EXECUTIVE SUMMARY

Overview

The Sustainable Transport Plan (STP), published by the ACT Government in 2004, sets the framework for a sustainable transport system for Canberra. The central component of the STP is to increase the proportion of trips within Canberra using public transport, cycling and walking.

In support of the STP, subsequent studies recommended expansion of various high speed “Rapid” services, including between the Woden Town Centre and Civic, along Yarra Glen and Adelaide Avenue.

The primary purpose of this study is to evaluate three potential bus stops along the Yarra Glen – Adelaide Avenue corridor, to be serviced by Rapid buses. The evaluation includes development of preferred design options and a consideration of costs and benefits.

The bus stop locations would be at the intersections of:

- Yarra Glen and Carruthers Street
- Adelaide Avenue and Kent/Novar Street
- Adelaide Avenue and Hopetoun Circuit

Three design options were developed for each bus stop. These design options recognised that the entire ACTION bus fleet has passenger access doors only on the left side of each bus.

The design options were presented to ACT Government stakeholders, public stakeholders and the community for feedback. Based on the feedback received, and after negotiation with ACTION, preferred options were selected. The preferred design options are:

- Yarra Glen/Carruthers Street: “Split Median Stop” providing one bus stop for each direction, located in the median near the overpass with pedestrian access via ramps and stairs from the overpass.
- Adelaide Avenue/Kent/Novar Street: “Median Crossover Stop” providing a single large bus stop in the median, servicing buses in both directions, located under the overpass with pedestrian access via ramps and stairs from the overpass.
- Adelaide Avenue/Hopetoun Circuit: “Median Crossover Stop” providing a single large bus stop in the median servicing buses in both directions, located above Hopetoun Circuit with pedestrian access via ramps and stairs from Hopetoun Circuit.

The preferred design option for each location was taken back to the community for further feedback. Most feedback was positive, but some additional issues were identified.

The final project stage was the economic analysis of the project and the development of a business case. The economic analysis quantified the costs and benefits of the project over the expected lifetime and compared them to assess the economic viability. The bus stop cost estimates (including 40% contingency and excluding GST) for the three locations are as follows:

- Carruthers Street: $3.5 million
- Kent/Novar Street: $3.3 million
- Hopetoun Circuit: $6.0 million
Taking into consideration currently predicted patronage levels, it was found that the preferred design option at Carruthers Street is economically attractive (albeit marginal), Kent/Novar Street is also feasible, but the Hopetoun Circuit stop is not economically attractive, unless the patronage levels increase significantly. A brief risk assessment was also conducted and it was found that the project is considered low-medium risk.

**Recommendations:** Based on the outcomes of this study, the following actions are recommended:

- Construction of a bus stop at Kent/Novar Street utilising the preferred design option: This project should be co-ordinated with EDD-LDA in relation to the proposed Canberra Brickworks redevelopment, which is subject to Government approval, in order to establish the exact location of the bus stop.

- The construction of the proposed bus stop at Carruthers Street, while economically feasible (albeit marginal), should be delayed until the success of the Kent/Novar Street stop can be more accurately quantified. The economic viability of the Carruthers Street stop should then be reassessed using this more accurate data.

- No more than half of the Rapid routes using Adelaide Avenue should be scheduled to stop at the new stops. Otherwise, delays to existing users will outweigh the benefits for users of the new stops. However, if patronage at the new stops increased significantly, additional services could be implemented along the whole Woden to City corridor.

- Consider detailed investigations into the performance of adjacent intersections to improve pedestrian and cyclist accessibility to the new bus stops and improve vehicle safety and capacity at each intersection.

- Consider an investigation into the existing pedestrian and cycle network in the suburbs around the new stops to ensure that these networks provide high quality access to the new stops.

The following executive summary sections present and discuss the methodology and outcomes of the Adelaide Avenue Bus Stops Feasibility Study. These include detailed functional analysis of the options and preliminary urban design and landscaping, tree and heritage assessments.

**ES.1 Introduction**

In 2004, the ACT Government released the Sustainable Transport Plan (STP), which provided the framework for a sustainable transport system for Canberra. The central component of the STP is to increase the proportion of trips within Canberra using public transport, cycling and walking.

In 2009, MRC (now MRCagney), developed the ACT Strategic Public Transport Network Plan (SPTNP) for the ACT Government. This plan sets out a structure for the future public transport network to meet the goals of the STP. Both the STP and SPTNP have been adopted for the March 2012 Transport for Canberra planning framework.

