Hobart City Deal Southern Projects Sub-Project 2: Macquarie Street and Davey Street Bus Priority

Concept Design Report

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Revision B

Department of State Growth

Tasmanian Government

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Document revisions

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EXECUTIVE SUMMARY

The Greater Hobart region's population and employment growth are putting increased pressure on its transport network. The growth of residential areas in Kingborough and the Huon Valley creates commuter pressures on the Southern Corridor (comprising Kingston, the Southern Outlet, and the Macquarie/Davey Street couplet) between Kingston and Hobart.

The Hobart City Deal Southern Projects seeks to encourage modal shift in favour of public transport to address congestion and accessibility issues along the Southern Corridor. The Project is comprised of five sub-projects that together provide a comprehensive, multi-faceted approach.

The subject of this report is Sub-project 2(SP2) the Macquarie Street and Davey Street bus priority works.

The scope of this phase of the project includes planning investigations comprising desktop assessments of environmental & heritage, traffic investigation, and geotechnical issues, development of concept design drawings, and development of P50 / P90 cost estimates.

All concept options described within this report were developed with the following design standards:

- Austroads Guide to Road Design Part 3: Geometric Design
- Austroads Guide to Road Design Part 4A: Un-signalised and Signalised Intersections
- Austroads Guide to Road Design Part 4C: Interchanges
- Austroads Guide to Road Design Part 6: Roads Design, Safety and Barriers
- Austroads Guide to Road Design Part 5: Drainage General and Hydrology Considerations
- Austroads Guide to Road Design Part 5A: Drainage Road Surface, Networks, Basins and Subsurface
- Austroads Guide to Road Design Part 5B: Drainage Open Channels, Culverts and Floodways
- Local Government Association of Tasmania (LGAT) Standard Drawings
- AS1742-2014 Manual of Uniform Traffic Control Devices

- AS2890-2019: Parking facilities On-street parking
- Department of State Growth Standard Specification for Professional Services; and
- Vicroads Traffic Engineering Manual Volume 3 Part 219 Accessibility DDA Guidelines.

The P50 P90 cost estimates for the preferred options are summarised below:

Macquarie and Davey Streets Bus Priority

Base Estimate	P50 Total Outturn Cost	P90 Total Outturn Cost
$5,751,900	$7,051,900	$7,851,900

1. Introduction

1.1 Background

The Greater Hobart region's population and employment growth are putting increased pressure on its transport network. The growth of residential areas in Kingborough and the Huon Valley creates commuter pressures on the Southern Corridor (comprising Kingston, the Southern Outlet, and the Macquarie/Davey St couplet) between Kingston and Hobart.

The Hobart City Deal Southern Projects (the Project) seeks to encourage modal shift in favour of public transport to address congestion and accessibility issues along the Southern Corridor. The Project is comprised of five sub-projects that together provide a comprehensive, multi-faceted approach:

- Sub-project 1: Southern Outlet Transit Lane – Concept design for a northbound Transit lane on the Southern Outlet between Olinda Grove and Hobart/Macquarie Street. The lane will operate as a T3 lane for use by buses, private vehicles carrying three or more occupants, taxis, and emergency service vehicles
- Sub-project 2: Macquarie/Davey Bus Priority – Concept design for bus priority measures on Macquarie and Davey streets that considers how to optimise bus operations while managing impacts
- Sub-project 3: Kingborough Park-and-Ride – Concept design for park-and-ride facilities at two locations in the Kingborough municipality. The scope of work includes selecting two locations and developing any specific attributes of the facilities in collaboration with stakeholders. At the time of this report, two sites had been chosen – Browns Road, Firthside and Huntingfield terminus
- Sub-project 4: Bus service plan for Southern Corridor – Developing a park-and-ride bus service model to support the two Kingborough park-and-ride facilities (sub-project 3), the Southern Outlet transit lane (sub-project 1), and the bus priority measures proposed for Macquarie and Davey Streets (sub-project 2). The bus service model will be focused on encouraging modal shift to public transport with the potential for new buses, bus routes, and stops; and
- Sub-project 5: Southern Outlet Transit Lane – T3 Enforcement – Concept design and a concept of operations plan for the proposed T3 lane on the Southern Outlet (sub-project 1), including the recommended locations of enforcement devices, as well as technological and legal considerations.

The subject of this report is Sub-project 2: Macquarie/Davey Bus Priority – Concept design for bus priority measures on Macquarie and Davey streets.

1.2 Location

The project extends along Macquarie Street from the Southern Outlet to Elizabeth Street and along Davey Street from the Southern Outlet to Murray Street as shown in red in Figure 1 below.

Macquarie Street and Davey Street are a primary one-way arterial couplet that travels in the north-east and south-west directions through Central Hobart. They serve two primary traffic movement purposes:

- Facilitating movement through the Hobart CBD, connecting the Southern Outlet to the Tasman and Brooker Highways;
- Distributing and collecting traffic from the Highway system to Hobart's one-way street grid.

Both purposes are important to the function of the traffic network and are well utilised. The characteristics of the both streets are further described below in Section 1.4.

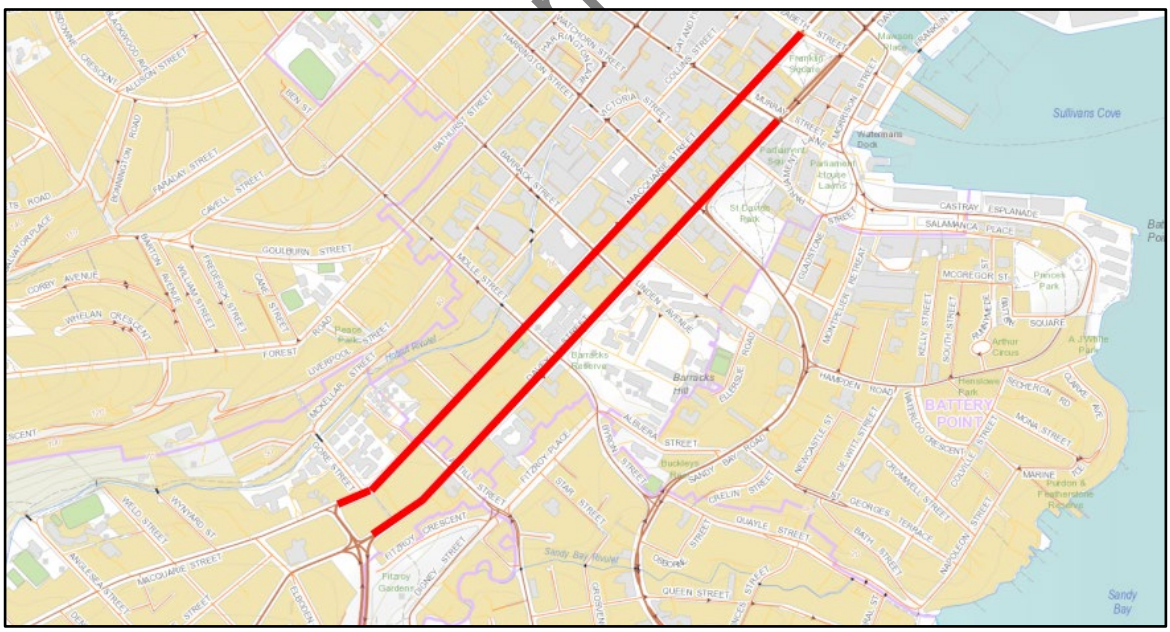

Figure 1 - Locality Plan

1.3 Objectives and Constraints

1.3.1 Project Objectives

The overall objectives of the Hobart Transport Vision – Southern Projects project are to:

- Achieve modal shift for commuters using the Southern Outlet
- Improve public transport travel reliability along the Southern Outlet corridor
- Encourage multiple occupancy of private vehicles during peak periods of travel; and
- Improve public transport passenger experience for Kingborough and Huon residents.

