessment

#### *Bus Routing*

There would be a likely improvement for overall travel times with buses having access directly onto Cimitiere Street.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street South to Charles Street, between Cameron Street and Cimitiere Street, will result in additional circulation for dead running services travelling to the departure points. Buses would be required to divert via York Street and Charles Street rather than simply turning from York Street directly into St John Street.

The proposed circulation route is presented in Figure 64.

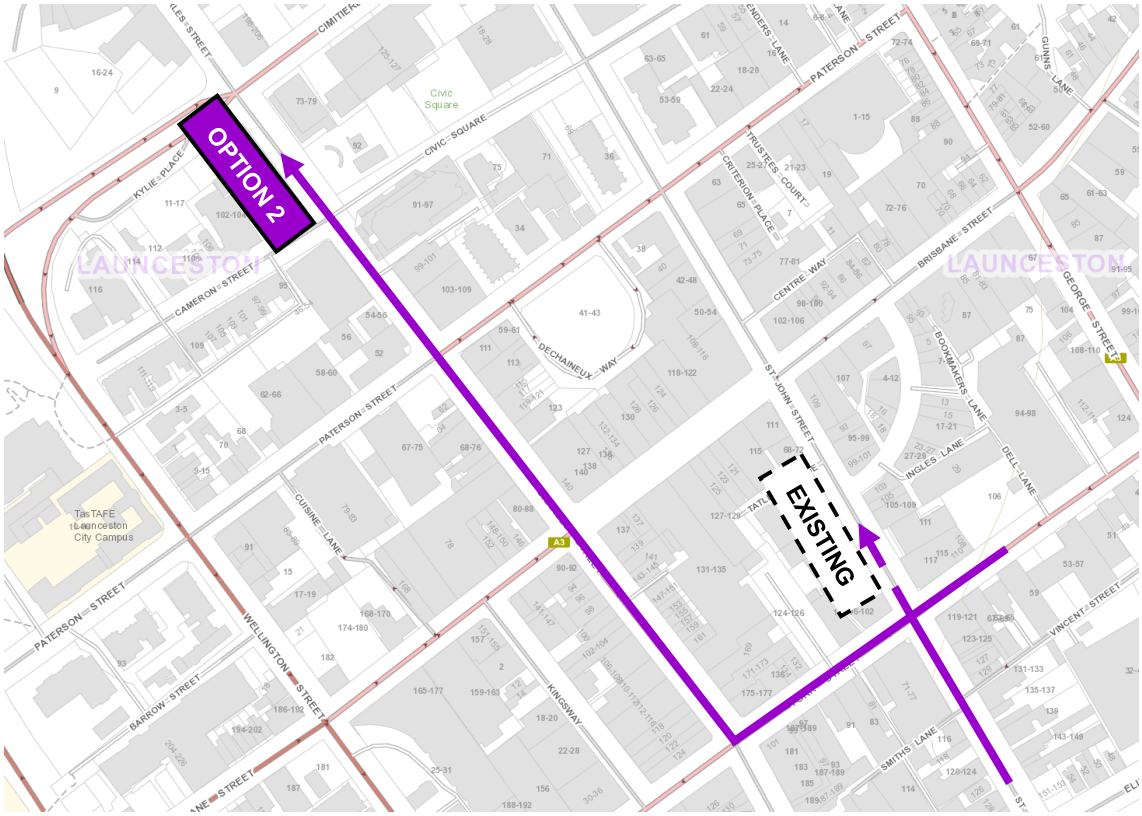



**Figure 64 Option 9 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The closest toilet facilities are located at Civic Square.

#### *Intersection Operation*

The impacts to intersection operation are generally limited to the reduced capacity at the Charles Street / Cimitiere Street junction and up to an additional 10 buses per hour turning right from the proposed bus stops onto Cimitiere Street. This intersection is considered to have sufficient capacity to accommodate the changed conditions with only a minor change in performance.

#### *Road Safety*

The proposed Option 9 bus stops will significantly restrict the available sight distance at the existing driveway crossover for 44 Charles Street. Furthermore, any bus using the proposed

layover space would fully restrict access to this driveway, which may be an unacceptable outcome.

### *Parking*

The Charles Street North B option will require removal of car parking on both sides of Charles Street, between Cameron Street and Cimitiere Street, resulting in a net loss of 7 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking.

### *Accessibility*

The proposed Charles Street North B option is located approximately 430 metres walking distance from the CBD centroid as shown in Figure 65. This represents a significant increase compared to the existing location approximately 100 metres from the CBD centroid.

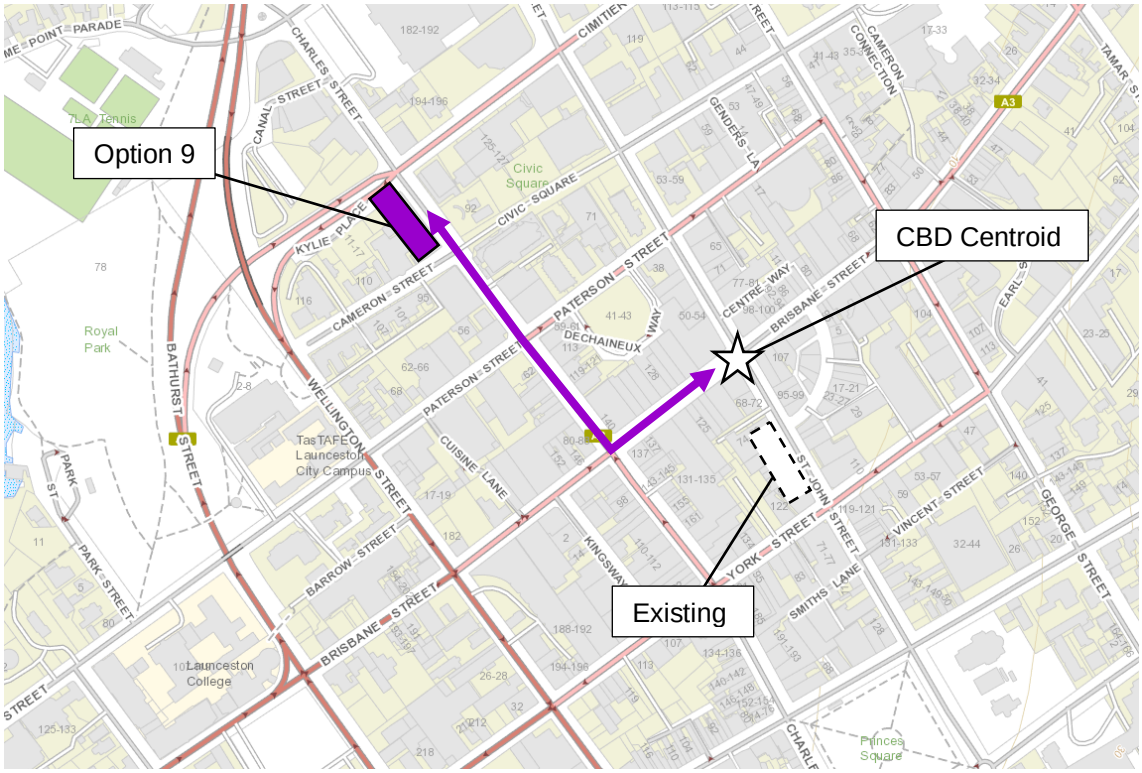



**Figure 65 Option 9 Charles Street North B Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

Parts of Charles Street, between Cameron Street and Cimitiere Street, have a gradient exceeding 2.5% and may not be suitable for public transport accessibility.

### 4.9.4 Summary

A summary of the technical feasibility assessment for Option 9 Charles Street North B is provided in Table 18.

**Table 18 Option 9 Charles Street North B Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Maybe | Requires relaxation of minimum design standards. |
| Accessibility | No | Located significant distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Minor | Requires changed route via Cimitiere Street. |
| Dead Running Services | Major | Significant increase in circulation required. |
| Intersection Operation | Minor | Impacts to Charles Street / Cimitiere Street junction. |
| Road Safety | Moderate | Restricted sight distance at existing driveway, proposed layover restricts access to driveway. |
| Parking | Moderate | Loss of all car parking spaces in this section. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.10 Option 10 – Paterson Street West

### 4.10.1 Location and Bus Routing

Option 10 is located at Paterson Street West, between Wellington Street and Charles Street, opposite the Council-owned, multi-storey car park. The location is provided in Figure 66.

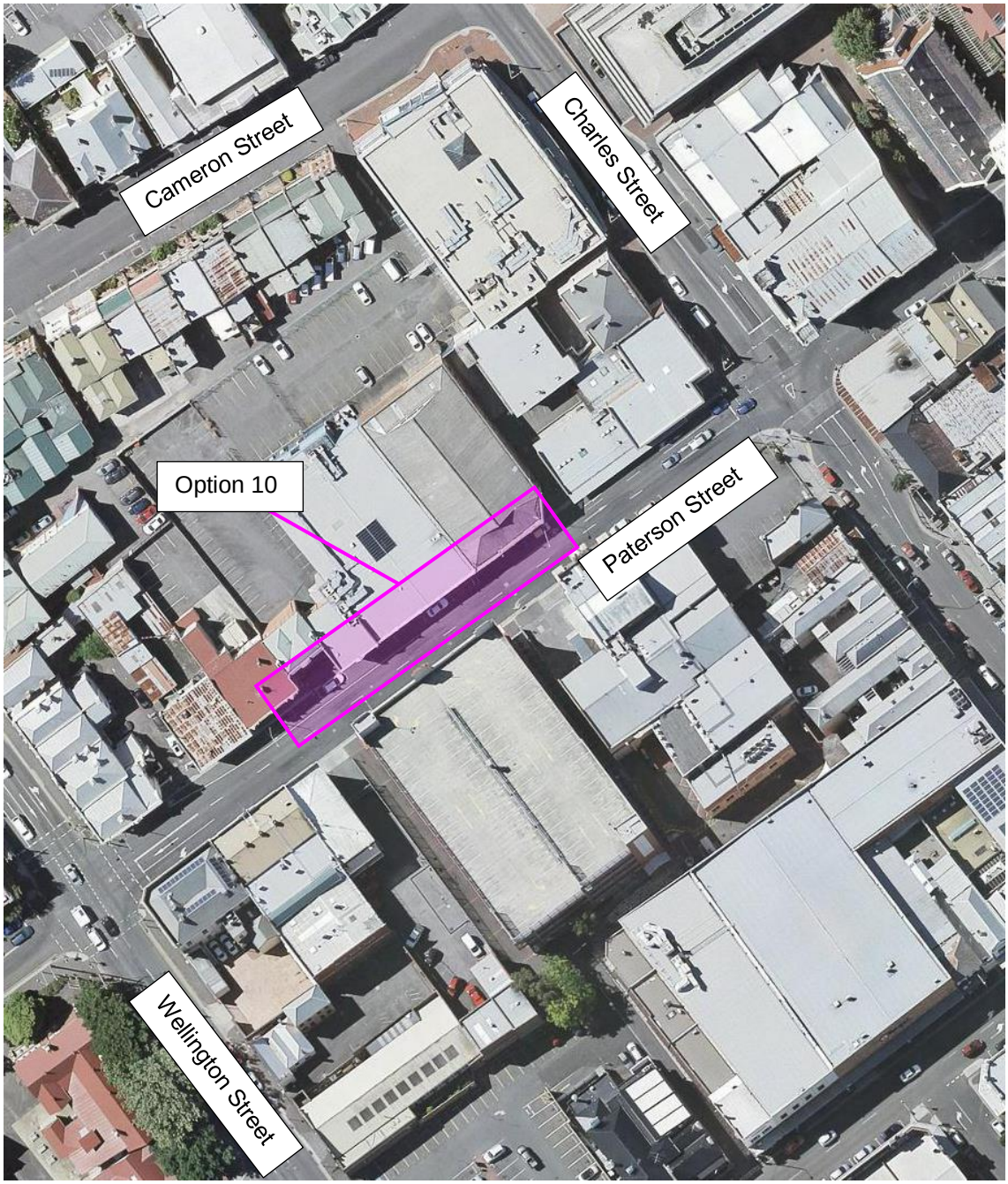



**Figure 66 Option 10 Paterson Street West Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Bus routing will be largely as per the existing situation, with buses turning from Paterson Street onto St John Street, to travel either northbound or southbound. The Option 10 departure routes are presented in Figure 67.