One of the recommendations of the SPTNP was to improve the Rapid bus services along Adelaide Avenue and Yarra Glen to form part of the backbone of the public transport network. In addition, the SPTNP recommended the investigation of options to provide bus stops at Carruthers Street, Kent Street/Novar Street (hereafter referred to as Kent/Novar Street) and/or Hopetoun Circuit.
The primary purpose of this new study is to develop design options for each of these potential bus stops and evaluate the costs and benefits. The study area for this project, along with potential bus stop locations, is shown in *Figure ES.1*.

![Figure ES.1: Study Area and Strategic Bus Stop Locations](image)

Specifically, the study aims to:

1) Develop design options for each stop, including:
   - Identifying the best detailed location for each bus stop in Deakin, Curtin and Yarralumla.
   - Developing the functional planning, design and operational requirements for the bus stops.
   - Develop concept plans for bus infrastructure requirements associated with the bus stops including the physical road design requirements.
   - Providing recommendations for developing Adelaide Avenue as a high quality landscape corridor as per the National Capital Plan, taking into account land use integration with Yarralumla redevelopment and Deakin growth.

2) Evaluate costs and benefits, taking into consideration available demographic and patronage data.
A number of previous studies had looked at the possibility of providing bus stops on Adelaide Avenue. However, none of the previous studies had assessed these locations in detail. The relevant previous studies include:

- ACT Strategic Public Transport Network Plan (SPTNP)
- Canberra Brickworks and Environ Planning Study
- Coverage Service Delivery Feasibility Study
- ACT Major Stops Study

The current study also took into consideration data from the Australian National Census of 2006.

**ES.2 Infrastructure Configuration Options**

**ES.2.1 Introduction**

Set out below are the major considerations which drive the development of “design options” for the three potential bus stops.

The design options recognise two realities:

**Firstly**, all the buses in the ACT fleet only have passenger access doors on the left. The costs would be prohibitive to install doors on the right and there would be some loss of seating capacity. *As a result, each bus stop “platform” needs to be on the left of the bus.*

**Secondly**, the current bus lanes on Adelaide Avenue are the inner or median lanes. This has the advantage that buses become much less entangled with vehicles entering or leaving Adelaide Avenue. There will need to be significant other benefits to change to “kerbside” bus lanes.

**ES.2.2 Bus Lane Adjacent to Kerb**

There are two possible configurations for bus stops if the bus lane is adjacent to the kerb and these are:

- Ramp stops (generally located on the on-ramps)
- Kerbside stops

Ramp stops are a simple design of stop to implement along the corridor with two of the three proposed locations having suitable on- and off-ramps (only east facing ramps are provided at the Kent/Novar Street interchange so this location is not suitable for ramp stops). Buses would exit Adelaide Avenue via the off-ramp at each location, continue through the intersection at the cross road and service a bus stop positioned along the on-ramp. The bus would then return to Adelaide Avenue and continue its journey in its original direction.

The cost of building ramp stops is low, as the addition of the stop to the ramp is relatively simple. However, congestion at the merge from on-ramps to the motorway can be experienced if vehicles are entering a higher speed roadway.

Another low cost approach, and an alternative to using ramp stops, is to build bus stops along Adelaide Avenue on the kerbside of the outer lane. However, kerbside stops represent a higher safety risk option than ramp stops, due to the immediate adjacency of the stop to a
high-speed, through traffic lane and indented bus stops would require substantial entry and exit tapers for buses to slow down on approach to the stop and speed up when leaving the stop.

The cost of construction for a kerbside bus stop is relatively low and is the same order of magnitude as ramp stops, due to the small size of the stop required, and the relative ease of constructing this adjacent to the existing road. However, safety issues mean that ramp stops (if ramps exist) would generally be preferable to kerbside stops.

**ES.2.3 Bus Lane Adjacent to Median**

Median bus stops are commonly used along long, high-speed road corridors. As already mentioned, median lanes allow a higher degree of segregation of buses from other traffic, avoiding interaction at on- and off-ramps.

There are differing types of median bus stops, mostly due to the large number of possible configurations available for each stop platform, and the available size of the median area for the platforms to be built.

Along high-speed road corridors, such as Adelaide Avenue, the median stops must provide protection for pedestrians accessing the platforms and must have sufficient safety barriers to ensure the platform is segregated from the roadway.

Two possible configurations for bus stops if the bus lane is within the median are:

- Split median stops
- Median crossover stops

“Split median” stops provide separate stops in each direction, potentially longitudinally offset to minimise the width required within the median. Buses exit the median bus lane, following a stopping lane to the right, which would align with a bus platform, and then continue to travel in the same direction and merge back into the bus lane. In this instance, the two stop platforms are physically separated and passengers requiring to interchange between the two would need to exit via a pedestrian ramp (or stairs), cross the adjacent cross street, and access the second platform via its pedestrian ramp.