The key anticipated project benefits include:

- Improved public transport passenger experience for Kingborough and Huon residents
- Improved public transport travel reliability along the Southern Outlet and Macquarie/Davey streets
- Improved bus operations along Macquarie and Davey streets
- Better utilisation of transport infrastructure to address congestion
- Increased capacity along the Southern Outlet corridor; and
- Providing long-term solutions to meet future demand and address road safety related issues.

1.3.2 Report Objectives

This report documents the design options considered in developing the functional design for the proposed bus priority measures on Davey Street and Macquarie Street and presents a recommended Concept Design for the State's consideration. The objectives of this report are to:

- Describe the recommended Davey / Macquarie project
- Describe the transit priority design options that have been investigated
- Describe the advantages and constraints of the project; and
- Make reference to other investigations and activities which have been conducted as part of this project.

1.3.3 Project Constraints

The project objectives are to be delivered within the following constraints:

- Compliance with all relevant environmental, heritage and planning legislation
- Community and local government acceptance
- Deliver within the project budget; and
- Deliver within the project timeframe.

1.4 The Existing Road and Roadside Environment

1.4.1 Macquarie Street

Macquarie Street is a Category 1 State Road which has the function to be the primary freight and passenger road. It is predominantly a one-way road travelling in the north-eastbound direction, except in Franklin Square (between Murray Street and Elizabeth Drive) where it becomes a two-way road for buses, taxis, bicycles and permitted vehicles only. South/west of its intersection with the Southern Outlet it also has two-way travel.

For the most part (within the study area), Macquarie Street has three travel lanes with turn lanes, footpaths, kerbside parking, bus zone and loading zones permitted on both sides of the road. The road width varies between 14.3 metres to 15.2 metres along the one-way sections and measured at 19.4 metres at the two-way section. The narrowest section is found between Antill Street and Molle Street located further south of the project area. The posted speed limit on Macquarie Street is 50 km/h.

1.4.2 Davey Street

Davey Street is a Category 1 State Road which has the function to be the primary freight and passenger road. Within the project area, it is a one-way road travelling in the south-westbound direction up to the Southern Outlet. South/west of the Southern Outlet, it has two-way travel.

For most part, Davey Street has four travel lanes with turn lanes, footpaths, kerbside parking, bus zone and loading zones permitted on both sides of the road. The road width varies between 17 metres to 18.5 metres. The narrowest section is found between Antill Street and Barrack Street. The posted speed limit on Macquarie Street is 50 km/h.

1.5 Project Scope

The scope of this project includes:

- The development of a concept design for an eastbound and westbound bus lane on Macquarie Street and Davey Street, respectively, between the Southern Outlet and Murray/Elizabeth Street providing the necessary modification opportunities on the carriageway.
- The Concept Design Report, which describes how consideration of traffic impacts, bus operations, road safety issues, stakeholder engagement, environmental, heritage, planning and geotechnical requirements and constraints, the engineering survey including utility services location, road upgrade requirements, and cost estimates – both capex and opex - informed the Concept Designs.
- Concept Design drawings and a Concept Design Report that includes the attributes of the proposed bus lanes, as well as other improvement opportunities for the corridor that support the project objectives.

2. Strategic Context

2.1 General

The Tasmanian Government has made a commitment to addressing growth through the Greater Hobart Traffic Solution (2018–2023) and Hobart City Deal (2019–2029). The Hobart City Deal is a shared 10-year vision between the Australian and Tasmanian governments and local councils, including Hobart and Kingborough councils, to guide and encourage investment to build a vibrant, liveable and connected global city.

The Hobart City Deal reflect the Tasmanian Government commitment to address the current network challenges. The Project is part of a funded program of projects including:

- $20 million for Kingborough transport infrastructure, including creating new park and ride(s) and improvements to the Kingborough bus interchange
- $35 million for a Southern Outlet transit lane, and
- $16 million for Macquarie and Davey Street bus priority (this project).

The Tasmanian Government's Hobart Transport Vision (the "Vision") is a holistic plan that seeks to prioritise active and public transport modes to provide a reliable and cost-effective alternative transport system with a focus on prioritised rapid passenger transport as a competitive alternative to private car travel. The sub-projects are consistent with the Vision. They are also an opportunity to create synergies between Kingborough Council, the City of Hobart, the Department of State Growth, and the Royal Automobile Club of Tasmania (RACT), among other stakeholders, on a future vision for transport in Greater Hobart.

2.2 Planning Studies

The need for bus priority on Macquarie and Davey Streets was established in the Hobart Transport Vision and Hobart City Deal, as described above.

Davey and Macquarie Streets Options Review (GHD, July 2018)

In 2018, the City of Hobart, in collaboration with the Department of State Growth, engaged GHD to review opportunities for providing bus priority and other improvements for the Macquarie Street and Davey Street corridor through the Hobart CBD. The review was done with consideration of the impact of recommended treatments on different road user groups, and the physical and operational constraints.

The study identified the removal of parking and/or road widening to accommodate bus lanes or additional traffic lanes. The recommended solution was the timed (peak period) removal of parking and application of bus/high-occupancy vehicle priority in the peak direction (i.e. northbound on Macquarie Street in the AM peak). The need for bus priority on Davey Street is considered lower.

Recommended short-term actions include signal coordination improvements, rationalising bus stops and extending clearways for turning movement queue storage.

Hobart South Bus Priority Study (WSP, September 2019)

Department of State Growth commissioned WSP to review the previous bus priority proposals and to develop a strategic options analysis that considered the suitability of the various bus priority options on the Southern Outlet, Macquarie Street and Davey Street.

The analysis of the current bus timetable identified operating speeds well-below the desired level on the Macquarie Street and Davey Street corridors. GoogleTraffic confirmed the presence of traffic congestion, with the northbound/eastbound direction having the slowest speeds in the AM peak and the southbound/westbound direction on Davey Street having the slowest speeds in the PM peak. Potential bus priority options to address these issues include:

- Bus lanes or transit-lanes (e.g. T2 or T3) and/or clearways
- All-day, or timed AM peak period or AM and PM peak period
- Positioned in the kerbside lane or second lane (from the left).

It is clear there is a strategic intent from the State Government to encourage bus use on key corridors, and support for bus priority on the Southern Outlet, Macquarie and Davey Streets to compliment planned park-and-ride in the Kingston area. Given the Government's intent to strongly promote bus use priority measures targeted at buses (rather than general traffic improvements such as clearways alone) should be pursued.

This suggests full-length bus lanes ought to be the final outcome, but the report recommends a staged implementation. It identifies the problems buses are facing from traffic congestion at specific locations on the corridor to be incorporated in the final design. A suite of targeted bus priority measures have followed that, over time, combine to form a prominent bus priority corridor that provides real priority over general traffic. A strategic reference sketch was produced as part of the report, which was used as the starting point for the concept design process.

3. Design Inputs

Both Davey Street and Macquarie Street are developed urban roads that are constrained by buildings on either side. Footpaths are provided on both sides of the road and typically fully paved from the boundary to kerb. To maintain these amenities and avoid acquisition of properties, the proposed bus lane must fit within the existing cross section. This can be achieved by changing lane configurations and widths.