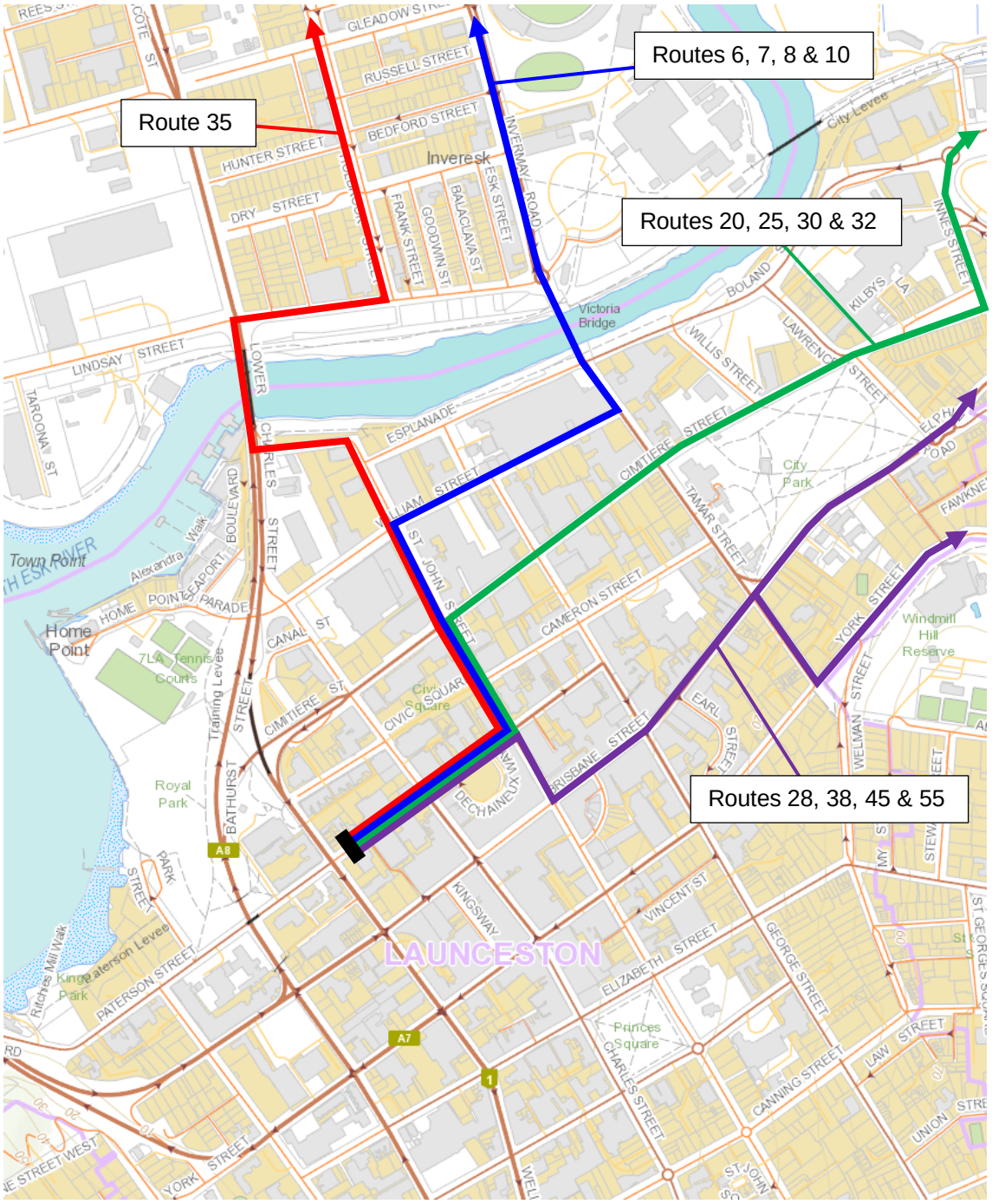



**Figure 67 Option 10 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.10.2 Technical Feasibility Review

#### *Roadway Cross Section*

Paterson Street, between Wellington Street and Charles Street, has a total road reserve width of approximately 17.7 metres comprising footpaths, parking bays, eastbound bicycle lane and traffic lanes. A diagram of the existing cross section is presented in Figure 68.

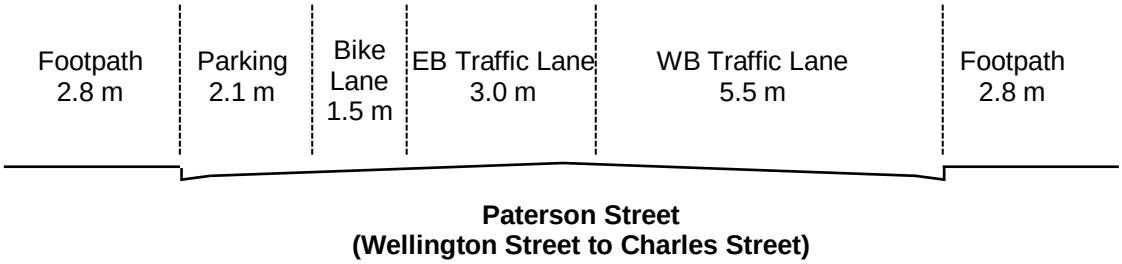



**Figure 68 Paterson Street West Cross Section**

The minimum requirements are summarised in Table 19.

**Table 19 Paterson Street West Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (north side) | 2.8 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 12.1 m | 10.0 m | Minimum includes 3.0 m bus stop and two 3.5 m traffic lanes. |
| Footpath (south side) | 2.8 m | 2.8 m | To match existing. |
| ***Total*** | ***17.7 m*** | ***18.4 m*** | |

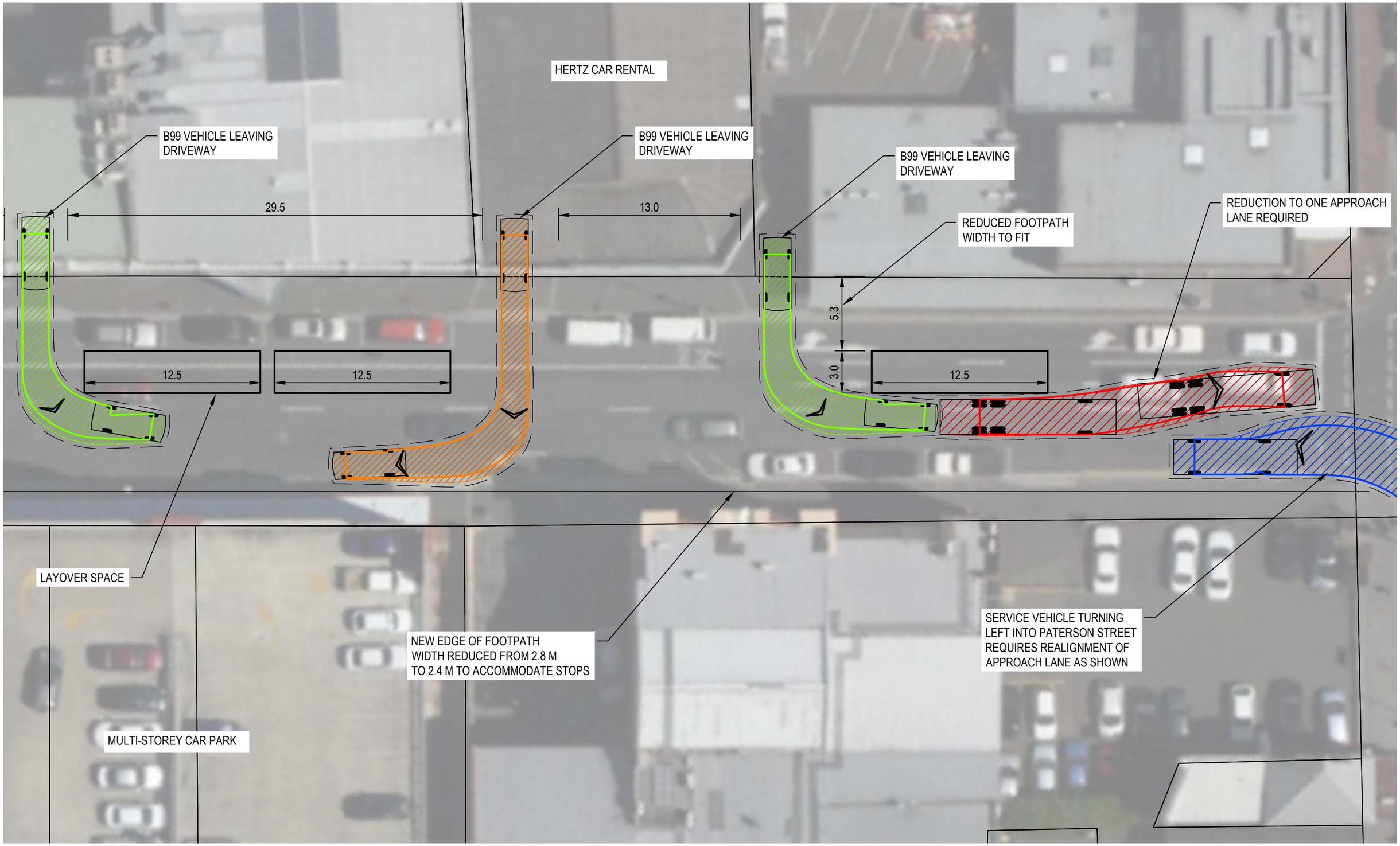
Based on Table 19, there is insufficient space within the existing Paterson Street road reserve cross section to accommodate the option based on one lane travelling in each direction, with reference to the minimum design standards described in this report. Furthermore, there would be insufficient space to maintain the existing eastbound bicycle lane.

#### *Operating Space*

There are a number of constraints impacting on the ability to provide bus stops at Paterson Street West including the following:

- Launceston Fire Station and access requirements for emergency vehicles
- Cuisine Lane junction
- Traffic activity into and out of Paterson Street West car park
- Existing bicycle lane
- Private accesses (including Hertz car rental)

Operating space requirements are demonstrated in Figure 69. Noting limited road cross section width, the arrangement shown includes reduced footpath widths on both sides of the road. In order to provide sufficient space for bus operation, the front stop must be located as close as practicable to the Charles Street junction.

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SCALE 1:250 AT ORIGINAL SIZE

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CITY OF LAUNCESTON
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TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 10 PATERSON ST WEST OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 69

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Plot Date: 31 October 2017 - 1:04 PM Plotted by: Mark Petrusma
Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg

### 4.10.3 Impacts Assessment

#### *Bus Routing*

The impacts on bus routing and service travel times for the Paterson Street West option are minimal. Buses will have direct access along Paterson Street to turn left or right onto St John Street, continuing as per the existing situation. It is noted that the intersection of Paterson Street / St John Street will likely require kerb-line adjustments and other minor modifications to accommodate the swept path of left-turning buses *without* encroachment into the oncoming traffic lane.

#### *Dead Running Services*

Option 10 would significantly increase the circulation required for dead running services. Access to Paterson Street West is only available via either Wellington Street (from Cimitiere Street) or Margaret Street as there is no direct access from Bathurst Street onto Paterson Street. The most likely circulation route is presented in Figure 70.

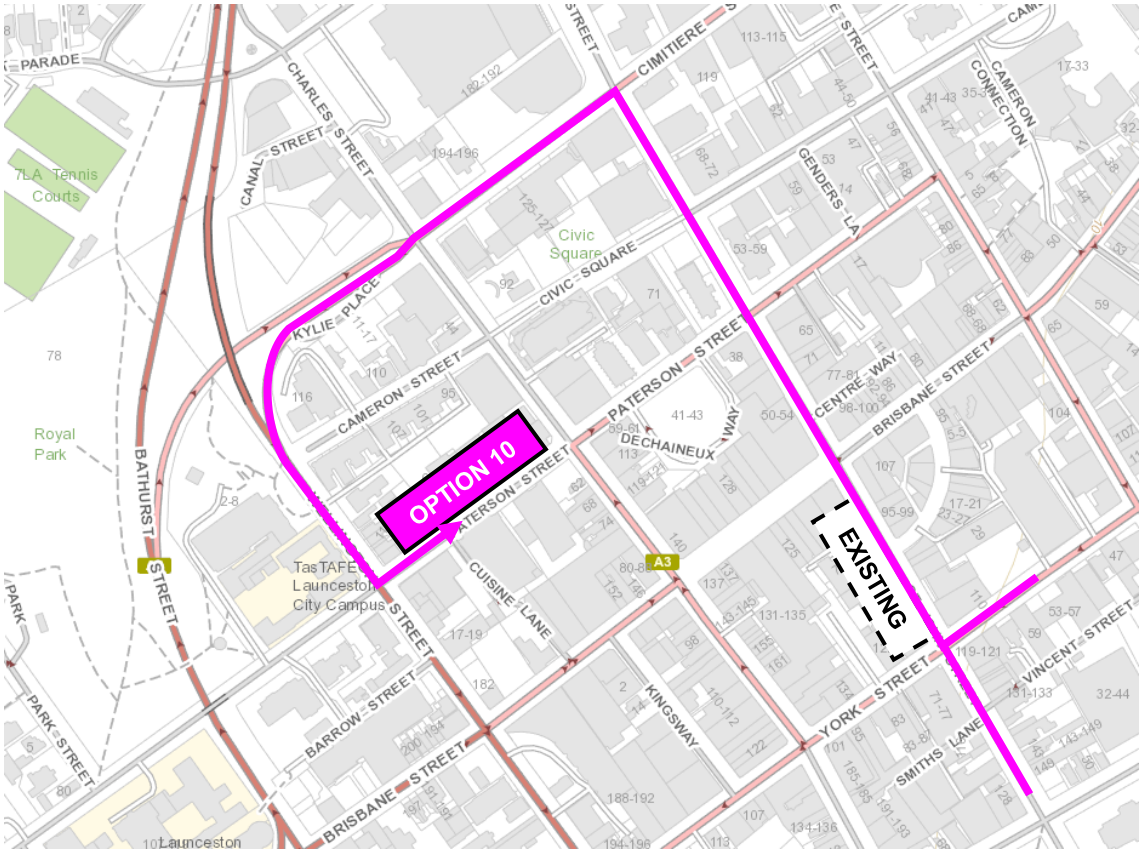



**Figure 70 Option 10 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The option is located in close proximity to toilet facilities at the Paterson Street West public multi-storey car park.

#### *Intersection Operation*

No significant impacts to intersection operation are expected as a result of Option 10. There will be a minor reduction in capacity at the Wellington Street / Paterson Street junction due to left-turning buses being required to straddle two lanes on dead running service routes.