“Median crossover” stops offer an elegant solution when the width of the median is narrow. Instead of having two separate stop platforms, there is a central single, dual sided platform, similar to a train platform. A bus approaching from the platform enters the off-ramp style exit to the right of median bus lane, and crosses to the right side of the platform, allowing alighting and boarding passengers to enter or exit the bus on the left side. Upon exiting the stop, the bus gives way to any buses arriving at the station as they cross to the opposite side of the platform. Once the bus has given way, it accelerates and re-enters the median lane to the left.

Median crossover stops allow passengers to interchange between the two directions of travel easily and legibly, simply by crossing the platform. The needs of cyclists are best met by this design, as bicycle storage is conveniently located for both their departing and returning journeys. Examples of median crossover bus stops in Australia include the M2 motorway in the northwest of Sydney in Baulkham Hills and West Pennant Hills.
The construction of median crossover stops can typically be the most expensive of the design options, due to the larger physical size of the central shared platform, although the shelter and associated infrastructure provided should be no more expensive than for two separate stops and possibly cheaper. However, a key benefit of a median crossover stop is that it can be positioned within a median with a narrower footprint than what is required for a split median stop.

**ES.3 Development of Bus Stop Concept Design Options for Each Location**

Three bus stop design options were developed for each location and these are as follows:

- Option A: Ramp Bus Stop or Kerbside Bus Stop (if a Ramp Bus Stop is not possible)
- Option B: Split Median Stop
- Option C: Median Crossover Stop

The design layouts for these preliminary options are presented in the following sections, as well as their respective preliminary cost estimates. These are initial, indicative cost estimates based on the initial concepts that were mainly used to compare the options. Cost estimates were later reviewed and updated after the preferred options were selected.

**ES.3.1 Location 1: Carruthers Street**

The following figures show the preliminary design options proposed for the bus stop location at Carruthers Street.

![Figure ES.2: Location 1 Option A - Ramp Bus Stop](image)
Figure ES.3: Location 1 Option B - Split Median Stop

Figure ES.4: Location 1 Option C - Median Crossover Stop

Preliminary cost estimates (GST Exc) for Location 1 Options A (ramp), B (split median) and C (median crossover) are $0.58 million, $2.99 million and $3.07 million, respectively.
ES.3.2 Location 2: Kent/Novar Street

The following figures show the preliminary design options proposed for the bus stop location at Kent/Novar Street.

![Diagram of Location 2 Option A - Kerbside Bus Stop](image)

*Figure ES.5: Location 2 Option A – Kerbside Bus Stop*

![Diagram of Location 2 Option B - Split Median Stop](image)

*Figure ES.6: Location 2 Option B - Split Median Stop*
Preliminary cost estimates (GST Exc) for Location 2 Options A (kerbside), B (split median) and C (median crossover) are $1.56M, $2.47M and $2.92M, respectively.

**ES.3.3 Location 3: Hopetoun Circuit**

The following figures show the preliminary design options proposed for the bus stop location at Hopetoun Circuit.
Preliminary cost estimates (GST Exc) for Location 3 Options A (ramp), B (split median) and C (median crossover) are $0.38M, $1.83M and $5.74M, respectively.
ES.4 Public Transport Functional Analysis

ES.4.1 Catchment Analysis

The standard methodology for defining the catchment around a bus stop or station in the ACT is to use a linear distance of 400m for regular bus services, or 750m for Rapid services (which reflects the fact that many people are willing to walk further to access high frequency services). These catchment boundaries are shown in Figure ES.11 (400m as pink, 750m as blue).

![Figure ES.11: 400m and 750m Catchment Boundaries of Proposed Stop Locations](image)

Analysis has been undertaken for both distances for each of the three proposed stop locations, and the residential population from the 2006 census. A similar analysis was made using estimates of employment, retail space and school students, which were developed by ESDD to inform their transport planning processes. Between 2006 and 2031, a 10% increase in employment, a 4% increase in retail space and a 1% decrease in school students is forecast in the catchment. Putting aside the potential Canberra Brickworks development, residential population growth is assumed to be negligible. This assessment recognises that there will be modest urban redevelopment leading to a growth in the number of dwellings, but this growth is likely to be offset by the trend to a smaller number of people in each dwelling.
ES.4.2 Existing and Future Routes Using Adelaide Avenue

The March 2012 ACTION bus network provides the following urban bus routes that travel along Adelaide Avenue:

- **Peak Only (Routes 111, 160, 161, 162, 225, 226, 227, 265, 267, 720, 732, and 770):**
  These routes only operate in the peak periods, and only in the peak flow direction (i.e. city-bound in the AM peak).