A review of the existing alignment and existing road cross section found that it is below current standards with departures from standards for horizontal alignment, barrier types and offsets, lane widths and unprotected hazards in the clear zone. The lane widths vary significantly along both Davey Street and Macquarie Street and do not appear to be optimised for the available cross section. While these reduced lane widths cannot be increased in the Concept Design, the lane widths and configurations are improved by applying functional specifications to the corridor using a hierarchal approach. This type of approach prioritises safety and operations by consistently applying lane reductions in a predetermined order of importance. This hierarchy is detailed in Section 3.3 . Departures are listed in Section 5 of this report.

3.1 Standards and Guidelines

The concept design options are developed in accordance with the current guidelines and standards listed below.

Austroads

- Austroads Guide to Road Design Part 3: Geometric Design
- Austroads Guide to Road Design Part 4A: Un-signalised and Signalised Intersections
- Austroads Guide to Road Design Part 4C: Interchanges
- Austroads Guide to Road Design Part 6: Roads Design, Safety and Barriers
- Austroads Guide to Road Design Part 5: Drainage General and Hydrology Considerations
- Austroads Guide to Road Design Part 5A: Drainage Road Surface, Networks, Basins and Subsurface; and
- Austroads Guide to Road Design Part 5B: Drainage Open Channels, Culverts and Floodways.

Standards Australia

- AS1742-2014 Manual of Uniform Traffic Control Devices.
- AS2890-2019: Parking facilities On-street parking

State Growth

- Standard Specification for Professional Services.

VicRoads

- Vicroads Traffic Engineering Manual Volume 3 Part 219 Accessibility DDA Guidelines.

3.2 Design Speed

The design speed of 50km/h has been adopted with departures where appropriate.

3.3 Typical Cross Section

The proposed design reallocates road space to balance the needs of public transport, walking, and cycling. This approach prioritises safety and operations by consistently applying a set of functional requirements within the cross section in a predetermined order of importance. This approach is summarised in Table 1 with commentary and references in the following sections.

Priority	User	Requirements	Desired Width	Minimum Width
1	Bus Lane	Continuous lane offset one lane from left kerb	3.5m 4.2m (shared with bicycles)	3.2m
2	Through traffic	2 travel lanes – Macquarie St 3 travel lanes – Davey St	3.5m	3.0m
3	Turning traffic	Kerbside turning lane approaching every intersection	3.2m	2.9m
4	Bicycle Lane	Davey Street only between Sandy Bay Road and Linden Avenue	1.5m + buffer	1.2m
5	Kerbside (parking and bus stops)	Left side (bus stops) Right side (no bus stops)	3.0m 2.6m	2.0-2.6m* 2.0-2.3m*
6	Footpath Widening		Existing	

**Minimum parking lane widths only suitable where adjacent lane is not also minimised*

Table 1 – Functional requirements

3.3.1 Bus Lane Width

Austroads Guide to Road Design Part 3 Table 4.3 recommends that a HOV lane shall be between 3.5m to 4.5m. Table 4.23 states that the minimum width of a bus lane that can be shared with cyclists is 3.7m (60km/h) or 4.2m for bus lane and separated on-road bicycle lane.

As the project is in an existing constrained urban road so the widths for road bus lanes on new roads in Table 4.22 do not apply.

A desirable bus lane width of 3.5m has been adopted, to be increased where space is available to better accommodate cyclists.

3.3.2 Through Traffic Width

Austroads Guide to Road Design Part 3 Table 4.3 recommends a lane width of 3.5m for urban arterial roads. For low speed roads with low truck volumes 3.0m to 3.4m is also recommended. A desirable width of 3.5m is adopted with a minimum of 3.0m.

3.3.3 Turning Lane Width

Austroads Guide to Road Design Part 3 Table 4.3 recommends a lane width of 3.5m for urban arterial roads. Given that the turn lanes are low speed, these lanes are reduced in width more than the through lanes and are lower priority. Desirable value of 3.2m and a minimum of 2.9m is proposed due to the highly constrained corridor width.

3.3.4 Bicycle Lane

Austroads Guide to Road Design Part 3 Table 4.18 recommends a desirable minimum of 1.5m with 1.2 to 2.5m being an acceptable range. A bicycle lane is proposed for the hill climb between Sandy Bay Road and Linden Avenue; a 1.8m lane is proposed, which exceeds the minimum and could potentially allow for the use of a physical separator, such as flexible delineators, between the bicycle lane and adjacent bus lane. A physical separator is considered highly desirable in this location and should be explored during detailed design.

3.3.5 Kerbside Parking

Australian Standard AS2890.5 Table 3.1 recommended a parking width of 2.0 to 2.3m for 50km/h with no safety buffer.

For this project, bus stops and off-peak parking are provided on the left-hand side of the road and in these instances a wider lane is required. A 3.0m desirable width and 2.6m minimum is proposed in these instances.

On the right-hand side of the road a 2.6m desirable width is adopted but a 2.0 to 2.3m minimum width is proposed.

3.4 Horizontal Alignment Lateral Shifts

The design lane widths vary block to block on Macquarie Street and Davey Street which require lateral shifts along the travel lanes. This is typical of constrained urban environments where driver alertness is high.

The length of lateral shift (taper length) is dependent on the speed and the width of the shift. A rate of lateral movement has been adopted which has then been used to calculate the taper length for the operating speed of 50km/h. For the concept design, it is assumed that adopting the diverge rate of 1.0 m/s is appropriate as per Austroads Guide to Road Design Part 3 Section 9.9.2.

3.5 Vertical Alignment

The existing vertical alignment was adopted in this Concept Design. Macquarie Street and Davey Street are kerbed urban environments and the vertical alignment of these roads cannot be changed without significant impact to surrounding buildings. This is outside the scope of this project.

3.6 Sight Distance

Existing sight distance values are adopted in the Concept Design. The intersections and approaches to intersections are not undergoing significant changes that would worsen these values. It is recommended that items such as vegetation are reviewed in Detailed Design to ensure sights lines are maximised.

4. Concept Design Options

The Concept Design drawings are provided in Appendix A. The proposed design approach on Macquarie Street and Davey Street is as follows:

- Reallocate road space to balance the needs of public transport, walking, and cycling with the corridor's traffic movement function with appropriate priority in each segment;
- Design the corridor to meet the changing needs as a movement or place corridor as it varies along its length;
    - Focus on traffic movement and access on the southern end where the corridor connects to the Southern Outlet, Antill Street, and Molle Street;
    - Higher priority for access (bus stops, footpaths, and parking) and place on the northern end where the corridor provides access to key activity areas, including Salamanca Place and Elizabeth Street.

4.1 Design considerations

The design team used the November 2019 WSP Strategic Sketch (see 2.2 Planning Studies) as a basis of design. A design workshop was held with the Department of State Growth Internal Working Group, WSP, and Pitt & Sherry on 3 February 2020. During the design workshop, the consultant team presented options based on the strategic sketch, project objectives, and considerations for the project as shown in Figures 2 and 3.