### *Road Safety*

Sight distances for vehicles leaving access driveways along the northern side of Paterson Street West will be restricted due to parked buses.

The existing bicycle lane on Paterson Street would need to be removed and bicycles would be required to travel in the traffic lane adjacent to buses pulling into and out of bus stops.

### *Parking*

The Paterson Street West option will require removal of car parking on both sides of Paterson Street, between Wellington Street and Charles Street, resulting in a net loss of 7 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking.

In addition, the option would require removal of 2 motorcycle parking spaces on the south side of Paterson Street and the existing loading zone located immediately outside Hertz car rental.

### *Accessibility*

The proposed Paterson Street West option is located approximately 350 metres walking distance from the CBD centroid as shown in Figure 71. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

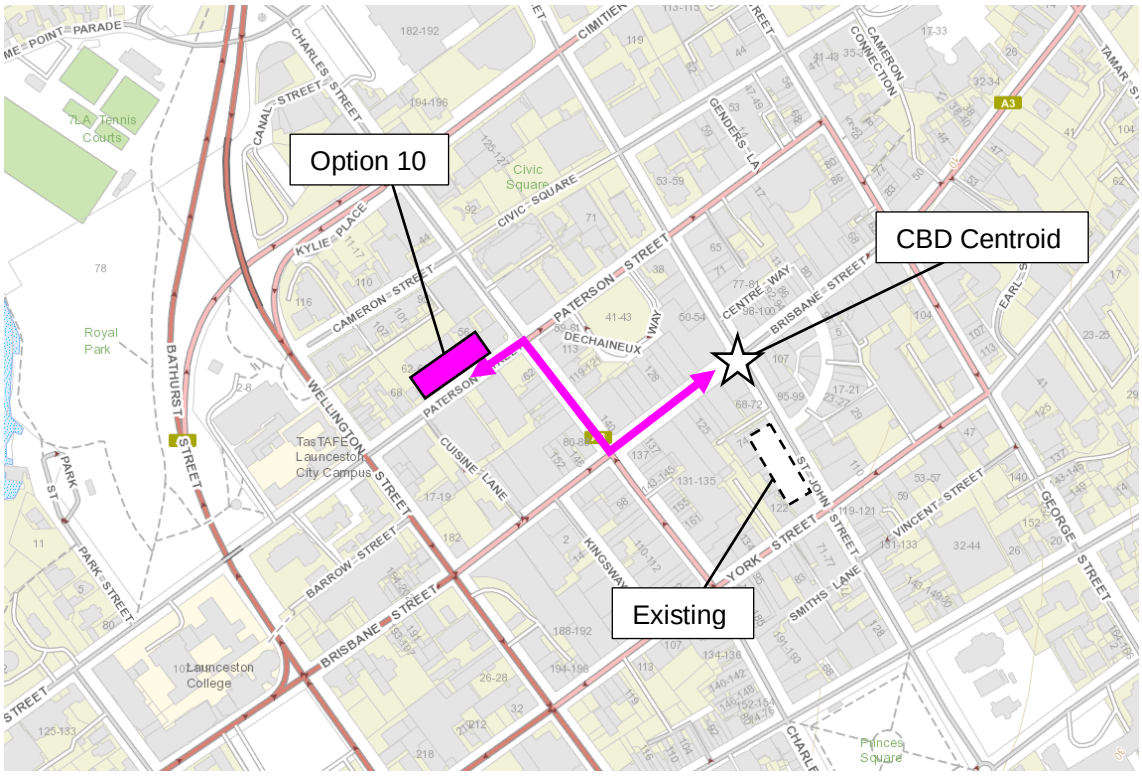



**Figure 71 Option 10 Paterson Street West Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at Paterson Street West is less than 2.5% and is therefore considered suitable for public transport accessibility.

### 4.10.4 Summary

A summary of the technical feasibility assessment for Option 10 Paterson Street West is provided in Table 20.

**Table 20 Option 10 Paterson Street West Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | No | Insufficient width available. |
| Operating Space | Maybe | Requires relaxation of minimum design standards. |
| Accessibility | Maybe | Located moderate distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Moderate | Increased travel distance via CBD streets. |
| Dead Running Services | Major | Significant increase in circulation required. |
| Intersection Operation | Minor | No significant impacts to intersection operation expected. |
| Road Safety | Moderate | Restricted sight distance at driveways due to parked buses. |
| Parking | Major | Loss of 7 car parking spaces, 2 motorcycle spaces and existing loading zone. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

## 4.11 Option 11 – Kingsway Northbound

### 4.11.1 Location and Bus Routing

Option 11 is located at Kingsway, between York Street and Brisbane Street, on the northbound side of the road as shown in Figure 72. Note that the southbound option is investigated as Option 12 in this report (Section 4.12).

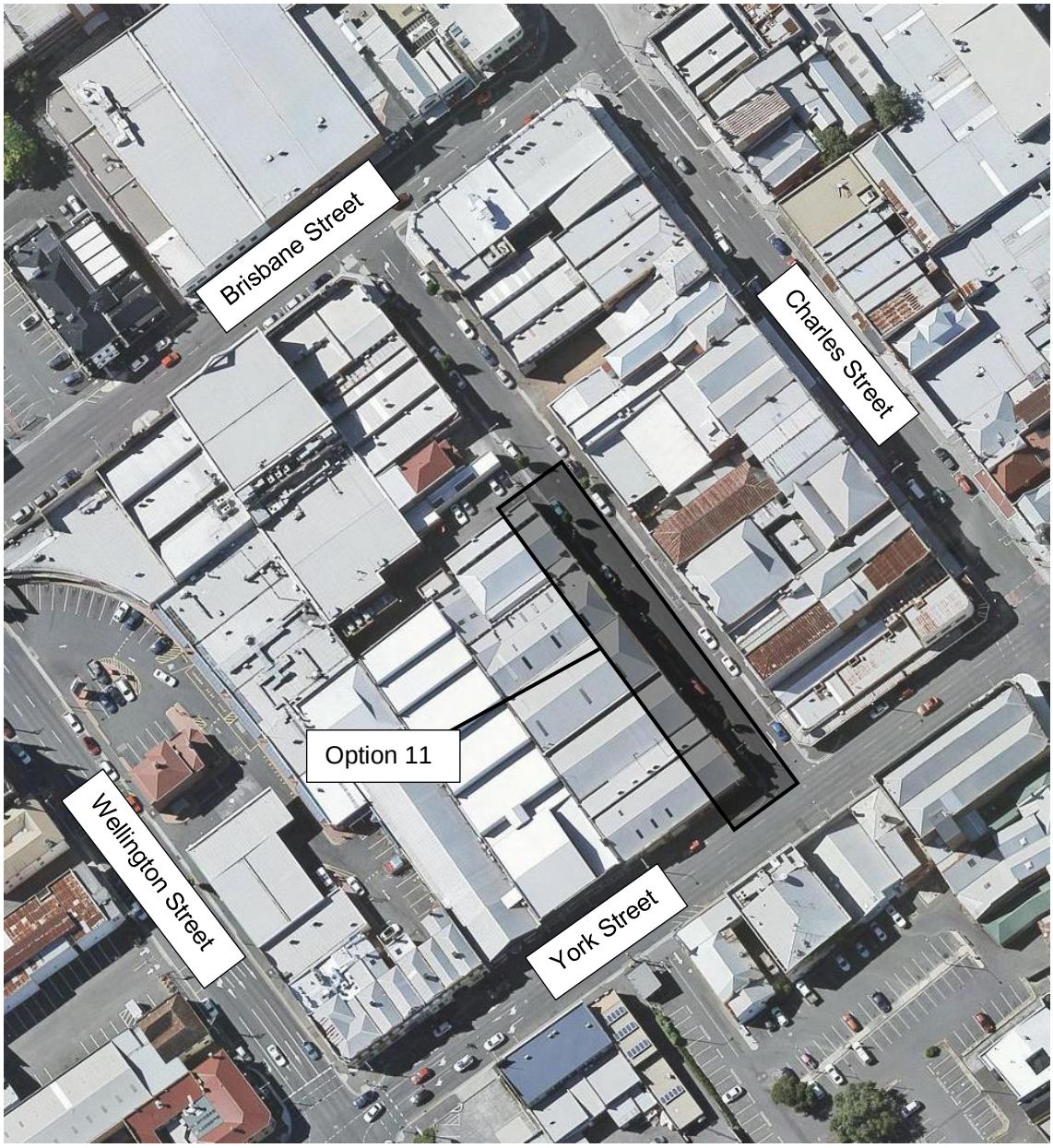



**Figure 72 Option 11 Kingsway Northbound Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn onto Brisbane Street, Charles Street, Paterson Street and then either left or right into St John Street before continuing as per the existing situation. The Option 11 departure routes are presented in Figure 73.

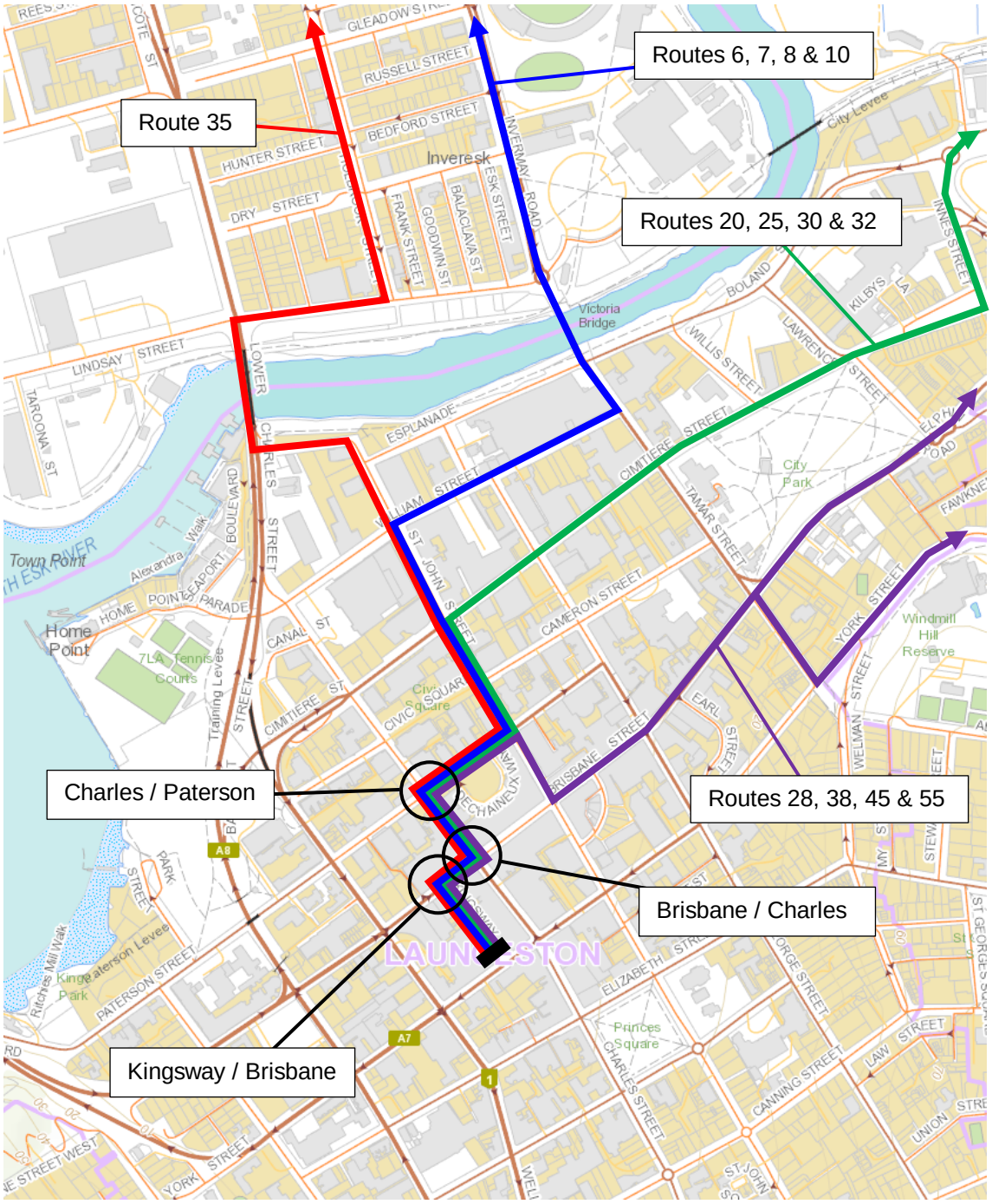



**Figure 73 Option 11 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.11.2 Technical Feasibility Review

#### *Roadway Cross Section*

Kingsway has a total road reserve width of approximately 15.2 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section (approximate) is presented in Figure 74.

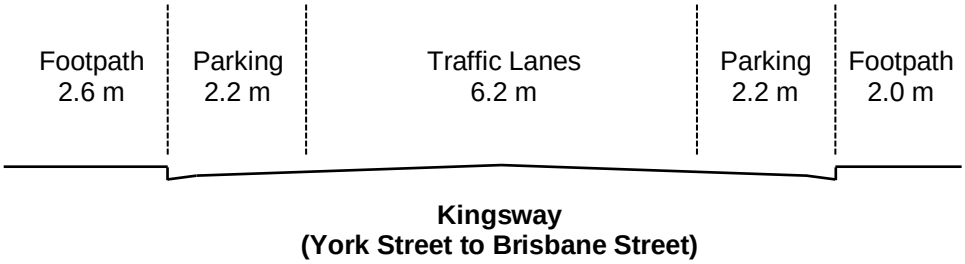



**Figure 74 Kingsway Cross Section**

The minimum requirements are summarised in Table 21.