- **Blue Rapid Route 300 series (300, 312, 313, 314, 315, 318, and 319):** These routes combine to form a braided high-frequency service, the Blue Rapid, and have a substantial common route section from Belconnen to Tuggeranong.

- **Weekend Blue Rapid (900):** On weekends, the Blue Rapid from Belconnen to Tuggeranong is operated by a single route, the 900.

For 2031, the SPTNP details a proposed future bus network for the ACT. Only the AM peak network is provided in detail, and this suggests a total of 40 buses travelling inbound and 32 travelling outbound. The PM peak flow is assumed to be the reverse of the AM peak. This represents a 64% increase in AM peak bus volumes, and an 80% increase in the PM peak compared with the 2012 peak periods.

ES.4.3 Functional Requirements of Stops

The proposed stops have relatively straightforward requirements. The minimum continuous bus stop platform length is 41m to allow for two buses. Shelter space needs to be provided to a high standard. Bicycle facilities also need to be incorporated into the stop. Passenger information and way-finding will also be critical elements. Given the high-frequency of buses using Adelaide Avenue, the inclusion of a passing lane at the stops is essential to prevent buses queuing when the stop is in use by another vehicle.

ES.4.4 Vehicle Delays and Operational Costs of Diverting Buses in Stops

The diversion of buses into each of the new stops represents a small increase in travel distance, along with an increase in travel time. The increased travel time is of more interest, as it represents an operational cost for the bus network, but also a personal time cost for passengers already on the buses whose journeys will experience a small delay each time their bus accesses one of the stops.

Bus travel time delays, which measure the time taken for each bus to decelerate into the bus stop, dwell at the stop while passengers board, and accelerate to re-enter the traffic stream, were also assessed for each option. The comparative assessment suggested that Option B (split median) stops create the least delay. Option C (median crossover) stops, whilst similar to Option B stops, will have additional small delays, which are incurred due to lower speeds required and occasional stopping at the crossover locations. Option A (ramp) stops have the highest delay due to intersections at ramp terminals.
ES.4.5  Patronage Forecasts

Preliminary strategic transport modelling has been conducted to estimate the number of boardings and alightings that may occur at the new bus stops in the future, based upon the available catchment data.

The modelled boardings and alightings are shown in Table ES.1, along with the transfers, at each of the bus stop locations in the 2021 AM peak hour. It can be seen from the table that the bulk of the passengers boarding and alighting at the proposed stops are likely to be transferring to/from another bus.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Carruthers Street Bus Stop</th>
<th>Kent/Novar Street Bus Stop</th>
<th>Hopetoun Circuit Bus Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boardings (initial)</td>
<td>31</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>Boardings (transfer)</td>
<td>18</td>
<td>116</td>
<td>208</td>
</tr>
<tr>
<td>Alightings (transfer)</td>
<td>0</td>
<td>90</td>
<td>76</td>
</tr>
<tr>
<td>Alightings (final)</td>
<td>4</td>
<td>17</td>
<td>5</td>
</tr>
</tbody>
</table>

The modelled boardings and alightings, along with the transfers, at each of the bus stop locations in the 2031 AM peak hour are shown in Table ES.2. The 2031 scenario shows a similar pattern to 2021 whereby the majority of the boardings and alightings are made up of passengers transferring from/to other buses.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Carruthers Street Bus Stop</th>
<th>Kent/Novar Street Bus Stop</th>
<th>Hopetoun Circuit Bus Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boardings (initial)</td>
<td>14</td>
<td>37</td>
<td>68</td>
</tr>
<tr>
<td>Boardings (transfer)</td>
<td>97</td>
<td>145</td>
<td>129</td>
</tr>
<tr>
<td>Alightings (transfer)</td>
<td>45</td>
<td>117</td>
<td>36</td>
</tr>
<tr>
<td>Alightings (final)</td>
<td>5</td>
<td>21</td>
<td>5</td>
</tr>
</tbody>
</table>
The potential Canberra Brickworks re-development has not been taken into account in the modelling scenarios that produced the patronage forecasts presented here. If Government approval is given to proceed with the Canberra Brickworks and environs proposal, and the potential development occurs, then the patronage forecast for the Kent/Novar Street stop could potentially increase further. The possible introduction of parking charges into the West Deakin office precinct has also not been taken into consideration. If such changes were introduced, the patronage levels at Carruthers Street and Kent/Novar Street would likely increase.