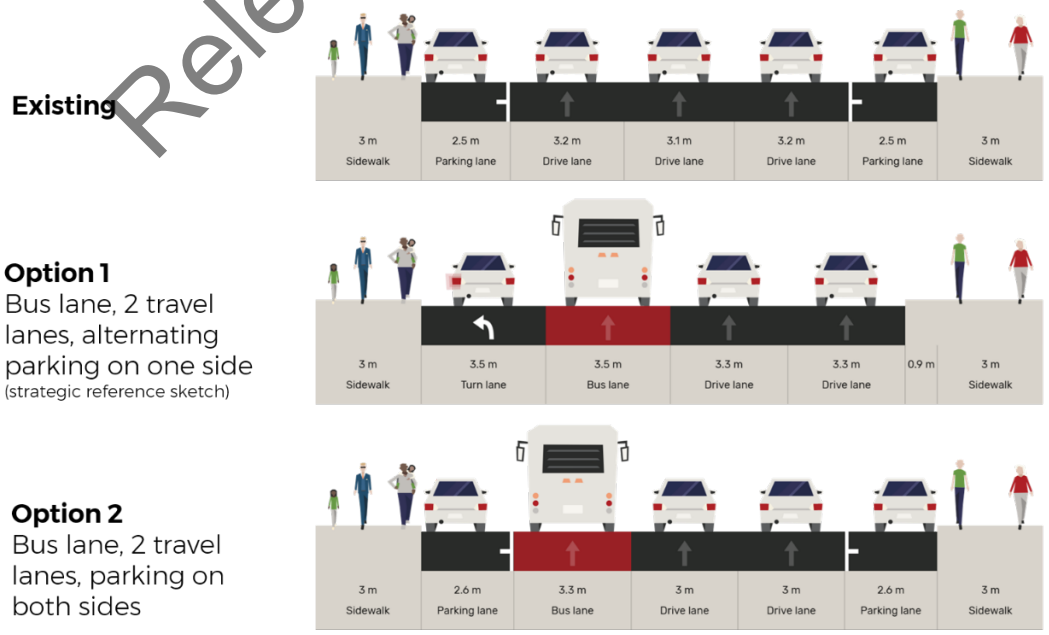

Figure 2 – Macquarie Street design considerations

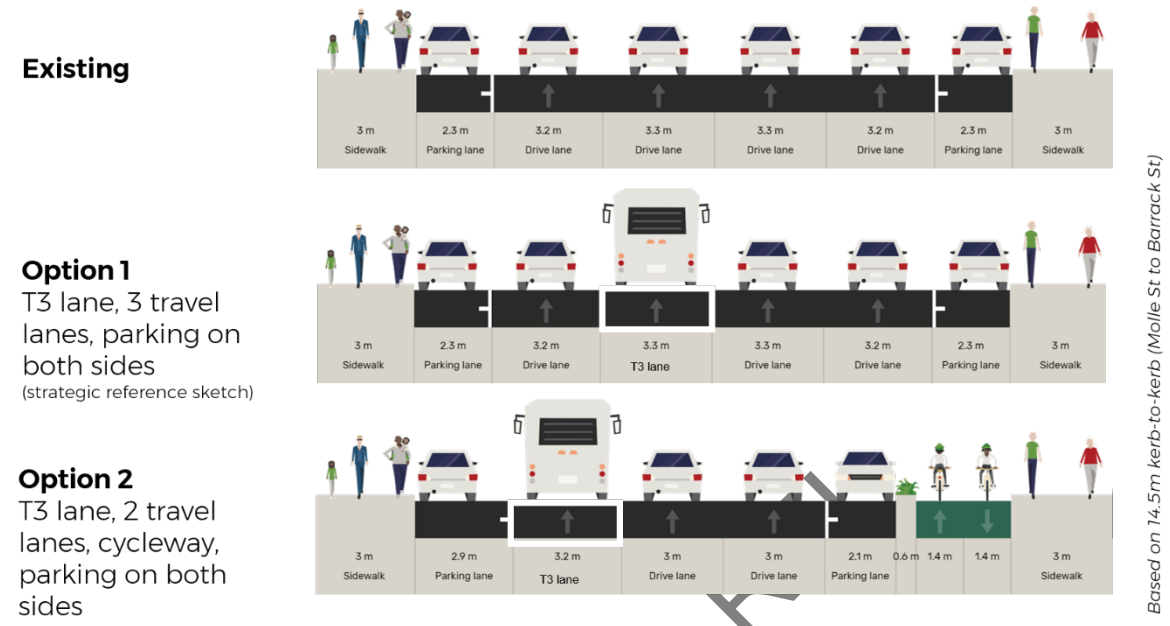

Figure 3 – Davey Street design considerations

The following key outcomes came from the Design workshop discussions:

Macquarie Street

- Proceed with Option 2 as the basis of design to maintain more parking along corridor. Need to consider lane widths required for freight movements;
- Add street trees where possible to parking lanes;
- Consider footpath widenings at bus stops to reduce conflict between high pedestrian flows and many people disembarking from buses in the morning.

Davey Street

- Proceed with Option 1 as the basis of design to maintain three general lanes of traffic; Davey Street capacity is important to the current traffic network operational strategy.
- Include cyclist provision where it fits – consider one direction cycling or using footpath width;
- Consider changing Transit Lane to a Bus Lane - easier to enforce and clearer bus priority message;

4.2 Preferred design

Following the outcomes of the 3 February 2020 design workshop, WSP developed a set of functional requirements to balance the needs of public transport, walking, cycling, and traffic along the corridor. The functional requirements, summarised in Table 1, were then applied along the corridor to develop the preferred alignment for each block.

Following the development of the overall alignment, the design team reviewed each intersection and bus stop to identify further improvements to improve walking, cycling, and public transport access along the corridor. These spot treatments, including bus boarders, pedestrian kerb extensions, street trees, and a new signalised crossing on Davey Street are described in further detail in the following sections.

4.2.1 Macquarie Street

For Macquarie Street, the design proposes to re-line mark and allocate the northernmost travel lane for exclusive bus lanes (3.5 metres wide), leaving the other two through lanes for general traffic. The capacity of turning lanes at the approach to intersections has been reviewed as part of this project, with additional or longer clearway/no-standing restrictions proposed to service the high demand of turn movements at some locations. On-street parking lanes will either be formalised or removed to suit the road width at various locations, and to ensure a bus lane and two general traffic lane are always available throughout.

4.2.2 Davey Street

For Davey Street, the design proposes to re-line mark and allocate the southernmost travel lane for exclusive bus lanes (3.5 metres wide), leaving the other two-to-three through lanes for general traffic. The capacity of turning lanes at the approach to intersections has been reviewed as part of this project, with additional or longer clearway/no-standing restrictions proposed to service the high demand of turn movements at some locations. Davey Street between Harrington Street/Sandy Bay Road and Barrack Street/ Linden Avenue incorporates a bicycle climbing lane along the southern kerbside. A new signalised intersection is proposed for the intersection of Davey Street and Salamanca Place to improve pedestrian accessibility and safety.

4.3 Public Transport

The concept design includes bus lanes, changes and improvements to existing bus stops, and bus boarders - as detailed below - to support bus operations and passenger experience along this core bus corridor.

4.3.1 Bus lanes

Bus lanes are proposed on Macquarie Street between Antill St and Elizabeth St and on Davey Street between Murray St and Antill St. The bus lanes are proposed as permanent full-time (24/7) bus lanes. The benefit and reasons to providing 24/7 bus lanes:

- 24/7 bus lanes are easy to understand, regulate, and enforce
- Designates all-day space for emergency vehicles, motorcycles, and bicycles, and buses
- The bus flows on Macquarie Street and Davey Street fit in the bus flow warrants, especially after the introduction of new services.

4.3.2 Bus stop changes and improvements

This project aims to improve the location and quality of bus stops along Macquarie and Davey Streets in order to increase patronage and encourage bus use. This includes a review of bus stop locations and improving the level of passenger amenity, shelter space, lighting, and passenger information at bus stops along the corridor.

Modification to bus stop locations as part of the Concept Design include:

- Removal of bus stop on Macquarie Street, east of Antill Street – as this area is serviceable by the bus stop west of Antill Street and East of Molle Street. The removal of this bus stop would also assist in ensuring the left turn traffic demand to Molle Street is well serviced.
- Consolidate bus stops on Davey Street east of Salamanca Place and west of Sandy Bay Road, to one bus stop proposed west of Salamanca Place.
- New bus stop on Davey Street between Antill Street and Southern Outlet to increase catchment for bus customers.