**Table 21 Kingsway Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (west side) | 2.6 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 10.6 m | 6.5 m | Minimum includes 3.0 m bus stop and 3.5 m traffic lane. |
| Footpath (east side) | 2.0 m | 2.0 m | To match existing. |
| ***Total*** | ***15.2 m*** | ***14.1 m*** | |

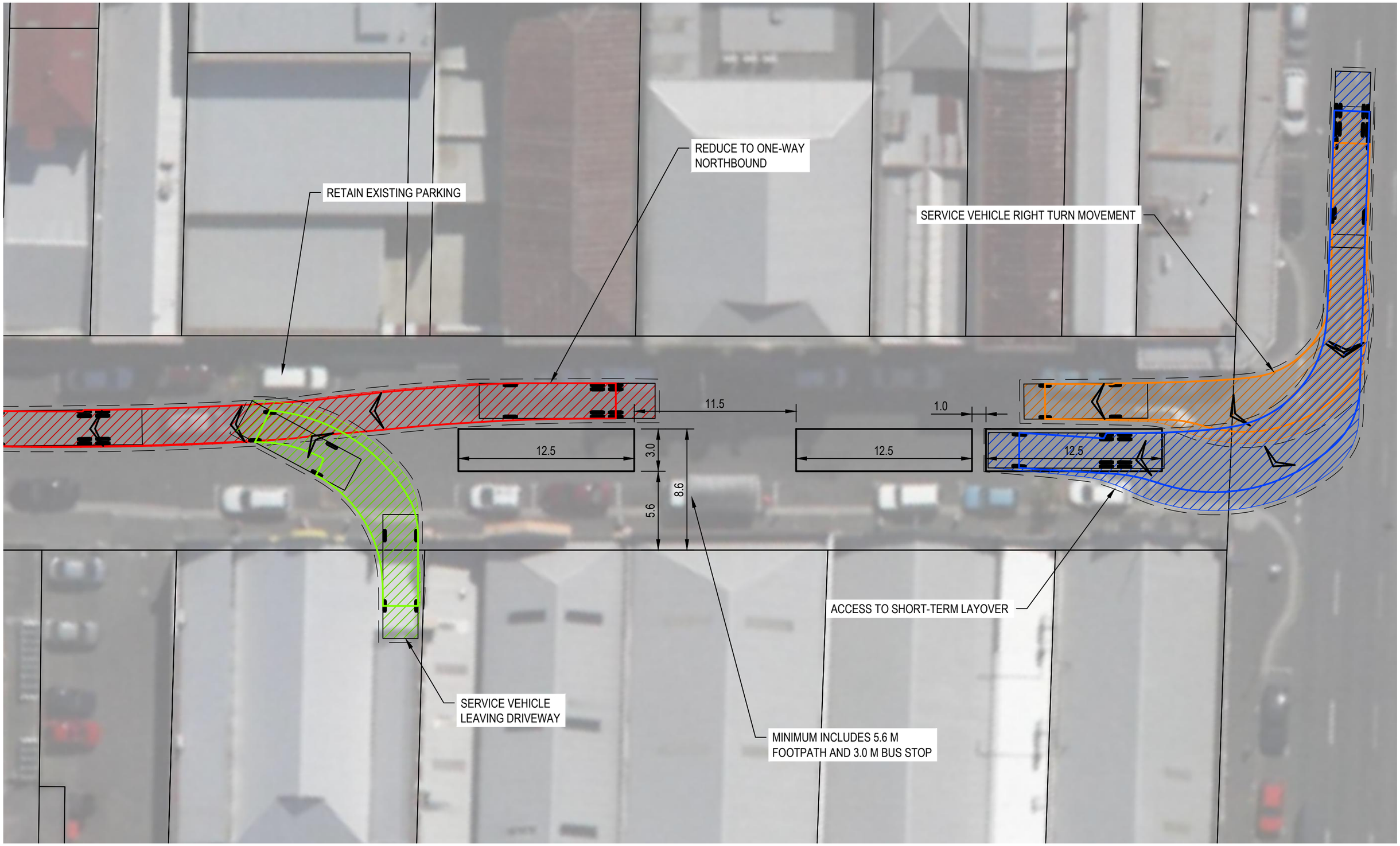
Based on Table 21, there would be sufficient space within the road reserve cross section to accommodate the option based on a single through lane travelling in the northbound direction. A lane width of 4.0 metres could be adopted, along with some additional footpath widening on the east side of the road.

#### *Operating Space*

The Kingsway northbound option involves providing two independently operating bus stops located at the southern end of the road (near York Street) plus an additional short-term layover immediately behind the rear stop. The southern end of Kingsway is used due to the frequency of driveway crossovers towards the northern end of the road which effectively prohibits the provision of stops at this location.

A potential arrangement is presented in Figure 75.

Note that access to and from driveways immediately opposite the bus stops can be retained, but movements by large vehicles can only be undertaken when the proposed bus stops are unoccupied.




0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

CITY OF LAUNCESTON
LAUNCESTON BUS INTERCHANGE OPTIONS
TECHNICAL FEASIBILITY ASSESSMENT
OPTION 11 KINGSWAY NORTHBOUND
OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 75

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Plot Date: 31 October 2017 - 1:05 PM Plotted by: Mark Petrusma
Cad File No: G:\32\18581\CADD\Drawings\32-18581-FIGS.dwg
Document Set ID: 4164477
Version: 1, Version Date: 25/10/2019

### 4.11.3 Impacts Assessment

#### *Bus Routing*

Buses departing stops at Kingsway (northbound) would be required to travel further to access St John Street compared to the existing stops at St John Street South. This would result in a moderate impact on travel times for outbound services.

There would be a major impact on bus routing for West Tamar services. These buses currently turn from Brisbane Street onto Kingsway to access York Street travelling towards the West Tamar region. Conversion of Kingsway to one-way northbound would be required to accommodate Option 11. This would result in significant additional circulation required for these services

#### *Dead Running Services*

There would be a minor impact on dead running services as buses would be required to continue along York Street to turn into Kingsway rather than St John Street. The circulation route is presented in Figure 76.

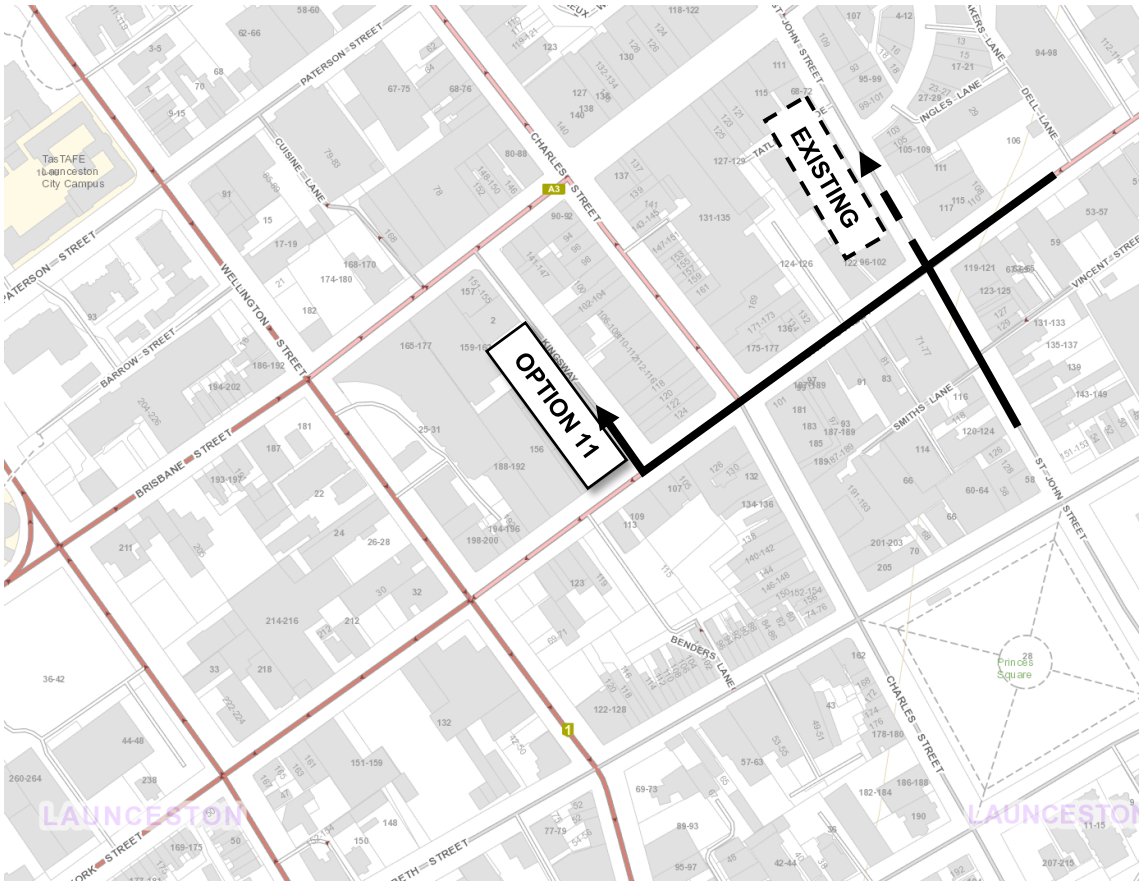



**Figure 76 Option 11 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The closest toilet facilities are located at Benders Lane, on the opposite side of York Street.

#### *Intersection Operation*

No significant intersection performance issues are anticipated to result from the proposed Option 11 bus stop relocation. Notwithstanding, some intersections will experience a net increase in bus activity including the following:

- York Street / Kingsway

- Kingsway / Brisbane Street
- Brisbane Street / Charles Street
- Charles Street / Paterson Street
- York Street / Bathurst Street
- Bathurst Street / Brisbane Street

The impacts of additional bus movements on the above intersections are likely to be minor.

The largest impact on the traffic network would be due to the conversion of Kingsway to one-way northbound. Kingsway currently acts as an 'outlet' for vehicles on Brisbane Street wishing to exit the Launceston CBD. With the conversion of Kingsway to northbound only, this route would be unavailable and these vehicles would be required to circulate via Charles Street and Paterson Street, thereby adding to traffic volumes on these roads.

It is noted that this increase in traffic would not be significant, and the impacts to connectivity are greater than the impacts to network performance.

### *Road Safety*

No significant road safety issues were identified relating to Option 11.

### *Parking*

The Kingsway Northbound option will require removal of car parking on both sides of Kingsway, resulting in a net loss of 10 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking.

In addition, the option would require removal of 2 existing loading zones on Kingsway. It may be a requirement that these are reinstated further north, further reducing the number of car parking spaces on this road.

### *Accessibility*

The proposed Kingsway Northbound option is located approximately 350 metres walking distance from the CBD centroid as shown in Figure 77. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

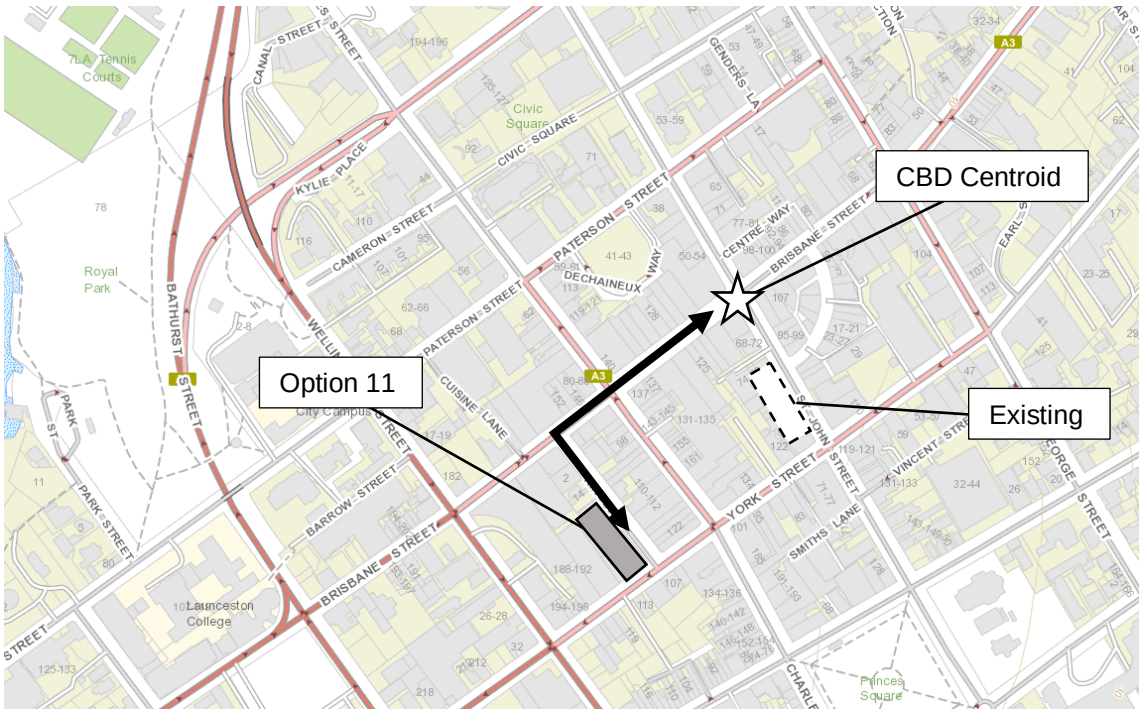



**Figure 77 Option 11 Kingsway Northbound Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

The average gradient at the southern end of Kingsway is less than 2.5% and is therefore considered suitable for public transport accessibility. It is noted that the gradient on parts of Kingsway exceeds 2.5%.