ES.5 Selection of Preferred Option for Each Location

ES.5.1 Community Information Session 1

After the development of the concept design options for each of the identified bus stop locations, a Community Information Session (CIS) was organised by SMEC to present the options to the community and obtain feedback. This was the first of two scheduled information sessions, and was held at the Curtin Shops on 25 February 2012.

The CIS was a drop-in format that provided an opportunity for the community to view and provide feedback on the proposed options. A total of 43 feedback forms were received by the end of the CIS.

Immediately following the CIS there was a six-week feedback period, during which non-government stakeholders and the community were provided an opportunity to go online, view the displays (i.e. electronic version of the posters displayed during the CIS) and provide feedback either through the online feedback form or through email submissions. There were 22 responses using the online feedback form and 39 email submissions.

The common key issues raised by groups and individuals included:

- Effects on existing rapid services
- Effects on traffic flow, and the need for effective traffic design and management
- Ensuring the safety of pedestrians, cyclists and drivers
- Providing high quality access and linkages
- Implementing effective bus service timetables and arrangements
- Ensuring a cost-effective solution
- Protecting key vistas
- Reviewing and confirming patronage.

ES.5.2 Stakeholder Design Workshop

The preliminary options were also presented to the government stakeholders during the Stakeholder Design Workshop. The workshop was held on 14 May 2012, and attendees included representatives from the following government agencies:

- ESDD – Transport Planning
- ESDD – Communications
- ESDD – Design Policy
• EDD – Land Development Agency (LDA)
• TAMSD – ACTION
• TAMSD – Roads ACT
• TAMSD – Urban Treescapes
• National Capital Authority (NCA)

Each of the options was discussed, and outcomes of the initial community consultation were also discussed. MCA worksheets (explained next in ES.5.3) were provided to the agency stakeholders, and they were given about a week to submit their respective scores.

**ES.5.3 Multi-Criteria Analysis**

A Multi Criteria Analysis (MCA) process has been developed to compare each of the design options for each location. The intention is to provide guidance in determining which design option is preferred at each location. The MCA allowed agency stakeholders to assess the proposed options, for each location, considering a range of issues and criteria. The scores were then aggregated to determine the options with the highest scores.

It is important to note that this process only sought to determine a preference amongst options and that the process of assessing the overall viability of the proposed stops occurred during the Business Case development.

The following were the criteria included in this MCA process:

• **Development Criteria**
  - Development cost
  - Future compatibility with a possible light rail service
  - Construction complexity
• **Operational Criteria**
  - Minimising route time increases
  - Passenger safety
  - Road safety
• **Design Criteria**
  - Visual impact
  - Integration of inbound and outbound stops
  - Passenger comfort
• **Access Criteria**
  - Passenger access
  - Access for persons with visual or mobility impairment
  - Ease of use by cyclists

After receiving the completed MCA worksheets from the agencies, the scores provided, together with the SMEC scores, were aggregated to come up with a preferred option for each location.

Based on the aggregated MCA scores, Option C (Median Crossover Stop) was the preferred bus stop design option for all the identified locations but it was noted that this configuration was not supported by TAMSD-ACTION.
ES.5.4 Additional Stakeholder Consultations

Following the circulation of the aggregated MCA results, TAMSD-ACTION expressed concerns about the median crossover design, particularly about the safety at the crossover points for buses. A number of meetings and discussions were held to discuss ACTION’s concerns and advice was provided to ACTION about the successful experience with the median crossover configuration elsewhere, notably in Sydney. As a result, a preferred option for each location was agreed.

ES.5.5 Preferred Options

The preferred bus stop design options for Yarra Glen and Adelaide Avenue are as follows:

- Carruthers Street: Split Median Stop (Option B)
- Kent/Novar Street: Median Crossover Stop (Option C)
- Hopetoun Circuit: Median Crossover Stop (Option C)

ACTION has agreed to the Option C (median crossover) design at the Kent/Novar Street and Hopetoun Circuit locations after SMEC explained that there is not enough median space at these locations to have the Option B (split median) platforms directly opposite each other (i.e. they have to be separated by a considerable distance). Furthermore, it was noted that applying the Option B design to Hopetoun Circuit would involve complicated pedestrian access to the platforms, which could also have personal safety concerns.

Schematic illustrations of the Split Median Stop (Option B) and Median Crossover Stop (Option C) design options are shown in Figure ES.12 and Figure ES.13, respectively. These should provide a better understanding of how these bus stops would work and the different features included in the design.