Additional details regarding improvements to two key bus stops are included below in 4.3.3 Bus boarders. Further analysis of the impact to these bus stop changes is outlined in the Traffic Impact Assessment (Appendix D). Amenities at all corridor bus stops should be reviewed and assessed during detailed design to determine additional improvements.

4.3.3 Bus boarders

In addition to the bus lanes, bus boarders (kerb extensions at bus stops) are proposed to improve bus operations and the customer experience at the busiest bus stops along the corridor:

- Macquarie Street between Trafalgar Place and Elizabeth Street
- Davey Street & Salamanca Place – far side of intersection
- Davey Street & Barrack Street – far side of intersection

The bus boarders are designed to be at least 35m in effective length, which comfortably accommodates two long rigid (14.5m) buses nose-to-tail or an articulated bus (19m) and a standard bus (12.5m). They are the full width of the kerbside lane and create designated space for bus passengers to alight from or wait/board the bus separated from the footpath.

The in-lane bus stop arrangement also has the benefit of removing the need to provide draw-in and draw-out manoeuvring space at the stop and the need for buses to wait for gap in traffic to leave the stop.

The two bus boarders on Davey Street include bus shelters with passenger information displays (amenities have not been included on the Macquarie St location as is an alighting-only bus stop).

4.4 Active Transport

4.4.1 Cyclists

The proposed concept design incorporates a bicycle climbing lane along the southern kerbside of Davey Street between Harrington Street/Sandy Bay Road and Barrack Street/ Linden Avenue where there is a steep gradient and a desired cycling connection to Molle Street and Barrack Street. This would separate cyclists from the bus lanes and general traffic lane to ensure efficient traffic flow at this section of road and improve safety for cyclists.

Bicycle storage boxes will be provided on Davey Street at the end of the hill climb at Barrack Street/Linden Avenue intersection and at Molle Street to allow cyclists to reach to the head of traffic queue and shift across from the kerbside travel lanes and avoid the traffic queue from the dominant left turn movement into the Southern Outlet.

Bicycles are permitted to ride in the proposed bus lanes. Given that bus lanes are not common in Tasmania, consideration should be given to the bus lane markings and associated signage during detailed design to ensure it is clear that cyclists are permitted.

4.4.2 Pedestrians

Pedestrian footpaths are available on either side of both Macquarie Street and Davey Street. Typically, the footpaths are fully paved from the boundary to the kerb line to maximise the path available for pedestrians and pedestrian crossings are provided at all intersections. The proposed concept design includes the following pedestrian upgrades:

- New signalised crossing at the intersection of Davey Street with Salamanca Place to improve accessibility/connectivity and safety at an existing high demand informal pedestrian crossing location.
- New kerb extensions at the following locations to improve pedestrian crossing distance and visibility:
    - Macquarie St & Molle St
    - Macquarie St & Barrack St
    - Macquarie St & Harrington St

5. Safety

A Road Safety Audit (RSA) has been carried out and is included in Appendix F of this report including the Designer's response. Many of the items identified in the RSA are existing non-compliances along Macquarie and Davey Streets and are typically driven by corridor width constraints.

Many items identified in the RSA were able to be resolved; however, some remain in the design. The typical types of safety issues identified in the RSA are summarised below. This list is not exhaustive, refer to Appendix F for the full list.

- Unprotected or partially protected hazards in clearzone
- Pedestrians not protected by barrier (Safe Systems Approach)
- Varying lane widths
- Lateral shifts
- Poor streetlighting
- Minor items to be resolved in future stages of design such as traffic lights being partially obscured by vegetation.

The scope of this Concept Design is the reallocation of road space to balance the needs of public transport, walking, and cycling with the corridor's traffic movement function. The project is not intended as an overall upgrade project of Macquarie Street and Davey Street. For example, to remove hazards of power poles within the clearzone would require either a safety barrier, or removal of the power pole, neither of which is feasible within this project. The Design Criteria adopted in the design is outlined in Section 3 of this report, the following sections list the main departures if applicable. Refer to the RSA for specific items.

The following issues and recommendations highlighted in the RSA should be further addressed during detailed design:

- Item 1.1– Consider reduction of the speed limit to 40 kph east of Barrack Street
- Item 2.2 – Recommend use of long-lasting thermoplastic line marking
- Item 3.8/3.10 - Consider undertaking a detailed street lighting investigation to determine if additional street lighting is required
- Item 3.14 – Consider reducing the cross fall grades on Davey Street between Molle Street and Antill Street
- Item 4.2/4.3/4.4/5.1/5.2/5.3/5.4 – Review the lateral shift of key intersections
- Item 6.2 - Ensure Retro Reflective Pavement Markers (RRPMs) are shown in accordance with local design guidelines and standards.

Additionally, the RSA identified some existing maintenance issues that should be addressed during construction or outside of this project:

- Items 2.3/2.4 – Not functioning streetlight luminaire
- Items 2.5/3.1/3.2/3.6/3.9/3.12/3.15/3.16 – Vegetation trimming to improve street lighting, conflicts with large vehicles, and safety
- Item 3.3/3.4 –Replace safety barrier with conventional safety barrier and improve linemarkings on Davey Street between Elizabeth St and Murray St (Outside of project area)

5.1 Horizontal Alignment

5.1.1 Lateral Shifts

The changes to lane widths and lane configurations results in many lateral shifts along both Macquarie Street and Davey Street. While this is not optimal road design, this is typical of a low speed arterial urban road. The rate of lateral shift does not exceed the maximum rate required for a diverge taper which is a comfortable rate of change for users. These lateral shifts will be reviewed in future stages of design and may be improved however, they cannot be eliminated.

5.1.2 Sight Distance

Existing sight distance values are adopted in this Concept Design. The intersections and approaches to intersections are not undergoing significant changes that would worsen these values. It is recommended that items such as vegetation are reviewed in Detailed Design to ensure sights lines are maximised.

5.1.3 Merge Taper

On Davey Street between Murray Street and Salamanca Place, a merge movement is required that does not currently meet Austroads minimums. For 50km/h a merge length of 80m is required however, approximately 40m is achieved.

5.1.4 Turns from side streets

Tighter turns are required from side streets onto Macquarie Street and Davey Street due to the proposed bus lanes at the following locations:

- Macquarie Street & Antill Street
- Macquarie Street & Molle Street
- Macquarie Street & Harrington Street
- Davey Street & Barrack Street
- Davey Street & Murray Street

Swept paths have been prepared in accordance with Austroads Guide to Road Design 4, Section 5.6.3 and are included as part of the Concept Design Drawings in Appendix A.

5.2 Cross Sections

An optimised cross-section has been provided in the Concept Design which follows a hierarchical approach. Details of the design criteria adopted in this project for each section is provided in Section 3.5 of this report and on the drawings.

There are many instances where desirable values for bus lanes, traffic lanes and on-street parking are not achieved. These are all detailed on the drawings in Appendix A.

5.3 Hazards and Roadside Barrier

There are many hazards within the clearzone on both Macquarie Street and Davey Street which are currently unprotected and are not proposed to be protected, relocated or removed as part of the proposed design works. An example of this is included in Figure 4 below. In this situation the existing power poles are positioned at the back of kerb and are unprotected. The offset and proximity to accesses results in no compliant barrier solution or space to relocate the pole away from the traffic lane. To resolve this issue, the power lines would need to be installed underground, which is outside the scope of this project.