### 4.11.4 Summary

A summary of the technical feasibility assessment for Option 11 Kingsway Northbound is provided in Table 22.

**Table 22 Option 11 Kingsway Northbound Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Yes | Adequate space for manoeuvring. |
| Accessibility | Maybe | Located moderate distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Major | Significant increased travel distance via CBD streets. |
| Dead Running Services | Minor | Minor increase in travel for dead running services. |
| Intersection Operation | Moderate | Potential impacts due to conversion to one-way northbound. |
| Road Safety | Nil | No significant safety issues identified. |
| Parking | Major | Loss of 10 car parking spaces and 2 loading zones. |
| Other Bus Operators | Major | Significant impacts on West Tamar services routes. |

## 4.12 Option 12 – Kingsway Southbound

### 4.12.1 Location and Bus Routing

Option 12 is located at Kingsway, between Brisbane Street and York Street, on the southbound side of the road as shown in Figure 78. Note that the southbound option is investigated as Option 11 in this report (Section 4.11).


**Figure 78 Option 12 Kingsway Southbound Site Location**

*Base imagery obtained from TheLIST © State of Tasmania*

Buses will be required to turn onto York Street and access northern and eastern destinations via Bathurst Street and Cimitiere Street. The Option 12 departure routes are presented in Figure 79. It is noted that departing services will have improved access to arterial routes without needing to circulate via local, CBD streets.

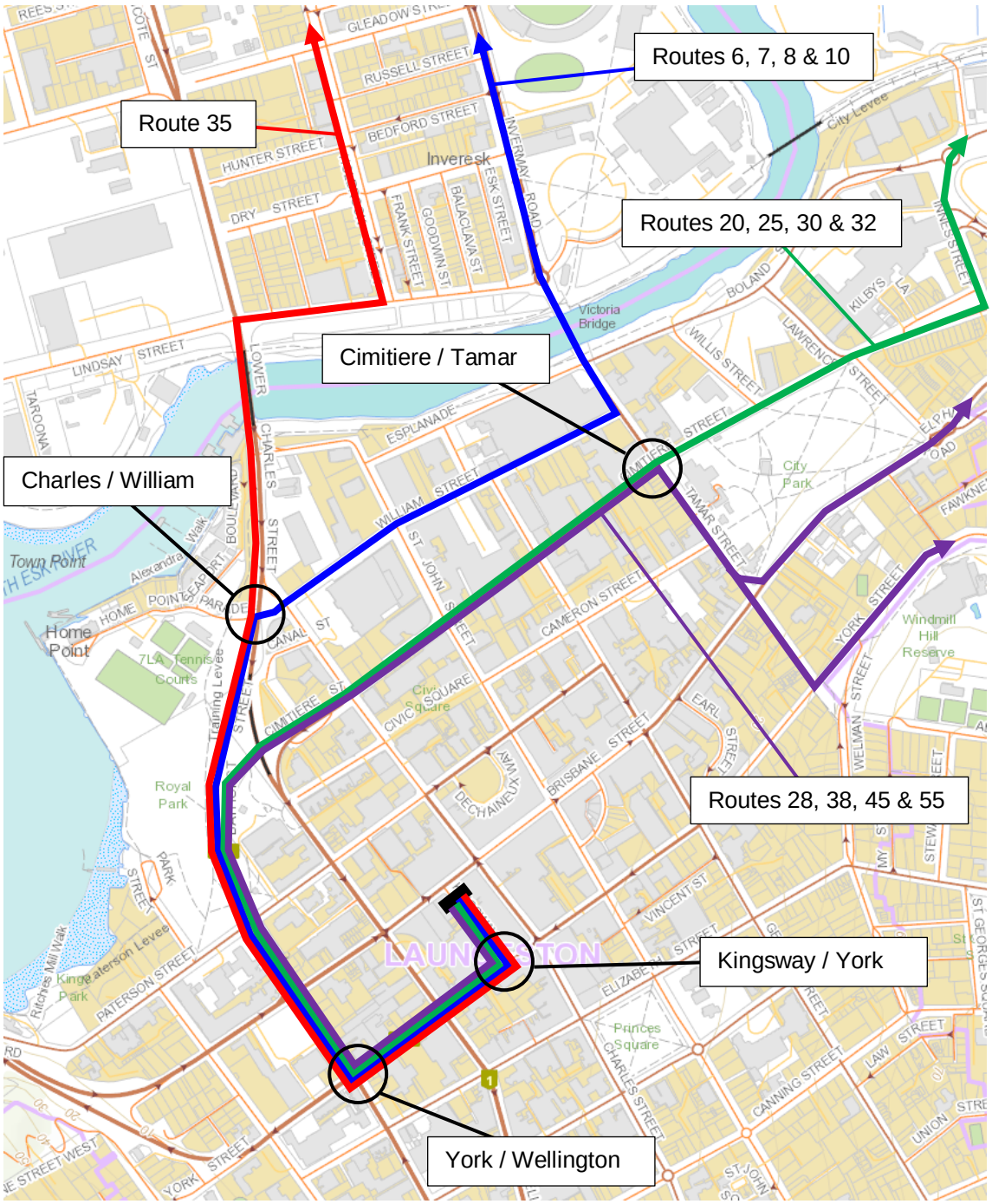



**Figure 79 Option 12 Departure Routes (Stops E and F)**

*Base map obtained from TheLIST © State of Tasmania*

### 4.12.2 Technical Feasibility Review

#### *Roadway Cross Section*

Kingsway has a total road reserve width of approximately 15.2 metres comprising footpaths, parking bays and traffic lanes. A diagram of the existing cross section (approximate) is presented in Figure 80.

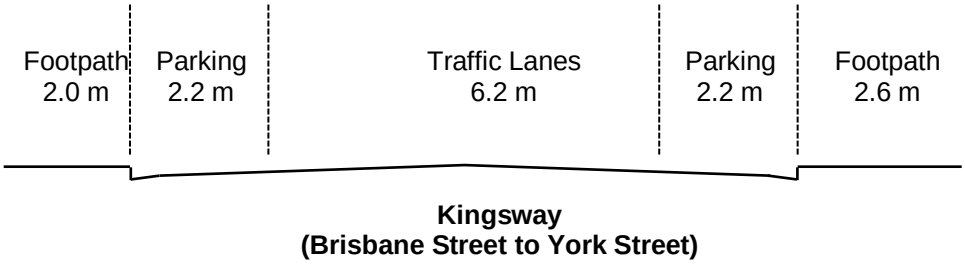



**Figure 80 Kingsway Cross Section**

The minimum requirements are summarised in Table 23.

**Table 23 Kingsway Road Width Assessment**

| | Existing | Minimum | Comment |
|---|---|---|---|
| Footpath (east side) | 2.0 m | 5.6 m | Desirable minimum not to reduce existing level of service. |
| Roadway | 10.6 m | 6.5 m | Minimum includes 3.0 m bus stop and 3.5 m traffic lane. |
| Footpath (west side) | 2.6 m | 2.6 m | To match existing. |
| ***Total*** | ***15.2 m*** | ***14.7 m*** | |

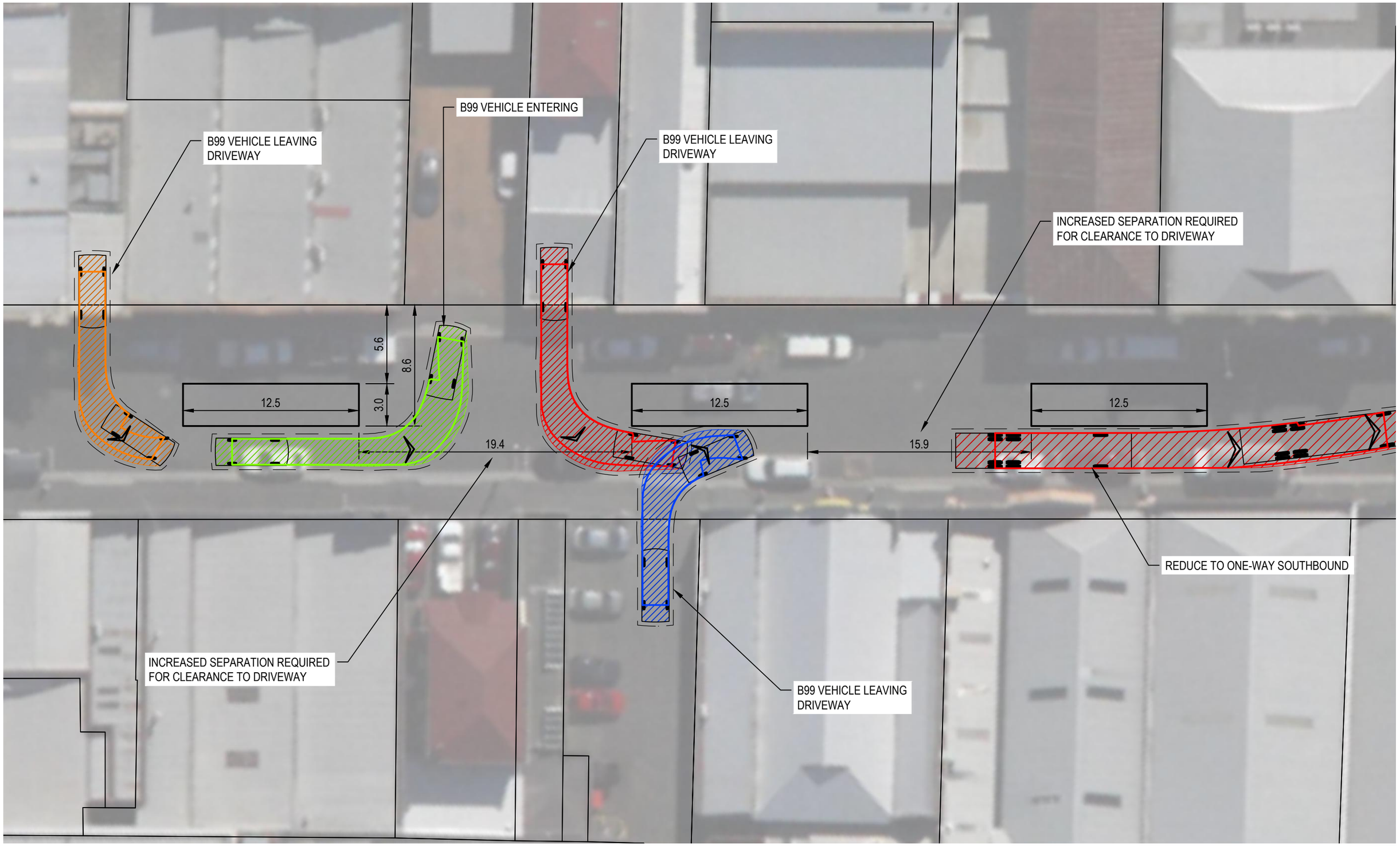
Based on Table 21, there would be sufficient space within the road reserve cross section to accommodate the option based on a single through lane travelling in the southbound direction. A lane width of 4.0 metres could be adopted to provide additional clearance to bus stops.

#### *Operating Space*

The Kingsway southbound option requires provision of two bus stops, and an additional layover, at intervals along the east side of the road, avoiding existing driveway crossovers and property accesses. The existing road will be reduced to a single, 4.0 metre wide traffic lane travelling in the southbound direction.

A potential arrangement is presented in Figure 81.

Note that access to and from driveways immediately opposite the bus stops can be retained, but movements by large vehicles can only be undertaken when the proposed bus stops are unoccupied.




0 2.5 5.0 7.5m
SCALE 1:250 AT ORIGINAL SIZE

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TECHNICAL FEASIBILITY ASSESSMENT

# OPTION 12 KINGSWAY SOUTHBOUND OPERATING SPACE REQUIREMENTS

Job Number 32-18581
Revision A
Date OCT 2017

Figure 81

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Document Set ID: 4164477
Version: 1, Version Date: 25/10/2019

### 4.12.3 Impacts Assessment

#### *Bus Routing*

Buses departing the proposed Option 12 stops would be able to turn onto York Street to access the arterial road network directly via Bathurst Street, Cimitiere Street or William Street. This would reduce the amount of circulation required via local CBD streets and could potential result in an improvement in overall travel times. An additional benefit is the removal of many bus movements from the pedestrianised environment within the bounds of the Launceston City Heart Project.

Services departing the existing West Tamar bus stop on Brisbane Street would be able to continue along Kingsway to access York Street as per the existing situation.

#### *Dead Running Services*

The relocation of departure points for northern suburbs services from St John Street to Kingsway, between Brisbane Street and York Street, will require buses to circulate via Bathurst Street or Wellington Street in order to access these stops. This will introduce additional time for dead running services.

The likely circulation route is presented in Figure 82.