![Figure ES.12: Schematic Illustration of the Split Median Stop Design (Option B)](image-url)
Plan and cross-section drawings for these preferred options have been refined for each specific location and are shown in the following figures.

**Carruthers Street: Split Median Stop**
Kent/Novar Street: Median Crossover Stop

Figure ES.15: Carruthers Street Preferred Bus Stop Design Cross Section

Figure ES.16: Kent/Novar Street Preferred Bus Stop Design Concept Plan
Figure ES.17: Kent/Novar Street Preferred Bus Stop Design Cross Section

Hopetoun Circuit: Median Crossover Stop

Figure ES.18: Hopetoun Circuit Preferred Bus Stop Design Concept Plan
ES.5.6 Community Information Session 2

The second of the two scheduled Community Information Sessions was organised by SMEC and was also held at the Curtin Shops on 25 August 2012. The purpose of this second CIS was to present the preferred bus stop design options to the community and obtain feedback via feedback forms and verbal comments.

Immediately following the second CIS there was a five-week feedback period, wherein the non-government stakeholders and the community were again given the opportunity to view online versions of the display boards and provide feedback, either via the online feedback form or through email submissions. There were 28 written responses received at the information session, and 18 submissions were received during the feedback period.

In general, the response was positive and many have expressed support for the preferred options, although a number of issues or key priorities have also been identified by the respondents. These are outlined below:

- Mitigating impacts on existing Rapid services
- Ensuring good access onto platforms, and a choice of access methods (notably ramps, stairs and possibly lifts)
- Ensuring efficient and safe access to bus stop locations from surrounding areas
- Minimising the visual impact of stops, ensuring high quality design for stops, and protecting Adelaide Avenue as a ‘main avenue’
- Ensuring effective connections to other services
- Ensuring the safety of bus drivers and commuters, pedestrians and cyclists
- Ensuring adequate bus stop facilities/amenities (i.e. parking, bicycle facilities and shelter)
- Confirming adequate patronage and Cost-Benefit Analysis of stops.
Features of the preferred bus stop design that the respondents most liked included the following:

- The central and accessible locations (proximity to surrounding areas)
- The access that the stops would provide to Rapid services

**ES.6 Urban Design**

**ES.6.1 Urban Design Considerations**

In designing each bus stop and associated landscaping, it is important to recognise the parkway setting at Yarra Glen and Adelaide Avenue, as a major approach route to the Parliamentary Triangle, and the proximity to houses and workplaces.

**ES.6.2 Landscaping Plans**

Landscaping design concept plans were prepared by dsb Landscape Architect for the preferred bus stop design options. Each of these plans reflect the surrounding landscape.

The Adelaide Avenue Bus Stops Landscape concept identifies with the transport movement along a significant parkway and town centre connector. The bus stops have a respect for the landscape form and structure and provide new landscape settings reflective of the landscape surrounds. The Adelaide Avenue Bus Stops are markers along the transition from the suburban to the National Capital.

Landscaping plans and artist’s impressions for the Carruthers Street, Kent/Novar Street and Hopetoun Circuit bus stops are shown in Figure ES.20 through Figure ES.25.

![Image](image-url)

*Figure ES.20: Proposed Landscaping Plan – Carruthers Street*
Figure ES.21: Carruthers Street Landscape Design Concept

Figure ES.22: Proposed Landscaping Plan – Kent/Novar Street

Figure ES.23: Kent/Novar Street Landscape Design Concept
ES.6.3 Heritage Assessments

After development of landscaping plans, and after an assessment of local trees, a specific heritage assessment was conducted for each proposed bus stop. The Heritage Assessment Report was submitted to the ACT Heritage Council, who then subsequently endorsed the findings of the report, which showed that there are no heritage constraints at any of the three investigated bus stop locations or along those portions of the Adelaide Avenue – Yarra Glen corridor.

ES.7 Business Case

The Business Case development involved the identification of the sources of the project costs and benefits, and the economic appraisal of the proposed bus stops. A separate economic analysis was undertaken for each of the proposed bus stop locations, so each stop can be assessed as a standalone project.
**ES.7.1 Sources of Project Costs**

The following are the four main components of the cost of constructing and operating the Adelaide Avenue bus stops:

- Capital cost of fixed infrastructure
- Recurrent cost of maintenance/operation of the fixed infrastructure
- Capital cost of mobile infrastructure (buses)
- Operating cost of mobile infrastructure (buses)

The cost estimates for the preferred bus stop design options were updated to include the cost of the proposed landscaping plans and these are shown in *Table ES.3*.