Figure 4 - Power poles at Back of Kerb Example

The typical hazards are listed below:

Macquarie Street:

- Southern Outlet to Molle Street power poles on both sides
- Harrington Street to Murray Street, trees with trunk diameter greater than 150mm
- Light poles both sides full length.

Davey Street:

- Murray Street to Harrington Street, trees with trunk diameter greater than 150mm.
- Harrington Street to Southern Outlet, power poles on right side
- Light poles both sides full length.

In some instances where barriers are provided, the existing barrier system does not meet current standards including barrier types and connection types. It is not proposed as part of the Concept Design to upgrade these barriers however this was identified as an item in the RSA. An example of this is included in Figure 5.

Figure 5 – Existing Barrier Type does not meet current standards

Non-compliant sections of barrier are listed below:

Macquarie Street:

- Power pole located within the barrier deflection zone on left side of intersection of Southern Outlet and Macquarie Street

Davey Street:

- Non-compliant barrier in the median south of Elizabeth Street
- Non-compliant barrier on the right-hand side, south of Elizabeth Street

5.4 Lighting

Lighting is considered to be outside of scope for this project as it is not an overall upgrade project; however, it was identified as an item in the RSA.

5.5 Pedestrians

The proposal includes the installation of traffic signals at the intersection of Davey Street and Salamanca Place to cater the desirable walking route to/from Salamanca Place which provides direct access to commercial and tourism area including the wharf and Salamanca Market typically held every Saturday between 8:30am-3:00pm. A formalised pedestrian crossing at this location would therefore improve accessibility and safety at the location.

As per the existing conditions, the footpaths along the corridor are proposed to be grade separated from the adjacent traffic/bus lanes using kerb and gutter. The removal of on-street parking at some locations along the corridor due to the proposal may remove their subsidiary function as a separator between the footpath and traffic/bus lane.

The opportunity to provide barriers has been investigated, however not feasible with access to properties, bus stops and other kerbside uses likely to be adversely impacted. Thus, it is not proposed as part of the Concept Design to provide increased separation or barriers between footpath and traffic/bus lanes.

6. Design Implications

6.1 Land Use Planning

A Planning and Environment Report was undertaken and included a review of land ownership and planning requirements. This report is in Appendix E including plans.

The study area extends along Macquarie Street and Davey Street from the Southern Outlet to Elizabeth. Both streets are busy 3-4 lane, one-way roads, which service central Hobart. The north-east end of the study area is close to Hobart's Central Business District and is characterised by a mix of commercial and office uses, high density development with a range of old and newer buildings. The area currently experiences high levels of traffic congestion. As the study area moves south-west towards the Southern Outlet, the development is medium density with a mix of residential and commercial/office uses.

The development area is within the Hobart City Council local government area, and traverses land over which two planning schemes apply, including the:

- Hobart Interim Planning Scheme 2015, and
- Sullivans Cove Planning Scheme 1997

Further details including zoning are included in Appendix E.

6.2 Traffic and transport

The implication of the Proposal to road network performance, public transport accessibility and performance, property and local road accesses, and on-street parking are summarised in this section.

Overall, assessment of the proposed changes will have positive benefits to the Hobart transport network as it is likely to achieve the objectives and benefits listed in Section 1.3, particularly:

- More efficient and reliable bus services.
- Faster journeys for T3 transit vehicles compared to general traffic, thus encouraging the use of higher occupancy vehicles.
- Improved facilities for bicycles and pedestrians, with benefits of safer movement within Hobart CBD.

With the proposed bus lanes on Macquarie and Davey Streets, the project does change the capacity and performance of the road corridor. Details of impact of the Proposal to the road network performance are further detailed in the following sections and in Appendix D – Traffic Impact Assessment.

6.2.1 Road Network Performance

The following implications of the proposal to the road network performance are noted:

- Increased queuing and travel times on the Southern Outlet in the AM peak for general traffic.
- Minor increases in journey times on Macquarie Street and Davey Street for general traffic.
- Increased congestion on Davey Street, east of Salamanca Place and on Murray Street, north of Davey Street.

There are several measures that could be implemented to support the project and improve the performance of the road network for all users including:

- The expected take up of the new bus services will reduce traffic and reduce the magnitude of the impacts listed above. This can be enhanced by offering ticketing that encourages use for commuters who can use the services regularly.
- Shifting some trips to occur before (or after) the AM peak will result in significant reductions on congestion on the Southern Outlet. This can be achieved by encouraging businesses, Government departments and schools to stagger their start hours or through other Travel Demand Management strategies and communications. In addition, the Addinsight app will be available to the public to assist them in planning their journey and make them aware of the benefits of travelling away outside the peak period.
- Promote the new bus services and higher occupancy vehicle lane to local businesses to make CBD workers and shoppers aware of the new opportunities that may offer a better travel choice for their needs.
- Retiming of signals to match the new demand and improve traffic coordination.

6.2.2 Public transport

The proposed concept design will improve travel time and reliability for all the bus services that currently use the Macquarie and Davey Street corridor. Additionally, the proposed bus boarders will improve the quality of bus stops for bus customers.

6.2.3 Local Road and Private Access

The proposed design does not change access to any local roads, driveways, or properties along the corridor. The separation of bus lanes from general traffic lanes will be through line marking only.

Note that while the Tasmanian Road Rules 2019 only allow bus lanes to be used by public buses, motorcycles, emergency vehicles, and bicycles; there are a few exceptions to the rule including:

- crossing the bus lane to enter/leave the road (i.e. to abutting properties or side streets)
- avoid hazard in the adjacent general traffic lane
- overtake a vehicle turning right or making a U-turn from the centre of the road – not applicable to Macquarie Street and Davey Street bus lanes due to the one-way system on these roads.

These exceptions are limited up to a permitted distance of 100 metres, which would be adequate to carry out the above movements, thus resulting in no access impacts to affected properties.

6.2.4 On-street parking

The proposed design reviews the road space utilisation (kerb-to-kerb) and re-manage the priorities for bus services, active transport and high-demand turning movements to/from adjacent streets. As a result, the supply and location of kerbside parking will be affected by the proposal and is depicted in Table 2 below.

	Macquarie Street			Davey Street		
Total Spaces	**AM**	**Mid-day**	**PM**	**AM**	**Mid-day**	**PM**
Existing	159	187	183	164	178	163
Proposed	103	146	129	152	157	142
Change	-56	-41	-54	-12	-21	-21
Percentage in change	-35%	-22%	-30%	-7%	-12%	-13%

Table 2 – Proposal's impact to on-street parking

Overall, the proposal will reduce the on-street parking supply on Macquarie Street (by 22 per cent to 35 per cent) and Davey Street (by 7 per cent to 13 per cent). However, this will be offset by additional bus services and incentives for higher car occupancy (fewer cars per CBD employee) and therefore reduced demand for parking. Adopting parking policies that acknowledge the new balance between the travel modes, with more people using the bus and using the park and ride facilities would need to be considered to manage the implications associated with the loss of on-street parking.

6.2.5 Connections to the surrounding transport network

During the development of the Concept Design, the following issues and potential solutions were identified outside of the project area:

- **Macquarie Street between Elboden St and the Southern Outlet (west of the project area)** – The kerb-side lane is about 50m long on approach to the intersection with the Southern Outlet. Consider designating this lane as a bus lane to begin making users of the South Hobart section of Macquarie Street aware that a bus lane is implemented ahead. This would also give bus priority at this intersection.