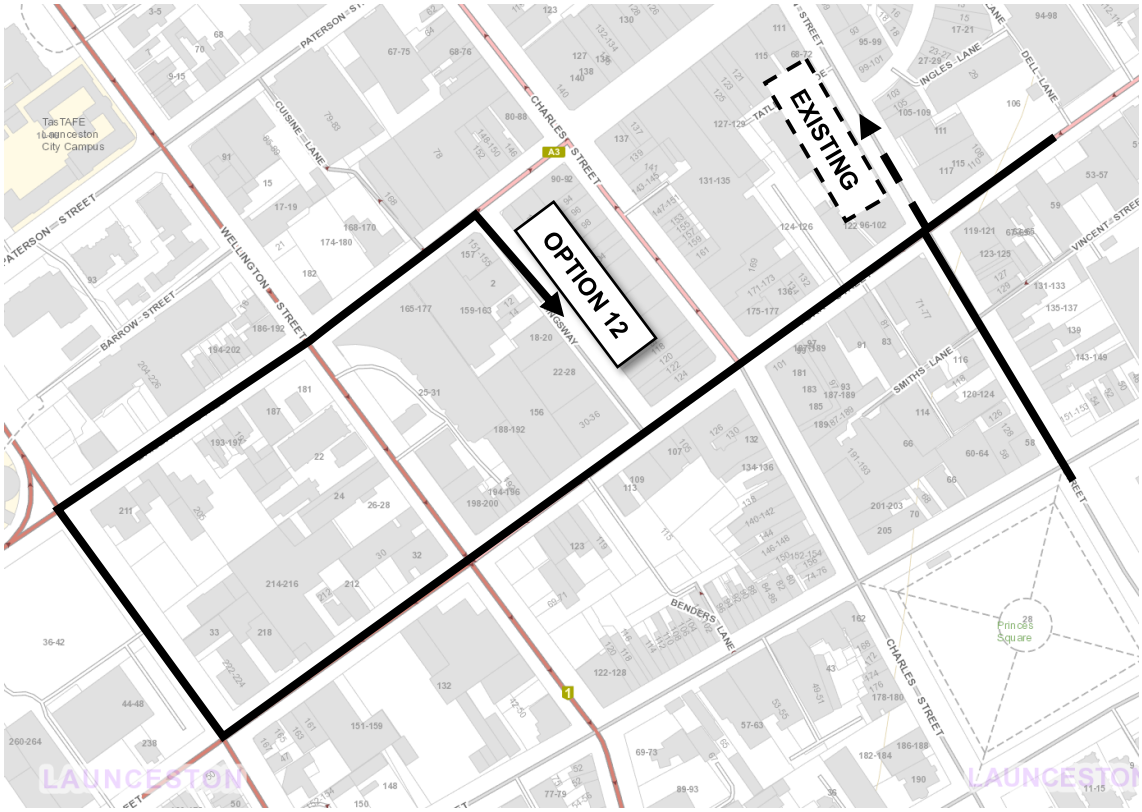


**Figure 82 Option 12 Dead Running Service Routes**

*Base map obtained from TheLIST © State of Tasmania*

The closest toilet facilities are located at Benders Lane, on the opposite side of York Street.

#### *Intersection Operation*

No significant intersection performance issues are anticipated to result from the proposed Option 12 bus stop relocation. Several CBD intersection may experience improved performance due to the shift of outbound bus services onto arterial routes such as York Street

and Bathurst Street. The following intersections will experience a net increase in bus turning movements:

- Bathurst Street / Brisbane Street
- Brisbane Street / Kingsway
- Kingsway / Bathurst Street
- Charles Street / William Street
- Cimitiere Street / Tamar Street

The impacts of the additional bus movements on the above intersections are likely to be minor.

### *Road Safety*

Sight distances for vehicles leaving access driveways along the eastern side of Kingsway will be restricted due to parked buses.

### *Parking*

The Kingsway Southbound option will require removal of car parking on both sides of Kingsway, resulting in a net loss of 15 short-term car parking spaces at a minimum. These spaces are 1-hour (1P) metered parking.

In addition, the option would require removal of 2 existing loading zones on Kingsway. It may be a requirement that these are reinstated in the immediate area, further reducing the number of car parking spaces on this road.

### *Accessibility*

The proposed Kingsway Southbound option is located approximately 320 metres walking distance from the CBD centroid as shown in Figure 83. This represents a moderate increase compared to the existing location approximately 100 metres from the CBD centroid.

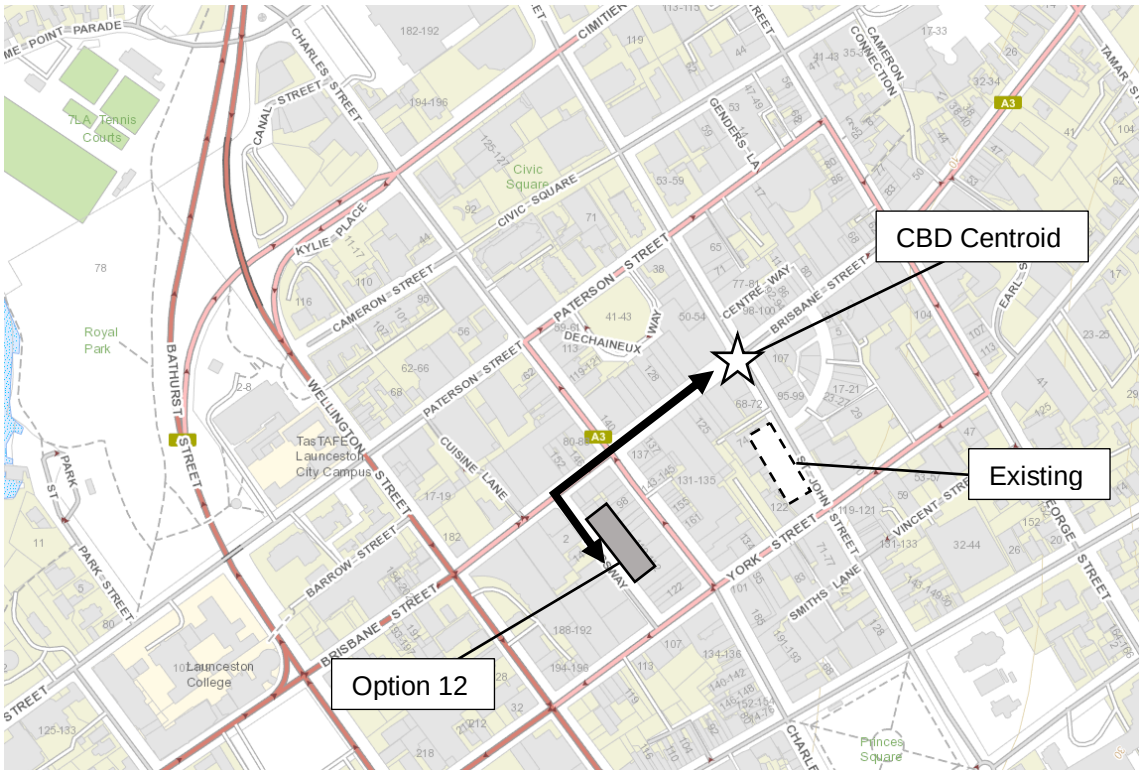


**Figure 83 Option 12 Kingsway Southbound Proximity to CBD**

*Base map obtained from TheLIST © State of Tasmania*

Parts of Kingsway have a gradient exceeding 2.5% and therefore may not be considered suitable for public transport accessibility.

### 4.12.4 Summary

A summary of the technical feasibility assessment for Option 12 Kingsway Southbound is provided in Table 24.

**Table 24 Option 12 Kingsway Southbound Summary**

| Constraint | Feasibility | Comment |
|---|---|---|
| Roadway Cross Section | Yes | Sufficient width available. |
| Operating Space | Yes | Adequate space for manoeuvring. |
| Accessibility | Maybe | Located moderate distance from CBD centroid. |
| **Criteria** | **Impact** | **Comment** |
| Bus Routing | Nil | Potential improvement due to direct access to arterial routes rather than CBD streets. |
| Dead Running Services | Major | Significant increase in travel for dead running services. |
| Intersection Operation | Minor | Minor impacts due to conversion to one-way southbound. |
| Road Safety | Moderate | Limited sight distance for access driveways. |
| Parking | Major | Loss of 15 car parking spaces and 2 loading zones. |
| Other Bus Operators | Nil | No impacts to other services / operators. |

# 5. Discussion

## 5.1 Process of Elimination

Potential options for the relocation of bus stops from St John Street South, including those detailed in Section 4 of this report, were investigated and eliminated on the basis of a range of the following key constraints:

- Launceston City Heart Boundaries
- Accessibility
- Proximity to Launceston CBD
- Road Use and Function
- Roadway Cross Section
- Operating Space

A series of maps have been prepared to demonstrate the process of elimination of potential options on the above basis. These are provided in the following sections.

### 5.1.1 Launceston City Heart Boundaries

The bus stops must be located within the boundaries of the Launceston City Heart Project between Wellington Street, Cimitiere Street, Tamar Street and Elizabeth Street. The extents of the Launceston City Heart Project are presented in Figure 84.

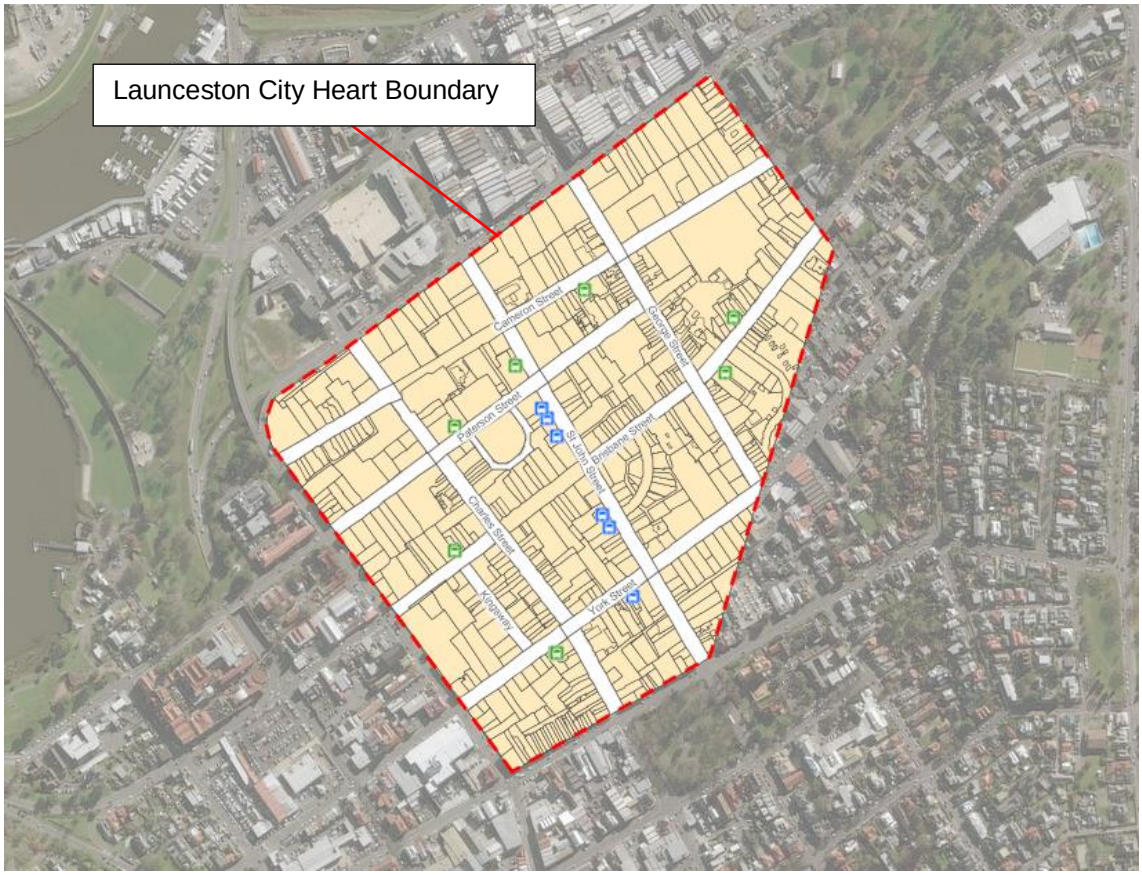


**Figure 84 Launceston City Heart Boundaries**

*Base imagery source: Digital Globe*

### 5.1.2 Accessibility

The street segment where bus stops are to be located must have an average gradient of not more than 2.5% to be considered suitable for public transport accessibility. Therefore, any potential options where the gradient exceeds 2.5% should be eliminated as shown in Figure 85.