*Table ES.3: Updated Cost Estimates for the Preferred Options*

<table>
<thead>
<tr>
<th>Location</th>
<th>Cost (Excluding GST)</th>
<th>Cost (Including GST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carruthers Street Bus Stop</td>
<td>$3,540,000</td>
<td>$3,894,000</td>
</tr>
<tr>
<td>Kent/Novar Street Bus Stop</td>
<td>$3,285,000</td>
<td>$3,613,500</td>
</tr>
<tr>
<td>Hopetoun Circuit Bus Stop</td>
<td>$6,011,000</td>
<td>$6,612,100</td>
</tr>
</tbody>
</table>

**ES.7.2 Sources of Project Benefits**

Development of bus stops on Adelaide Avenue is consistent with the National Capital Plan and supports the Strategic Public Transport Network Plan (SPTNP). The stops deliver benefits to public transport users, and the broader community, including:

- Travel time savings (for current users of local routes who switch to the rapid routes on Adelaide Avenue)
- Mode shift (especially for private car to bus)
- Improved facilities at bus stops
- Reliability

Other smaller but nonetheless significant sources of benefits include:

- Reduced congestion
- Safety
- Environmental externalities including noise, air pollution, greenhouse gases etc.
ES.7.3 Economic Analysis Methodology

Economic analysis of the proposed Adelaide Avenue bus stops was undertaken using Cost Benefit Analysis (CBA), consistent with the Australian Transport Council (ATC) Guidelines of 2006. These guidelines provide a nationally-endorsed CBA framework for transport projects in Australia. The proposed Adelaide Avenue bus stops were compared against the Base Case of not constructing the bus stops, using a 20 year evaluation period with a 7% annual discount rate to convert future costs and benefits to their equivalent current value.

In addition, the sensitivity of the economic analysis to changes in costs, benefits, discount rates, evaluation periods and bus stopping patterns was assessed.

ES.7.4 Results of Economic and Financial Analysis

As mentioned earlier, the results of the economic and financial analysis are presented separately for the preferred design option at each of location. A summary of the economic analysis results, showing the usual economic indicators (Benefit-Cost Ratio (BCR) and Net Present Value (NPV)), is presented in Table ES.4.

Table ES.4: Summary of Economic Analysis Results (20 years, 7% discount rate)

<table>
<thead>
<tr>
<th>Project/Location</th>
<th>NPV ($'000)</th>
<th>BCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carruthers Street Bus Stop</td>
<td>$711</td>
<td>1.2</td>
</tr>
<tr>
<td>Kent/Novar Street Bus Stop</td>
<td>$4,410</td>
<td>2.3</td>
</tr>
<tr>
<td>Hopetoun Circuit Bus Stop</td>
<td>-$817</td>
<td>0.9</td>
</tr>
</tbody>
</table>

The BCR is the ratio of project benefits to project costs. A value of 1 indicates that the benefits are the same as the costs. A BCR greater than 1 indicates that the economic benefits of the project are greater than the costs and the project is economically attractive.

The NPV also indicates the viability of the project. A NPV of 0 means that the benefits and costs are the same. If the NPV is greater than zero, the economic benefits are greater than the costs and the project is economically attractive.

The patronage forecasts which underpin the above NPV and BCR figures are based on the catchment analysis discussed earlier. If new developments occur within the catchment, or if other conditions changes (such as increased parking costs) then the economic indicators will also change.

ES.7.5 Impacts and Risks

The project will have positive environmental effects resulting from a shift in travel mode from private car use to public transport. In terms of possible adverse environmental effects, the project only involves localised works in existing road reserves where the ground and habitat is already disturbed. There would be a very small noise effect associated with buses decelerating and accelerating at the new bus stops.
The social impacts of the project would be small but positive. As part of the overall improvement of public transport services, the project would reduce social disadvantage through improved accessibility to employment, educational and social opportunities, and human services. Greater use of public transport would also have social/health benefits resulting from increased physical activity walking to and from bus stops.

The situation in terms of major risk categories is:

- **Budget Overruns and Schedule Delays**: The project involves a short section of road (bus lane) modification, pedestrian walkways, bus stops and user facilities at three locations. Each site has specific and potentially complex design and construction issues in terms of traffic management during construction (both on the bus lane and local streets), site access, provision of services, etc. However, the associated risks can be mitigated by careful attention to design and project management planning during the detailed design stage of project development. Overall, the risk of budget overruns and schedule delays is considered to be medium and that there is potential for some impact on the project. However, with prudent attention to contractual issues, it is not expected to involve any significant engineering or project management challenges that would produce a high overall risk of budget over-runs or schedule delays.