- **Davey Street east of Murray Street** - Davey Street currently has three travel lanes east of Evans Street and the proposed design includes three general travel lanes west of Murray Street. However there are currently four travel lanes between Evans Street and Murray Street. The interaction of this changing number of lanes, in combination with the split-level road on Davey Street between Elizabeth Street and Murray Street, contributed to increased congestion east of Elizabeth Street in the traffic model.

  Consider extending project are to Evans Street and to show Davey Street Evans Street and Murray Street as a consistent three-lane configuration. The fourth lane could be allocated for exclusive turn lanes (trapped lanes), parking, or for streetscape improvements. This encourages vehicles to align in their preferred lane earlier to reduce lane changing due to merging either side of Murray Street.

6.3 Stormwater

6.3.1 Stormwater

A Concept drainage design is shown on the drawings in Appendix A.

The existing road drainage system is a pit and pipe system which collects water from the kerb. The Concept Design matches this design with the following modifications:

- Additional pits are proposed at kerb build-outs to reduce flow widths against the kerbs and barriers

6.3.2 Water Sensitive Urban Design Requirements

Stormwater management must satisfy the requirements of the Planning Scheme and the State Policy on Water Quality Management 1997. The state policy establishes the water quality parameters to be obtained.

The Planning Scheme requires that stormwater from new impervious surfaces must be disposed of by gravity to public stormwater infrastructure. No substantial increase in impervious area is expected in Concept Design.

6.3.3 Hydrology

The project area is within the Derwent Estuarine Catchment and the Hobart Stormwater catchment. The Concept Design does not impact hydrology.

6.4 Utilities

A Dial Before You Dig request was conducted, along with review of available Utility GIS information, and the data was digitised into a CAD format and shown on the drawings. A preliminary assessment of utility impact was carried out for the extents of SP2.

6.4.1 Macquarie Street and Davey Street

Water

At this stage no water services are identified as being impacted by the works. The tree pits shown on Davey Street may impact the water main on the northern side of the road however can be confirmed and rectified in future stages of design.

Sewer

At this stage no sewer services are identified as being impacted by the works. This should be confirmed in future stages.

Power

At this stage no power services are identified as being impacted by the works. This should be confirmed in future stages.

Gas

At this stage no gas services are identified as being impacted by the works. This should be confirmed in future stages.

Telecommunications

At this stage no telecommunication services are identified as being impacted by the works. This should be confirmed in future stages.

6.4.2 Natural Values

A Planning and Environment Report was undertaken. This report is in Appendix E of this report for details however is summarised below.

No Commonwealth or State listed threatened native vegetation communities and species have been recorded within the project area – a natural values assessment is not recommended.

6.5 Stakeholder Implications

Initial stakeholder consultation for bus priority on Macquarie Street and Davey Street has been conducted as part of the overarching engagement for the Hobart City Deal Southern Projects, as described below. Public display and further stakeholder engagement activities regarding the Concept Designs for Macquarie Street and Davey Street are planned for Early 2021.

Focus Group

On 18 November 2019, the Department of State Growth held a Focus Group with key external stakeholders in Hobart to discuss local issues and obtain feedback to contribute to the planning and design processes of the Hobart City Deal. During the Focus Group, stakeholders expressed support for aspects of the Southern Projects, including the proposed park and ride sites and bus priority on Macquarie/Davey Street. Key discussion points specifically regarding Macquarie/Davey Street included:

- Bus journeys are convenient, cheap and sociable. However, long travel times, low quality bus shelters and the lack of 'park 'n' ride' and 'bike 'n' ride' options, are barriers to entry.
- Opportunity to increase the availability of bus services ("the more buses the better")
- Due to the project's proximity to local schools, opportunity to provide free or discounted student travel.
- Local challenges raised included:
    - pedestrian and bicycle safety
    - the dangers of cars giving way when turning right from Davey Street onto Macquarie Street
    - concerns over the potential reduction of parking on Macquarie and Davey Streets

City of Hobart

The Department of State Growth held briefings with representatives from the City of Hobart at key stages during the development of the concept design. A summary of feedback from those meetings are outlined below.

70% Draft Concept Design Plans (20 May 2020)

- Davey Street - Concern with proposed new bus stop in front of St David's Park impacting left-turn capacity into Sandy Bay road, causing traffic to back up across bus lane
- Macquarie Street - Concern with bus stop next to Warneford Street – suggest removing it to improve left hand turn capacity (allow people to get in left lane early to prepare for Molle) and mitigate turbulence.
- Davey street - Move location for commencement of bus lane to half way between Murray and Sandy Bay Road (not at the beginning of Murray) to mitigate confusion / turbulence and safety issues around intersection as traffic from separated lanes have to adjust to bus lane.
- Davey street - On the concept drawings the alignment of lanes on Davey street across Antill street looks out of alignment.
- Davey Street - the pedestrian crossing at top of Salamanca Place (to cross Salamanca place) will need some consideration – if bus stop is moved as proposed.
- Davey street – consider moving position of bus stop (between Molle and Antil), off the footpath to behind footpath, to allow greater footpath capacity for shared footpath (bikes/pedestrians).
- To address parking loss, should work with Council to see what can be done in side streets eg - providing permit parking provision. Likely challenges with the proposed parking loss on Macquarie Street between Gore St and Molle St.

Most of the design concerns outlined above were addressed in the Final Draft drawings.

Final Draft Concept Design Plans (29 Oct 2020)

- City is comfortable with the proposed concept designs and the additional work underway the Southern Outlet / Macquarie / Davey interface prior to public display
- Concerns regarding the loss of parking and side street issues but strategically happy with the direction.
- Two specific design matters were raised:
    - Given that design proposes only one right turn into Harrington from Davey street they suggested parking be removed during am and pm peak, or removed up to court permanently.
    - Check the left turn queuing into Sandy Bay Road with the bus stop moved in front of St David's Park.

6.6 Environmental issues

6.6.1 Environment - Flora and Fauna

A Planning and Environment Report was undertaken. This report is in Appendix E of this report for details however is summarised below.

As the proposed road works will occur in cleared, urban areas adjacent to Hobart's established road network and the Southern Outlet, the potential for impacts on natural values is low.

A desktop review using theList indicates that there are no records of threatened flora, fauna or communities that may be impacted by the development.

6.6.2 Historic Heritage

A Planning and Environment Report was undertaken including a specialist historic heritage assessment undertaken by Praxis. This report is included in Appendix E. This report identifies potential Historic Heritage issues arising from the proposed Hobart Transport Vision projects. While the strategy indicates that there are no listed heritage places in the development area (i.e. in the road network), it notes that there are numerous heritage places adjacent the road network which are listed under the Tasmanian Heritage Register and the Hobart Interim Planning Scheme 2015. The strategy also notes that the road network traverses several Heritage Precincts.

- **Properties listed on the Tasmanian Heritage Register**

Work proposed within any title included on the Tasmanian Heritage Register must comply with the provisions of the *Historic Cultural Heritage Act 1995*. In this respect the footpath beside the Treasury Building on Macquarie Street, works on this title must comply with the Act and a Heritage Impact Assessment must be submitted with the planning permit application. Depending on the final scope of works, other heritage places may be affected.

- **Properties listed in the Planning Scheme heritage schedule –** none are included in the survey corridor
- **Heritage Precincts identified under the Planning Scheme** - parts of the survey corridor overlap with the Heritage Precinct H4 (Davey Street from Antill Street to the

Southern Outlet) and Precinct SH2 (from 353 -357 Macquarie Street). Any major works may require a development application

- **Places of Archaeological Potential identified under the Planning Scheme** – part of the survey corridor overlaps with a Place of Archaeological Potential. There are exemptions available for some works, however, depending on the extent an application, an archaeological impact assessment may be required; and
- **Trees included on the significant trees list** – the proximity of works and the potential for impacts on the English Oak at The Hermitage (251 Davey Street) will need to be considered.