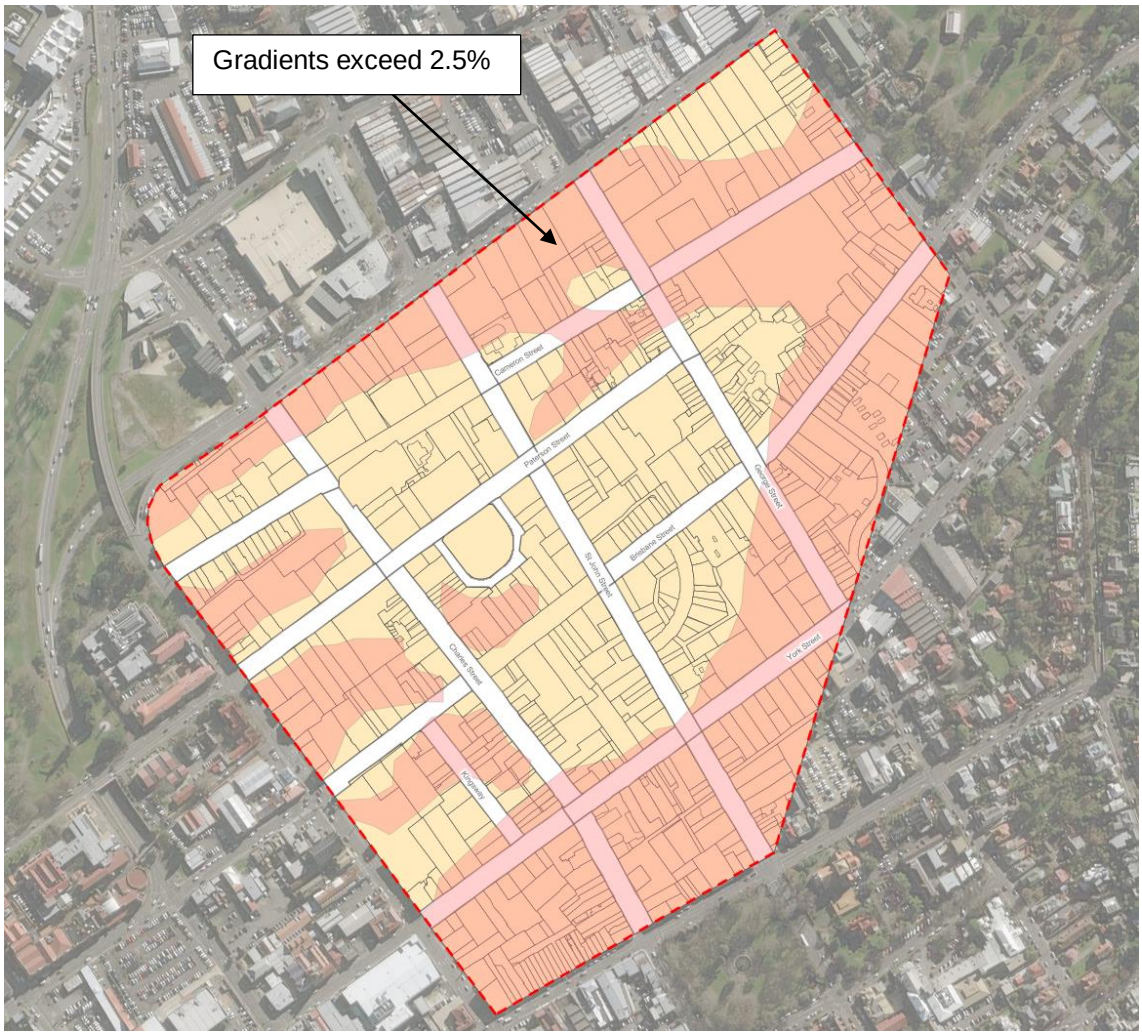


**Figure 85 Accessibility (Gradients)**

*Base imagery source: Digital Globe*

### 5.1.3 Proximity to Launceston CBD

The bus stops must be located within a reasonable walking distance of the Launceston CBD Centroid, considered to be the intersection of St John Street and Brisbane Street as shown in Figure 86.

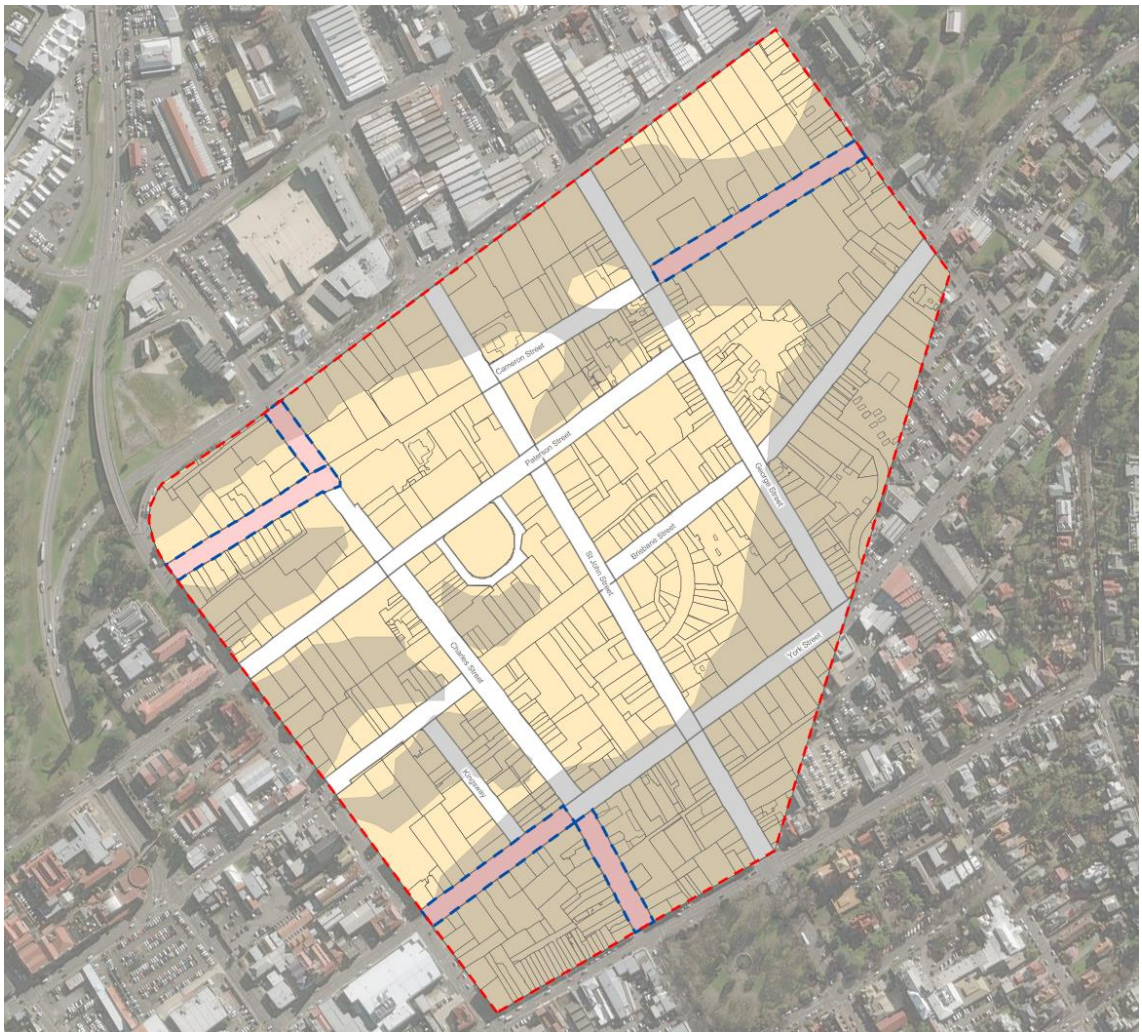


**Figure 86 Proximity to CBD Centroid**

*Base imagery source: Digital Globe*

### 5.1.4 Road Use and Function

Arterial roads (including York Street) and pedestrian priority streets were eliminated on the basis of road use and function. Additionally, the areas currently utilised by CBD departure stops at St John Street were also eliminated. The eliminated options are presented in Figure 87.

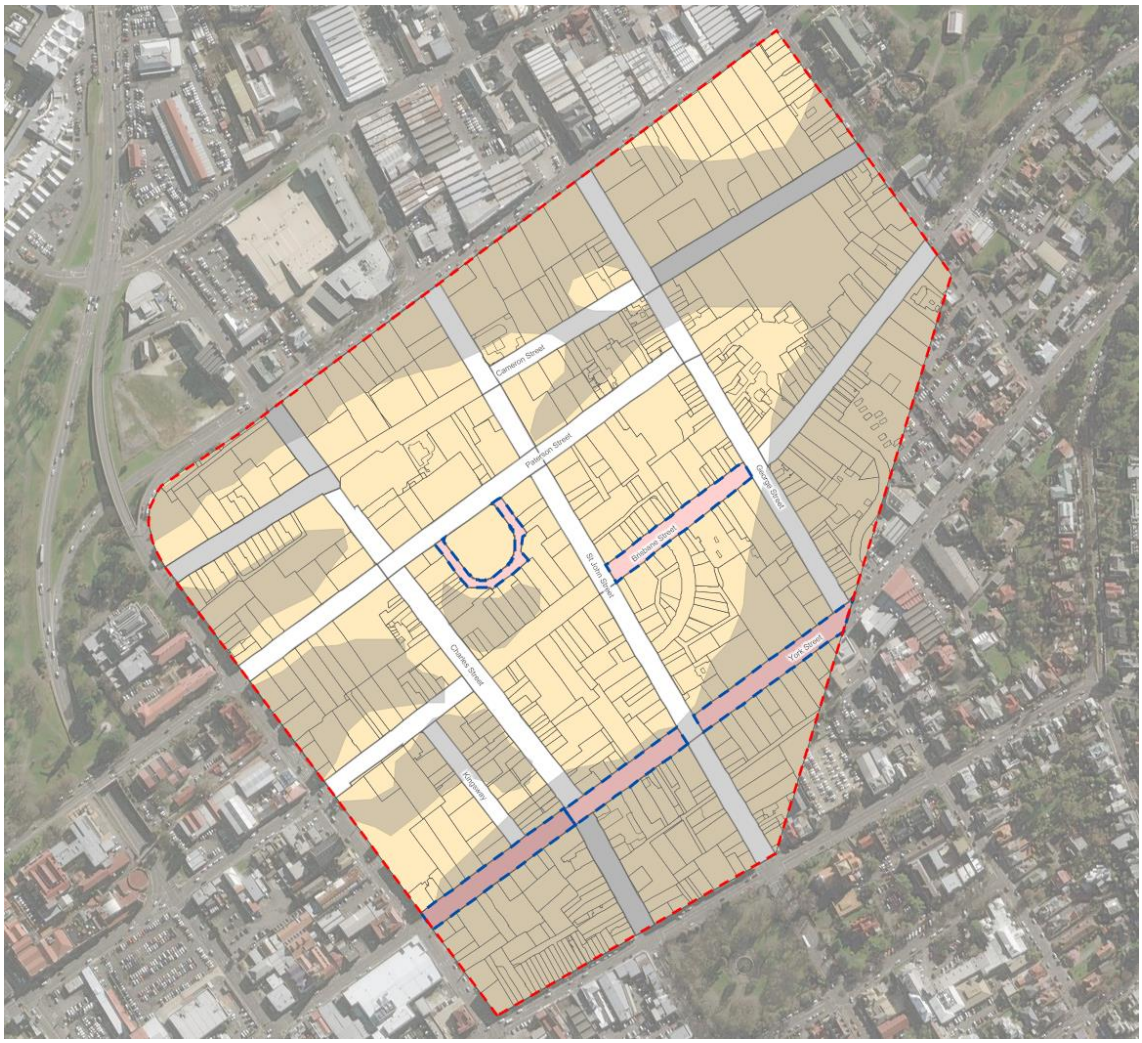


**Figure 87 Road Use and Function**

*Base imagery source: Digital Globe*

### 5.1.5 Roadway Cross Section

Footpaths, bus stops and traffic lanes must be able to be accommodated within the existing road reserve without requiring acquisition of additional private land as per the minimum design standards detailed in Section 2.5.1 of this report. The eliminated options are presented in Figure 88.

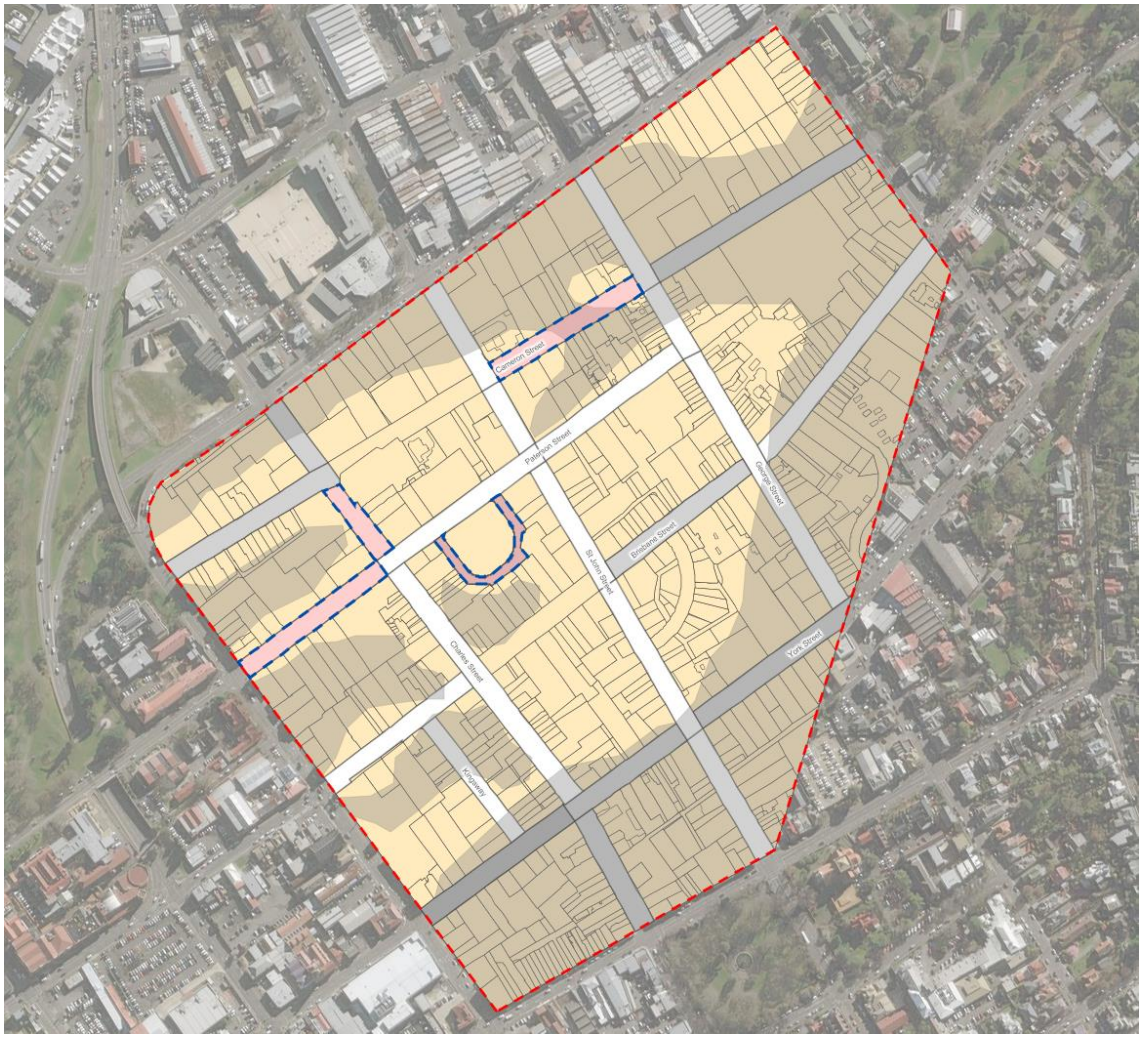


**Figure 88 Roadway Cross Section**

*Base imagery source: Digital Globe*

### 5.1.6 Operating Space

Buses must be able to physically manoeuvre into, out of and around the proposed bus stops without significantly impacting on traffic efficiency or road safety. The eliminated options are presented in Figure 89.