- **Non-Integration with Existing Systems/Facilities**: The project has been specifically designed to integrate with the existing Adelaide Ave bus lane; the existing traffic management system; and the regional cycle network. If the projects proceed as planned, the risk probability and potential impact on the project are low.

- **Lack of Availability of Expertise, Equipment or Materials; and Industrial Disputes**: These potential risks could be managed through firm advance supply contracts in place, and prudent contract and project management. With these measures in place, the risk probability is low, but there is some potential for impact on the project. The overall risk rating is assessed as low.

- **Environmental and Social Issues**: No significant adverse environmental or social issues have been identified in the preliminary issues scan that cannot be managed and mitigated through consultation with NCA and Environment ACT, and an ongoing community consultation process. As noted above, the project involves localised works in existing road reserves where the ground and habitat is already disturbed. As a result, the risk probability and potential impact on the project are low.

- **Construction Logistics and Safety Risks**: This set of projects will need to be constructed in the middle of a busy road. This situation can create logistics problems and safety risks to the people undertaking the works. However, similar works are regularly undertaken safely around Canberra and elsewhere around Australia. Key ingredients for management of risk will include:
  - Strict compliance with all Work Health and Safety legislation by contractors
  - Only accept tenders from contractors with proven safety track records
  - Submission of a construction work plan with each tender, including arrangements for delivery of materials
  - Robust contractor supervision

With a mix of low and medium risks, this is considered to be a low-medium risk project.
ES.7.6 Summary of Business Case Findings

The key findings of the Business Case analysis are:

- The Kent/Novar Street location provides the strongest economic return to the community, followed by Carruthers Street
- Construction of the proposed bus stop at Hopetoun Circuit is not economically attractive (unless there were to be significant changes in the catchment)
- Most of the overall benefits accrue to users of the new stops from the value of savings in travel time and improved facilities at the stops
- Additional cost, safety and environmental benefits also come from the effect of mode shift to public transport and the resulting car use reduction
- The results are generally robust, but the analysis also highlights the sensitivity of the economic viability to the stopping pattern of bus services (i.e. if a high proportion of bus services stop at the proposed new bus stops, then the delays to through passengers can adversely impact the project benefits significantly)

ES.8 Conclusions and Recommendations

This study investigated the feasibility of having bus stops on Adelaide Avenue at three, pre-identified locations – Carruthers Street, Kent/Novar Street and Hopetoun Circuit.

Three concept design options were developed for each location. After undertaking a multi-criteria analysis process and extensive consultations with the community and key stakeholders, the preferred bus stop “design options” are as follows:

- Split Median Stop (Option B) for Carruthers Street
- Median Crossover Stop (Option C) for Kent/Novar Street
- Median Crossover Stop (Option C) for Hopetoun Circuit

Close to the end of the design process, the preferred options were then re-presented to the community. Feedback was generally positive and supportive of the options, although there were still some issues raised that can be managed in the next stage of the project.

The bus stop cost estimates (including 40% contingency and excluding GST) for the three locations are as follows:

- Carruthers Street: $3.5 million
- Kent/Novar Street: $3.3 million
- Hopetoun Circuit: $6.0 million

A Business Case was developed and included an economic analysis, which indicated that the bus stops at Carruthers Street and Kent/Novar Street, each as a standalone project, is economically attractive. The bus stop at Hopetoun Circuit is not considered economically attractive unless there are significant changes in the surrounding urban catchment area.
Based on the outcomes of this study, the following are recommended:

- **Construction of the proposed bus stop at Kent/Novar Street using the preferred design option:**
  This project should be co-ordinated with EDD-LDA in relation to the proposed Canberra Brickworks redevelopment, which is subject to Government approval, in order to establish the exact location of the bus stop.

- **The construction of the proposed bus stop at Carruthers Street, while economically feasible (albeit marginal), should be delayed until the success of the Kent/Novar Street stop can be more accurately quantified. The economic viability of the Carruthers Street stop should then be reassessed using this more accurate data.**

- **No more than half of the Rapid routes using Adelaide Avenue should be scheduled to stop at the new stops. Otherwise, delays to existing users will outweigh the benefits for users of the new stops.**

- **Consider detailed investigations on the performance of adjacent intersections surrounding the bus stops to improve pedestrian and cyclist accessibility to the new bus stops and also to improve vehicle safety and capacity.**

- **Consider an investigation into the existing pedestrian and cycle network in the suburbs around the new stops to ensure that these networks allow good access, especially to the new stops.**