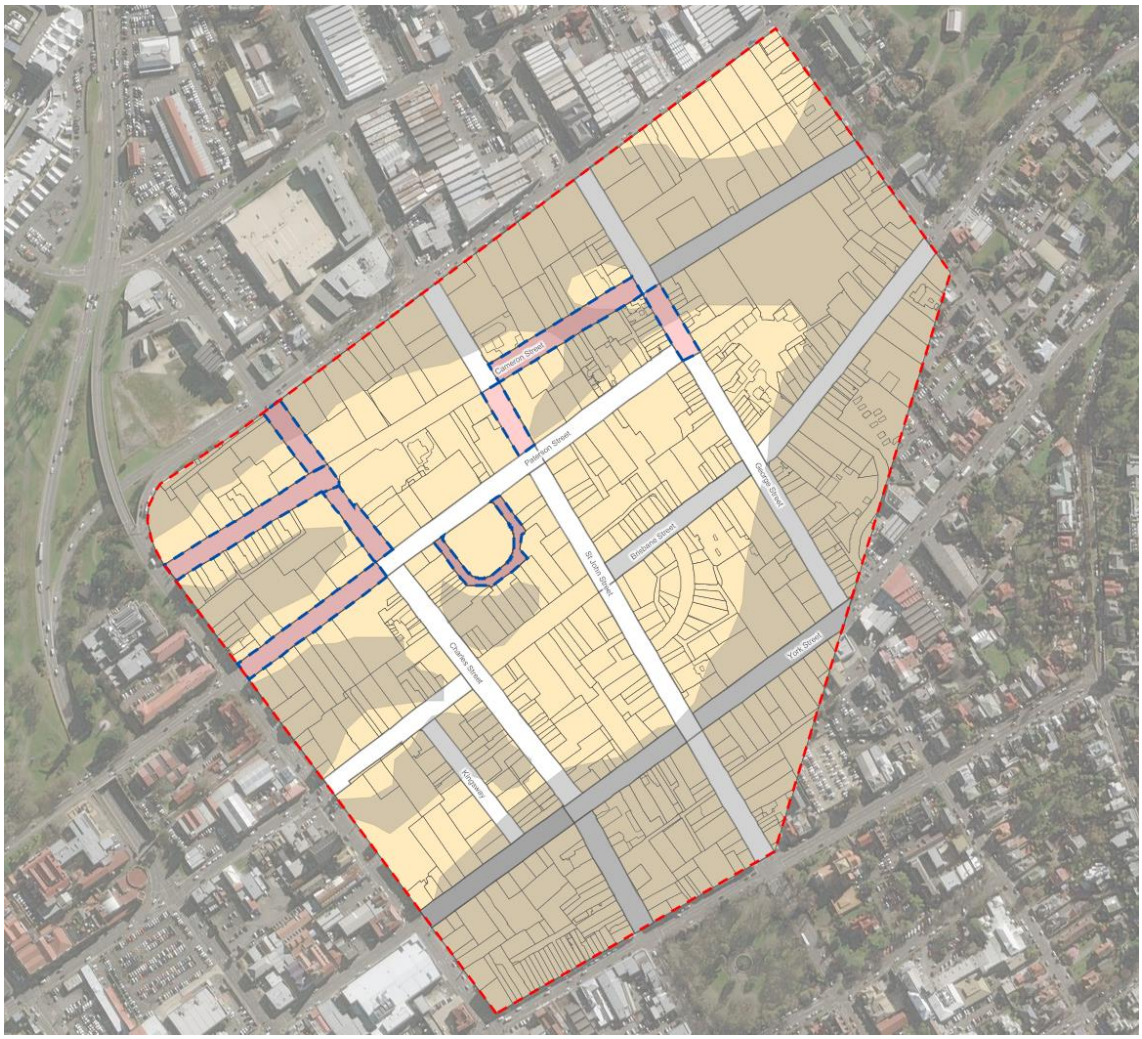


**Figure 89 Operating Space**

*Base imagery source: Digital Globe*

### 5.1.7 Summary

Based on the process of elimination summarised in Sections 5.1.1 to 5.1.6, there are limited options available which comply with the minimum requirements for technical feasibility. This is based solely on the location and physical geometry of each option. Those options which remain are as follows:

- Brisbane Street (Wellington Street to Charles Street)
- Kingsway (southern end only)
- Charles Street (York Street to Paterson Street)
- Paterson Street (Charles Street to George Street)
- George Street (Paterson Street to Brisbane Street)
- St John Street (York Street to Paterson Street)

The twelve options that have been assessed in detail in this report are shown overlaid on the option eliminations map in Figure 90.

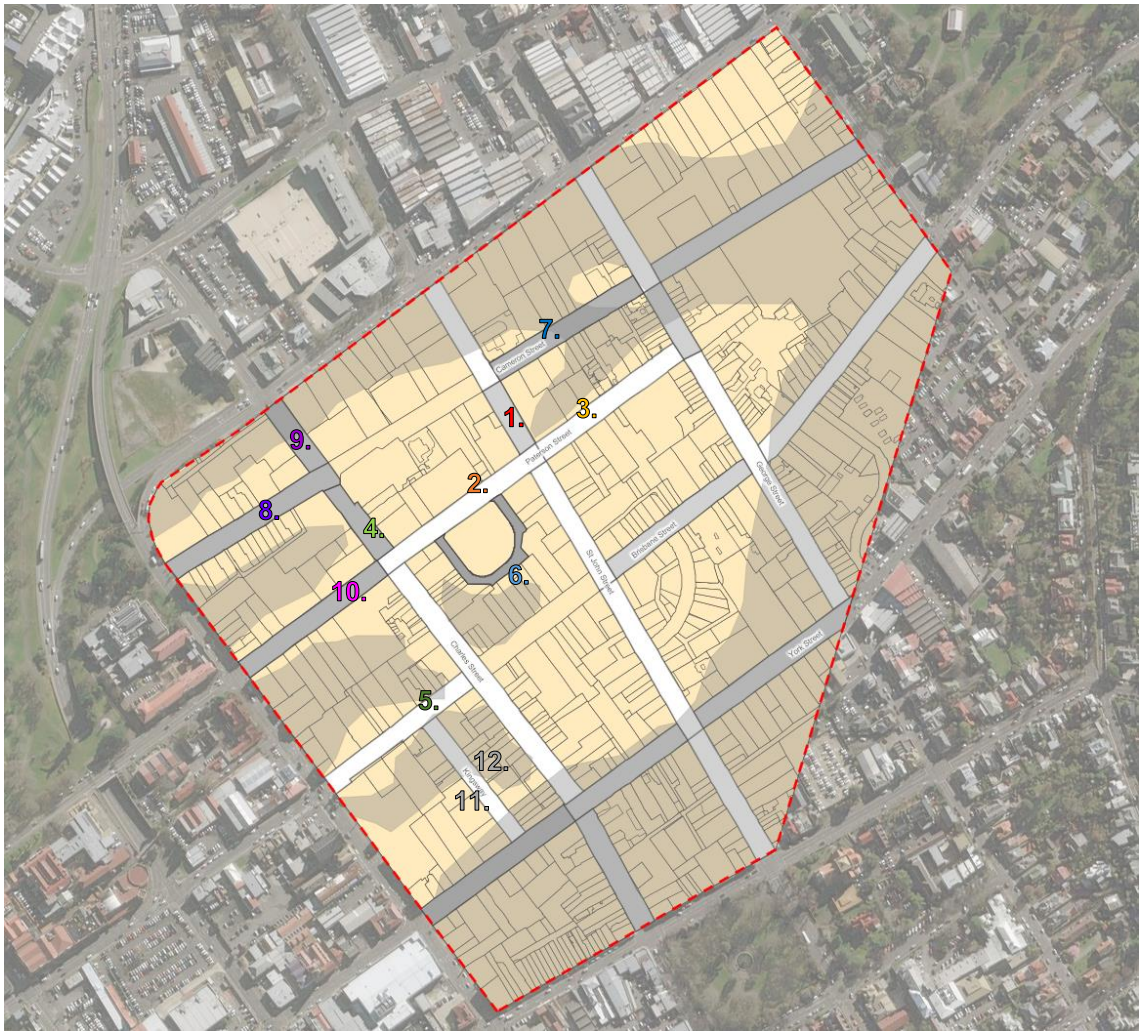


**Figure 90 Options Investigated in This Report**

*Base imagery source: Digital Globe*

## 5.2 Comparison of Options

A summary of all options is provided in Table 25. For each option, a rating has been assigned against the relevant constraints and criteria. The ratings are broadly described as follows:

- ✓ Can comply with minimum requirements
  Nil or minor impacts only
- – Could be feasible subject to relaxation of design standards
  Moderate impacts only
- × Option not feasible
  Major impacts which may be prohibitive for the option

### Table 25 Comparison of Options

| Option | | Technical Feasibility | | | Overall Traffic and Safety Impacts | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Roadway Cross Section | Operating Space | Accessibility | Bus Routing | Dead Running Services | Intersection Operation | Road Safety | Parking | Other Bus Operators |
| 1 | St John Street North | ✓ | × | ✓ | ✓ | – | × | × | × | × |
| 2 | Paterson Street Central | ✓ | ✓ | ✓ | ✓ | – | – | – | – | ✓ |
| 3 | Paterson Street East | ✓ | ✓ | ✓ | – | ✓ | – | ✓ | ✓ | ✓ |
| 4 | Charles Street North A | – | – | – | – | × | × | × | × | ✓ |
| 5 | Brisbane Street West | ✓ | ✓ | ✓ | – | × | ✓ | – | – | × |
| 6 | Dechaineux Way | – | × | ✓ | ✓ | – | ✓ | × | × | ✓ |
| 7 | Cameron Street East | – | – | ✓ | – | – | ✓ | ✓ | × | – |
| 8 | Cameron Street West | ✓ | – | × | ✓ | × | – | × | – | ✓ |
| 9 | Charles Street North B | ✓ | – | × | ✓ | × | ✓ | – | – | ✓ |
| 10 | Paterson Street West | × | – | – | – | × | ✓ | – | × | ✓ |
| 11 | Kingsway Northbound | ✓ | ✓ | – | × | ✓ | – | ✓ | × | × |
| 12 | Kingsway Southbound | ✓ | ✓ | – | ✓ | × | ✓ | – | × | ✓ |

# 6. Conclusions

Based on the investigations detailed in this report, there are a number of options that are not considered feasible on the basis of the physical geometry and bus access requirements, or accessibility, including the following:

- St John Street North
- Dechaineux Way
- Cameron Street West
- Charles Street North B
- Paterson Street West

The following four options may be feasible subject to a relaxation of minimum design standards, however each of these would result in major impacts based on the key criteria assessed in this report:

- Charles Street North A
- Cameron Street East
- Kingsway Northbound
- Kingsway Southbound

Based on those factors investigated in this report, only three options were found to comply with minimum design standards and are not considered to result in major detrimental impacts:

- Paterson Street Central
- Paterson Street East
- Brisbane Street West

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| Rev | Author | Reviewer | | Approved for Issue | | |
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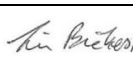
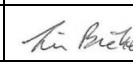
| | | Name | Signature | Name | Signature | Date |
| 0 | M. Petrusma | T. Bickerstaff | On file | T. Bickerstaff | On file | 29.11.17 |
| 1 | M. Petrusma | T. Bickerstaff | On file | T. Bickerstaff | On file | 6.12.17 |
| 2 | M. Petrusma | T. Bickerstaff |  | T. Bickerstaff |  | 18.12.17 |

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