There are not considered to be any critical heritage issues on the portion of the survey corridor from Fitzroy Gardens to Olinda Grove.

A Heritage Impact Assessment (Appendix G) was prepared by Praxis on the preferred concept design against any statutory heritage requirements and the conservation policies. Key findings include:

- No works are proposed on the titles of places listed on the Tasmanian Heritage Register or as Heritage Places under the HIPS15, nor are any works proposed in close proximity to any Significant Trees as included on the HIPS15.
- No works are proposed to any place affected by the areas included as Heritage Places or a Place of Archaeological Potential under the Sullivans Cove Planning Scheme 1997.
- The proposed bus stop relocations, bus boarders etc. and the proposed signalised intersection on the junction of Salamanca Place and Davey Street are within an Area of Archaeological Potential under the Hobart Interim Planning Scheme 2015. These works are also partially within various Heritage Precincts as per the HIPS15.
    - It is likely that any associated excavation would be minor and shallow and most likely only involve the excavation of recent road/footpath paving and base as well as modern kerbing/guttering. It is likely that the road reserve is already substantially disturbed from decades of roadworks and services and such minor excavations are not considered to have a high likelihood of disturbing significant archaeological remains.
    - It is likely that works in these areas relating to 'minor upgrades' by or on behalf of a 'State government' of infrastructure such as roads, footpaths (including widening, making or placing or kerbs, gutters, footpaths, traffic control devices etc.) that are within the Hobart Interim Planning Scheme jurisdiction would be exempt from requiring planning approval by virtue of Part E.13.4 of the scheme. In either case it is considered unlikely that any mitigation strategies will be required.

- If the proposed bus stop shelters are of a similar tenor to those already precedented in Davey/Macquarie Streets, then these are unlikely to have any major adverse visual/heritage impact. In the current case it is considered beneficial that the shelters be removed from the front of the former St Marys Hospital and reinstalled in the proposed location – which is a more open space backdropped by St Davids Park – i.e. the visual impact upon significant nearby heritage buildings will be less in the proposed location.

6.6.3 Aboriginal Heritage

Aboriginal cultural heritage is managed by Aboriginal Heritage Tasmania (AHT) under the Aboriginal Heritage Act 1975. A search of the Aboriginal Heritage Register should be undertaken to identify any sites of concern. Given the extent of disturbance within the Macquarie Street and Davey Street corridor, the potential for registered sites to be present should be minimal.

6.6.4 Noise

A noise assessment will be required to determine the need for noise mitigation and to confirm compliance with the planning scheme. This should be commenced once the concept alignment is finalised.

The Planning Scheme requirements are associated with the Utility zone and Central Business Zone provisions. There are no noise requirements under these zones; however, noise is a consideration from a stakeholder engagement perspective.

6.6.5 Development Application (DA)

It is expected that a Development Application will be required for this project. Items to be addressed within the application are listed below

- No Commonwealth or State listed threatened native vegetation communities and species have been recorded within the project area – no natural values assessment is considered necessary
- The proposed development area will traverse various utilities, which will have to be considered at design stage.
- Currently, the applicable schemes are the:
    - Hobart Interim Planning Scheme 2015; and
    - Sullivans Cove Planning Scheme 1997
- Sometime over the next year, the Tasmanian Planning Scheme and Hobart Local Provisions Schedule may replace both the above planning schemes.
- Under the Hobart Interim Planning Scheme 2015:
    - The limited exemption for minor upgrades by or on behalf of the State government will not apply because the Local Historic Heritage Code applies.
    - The land use will be deemed Utilities (not minor). While generally requiring a Permitted level of assessment, any reliance on Performance Criteria will trigger a Discretionary permit.
    - The following overlay and code matters are relevant:
        - A Heritage Impact Statement will be required to address the applicable standards under the Historic Heritage Code.
        - As the proposed road works are within 50 m of the Inner Residential and Urban Mixed Use zones, a Noise Assessment will be required to address the performance requirement of the use standard under clause 28.3.2 (noise) of the Utilities Zone
        - If any new vehicle crossing or junction is proposed, Council will require a Traffic Impact Assessment in order to demonstrate compliance with the performance requirement under clause E5.6.2 (A2 Road accesses and junctions) of the Road and Railway Assets Code
        - If the proposed stormwater arrangements do not comply with any of the acceptable in the standards under the Stormwater Management Code, Council will require a permit and Stormwater Management Plan to demonstrate compliance with the corresponding performance requirements.

- Under the Sullivans Cove Planning Scheme 1997:
    - A Discretionary planning permit will be required for Major Road Works in Cove Slopes and Enclosing Ridge, and several matters will have to be addressed, including:
        - Colours and materials (must be robust, self-pigmented external materials and finishes)
        - Amenity impacts
        - Stormwater management (Stormwater Management Plan required)
        - Traffic impacts (Traffic Impact Assessment required).
    - The Scheme's Schedule 1 – Conservation of Cultural Heritage Values is applicable to the title, which includes the footpath outside Treasury House. Otherwise, this schedule is not applicable to the rest of the development area, provided all works are outside the boundaries of the particular Places of Cultural Significance
    - If a permit is required and excavation is to occur in the portion of Davey Street or Elizabeth Street as a defined as a Place of Archaeological Sensitivity (i.e. the central retaining wall between Elizabeth and Murray Streets), the provisions of Part 22.6 of the scheme will need to be addressed with submission of an Archaeological Sensitivity Report
- Under the Tasmanian Planning Scheme, the land use will be deemed Utilities (not minor) and will generally require a Discretionary level of assessment due to reliance on performance criteria under certain codes. The following matters are relevant:
    - A Heritage Impact Statement will be required to address the applicable standards under the Historic Heritage Code.
    - A Traffic Impact Assessment will be required. With regard to the *Historic Cultural Heritage Act 1995*, a Heritage Impact Assessment must be submitted with the permit application for works on the title containing the footpath outside the Treasury Building and for any other works on titles which include an identified Heritage Place.
    - If new vehicle crossings or junctions are included, they will also have to be assessed under the code.

6.7 Geotechnical Issues

There are no known geological constraints.

6.8 Property Acquisition

No property acquisition is anticipated as part of this project.

7. Cost Estimates

7.1 General

WT Partnerships were engaged as a sub-consultant to carry out a Concept cost estimate for Macquarie and Davey Streets. The cost estimate is included in Appendix B.

The basis for the estimate was a set of the Concept Design Drawings, Estimate Advice Notice, and risk register prepared by pitt&sherry.

The summary of the cost estimate is provided in subsequent sections.

7.2 Base Estimate

The total base estimate for construction cost is $5,751,900. s 38 [redacted]

The estimate makes the following key assumptions:

- Project duration of 3 months
- Asphalt pavement resheeting 40mm wearing course and 60mm regulation
- Night working assumed for pavement resheeting works
- Lighting is not included as part of these works
- No impacts to existing services assumed (exception being stormwater pits at location of kerb alterations)
- Local connections to existing services are available for Traffic signals and PIDs.

7.3 Contingency

Contingent risks have been included in the cost estimates for the Southern Outlet Transit Lane based on the risk register in Appendix C.

Based on the probabilistic cost estimate, there is a 50 per cent chance that the final project cost will be below $5,751,900 and a 90 per cent chance that the final project cost will be below $7,851,900. The estimates are summarised in the following table.

Table 3 – Contingent cost estimate summary

	P50 ($m AUD)	P90 ($m AUD)
Base Cost Estimate	5.75	5.75
Contingency	1.30	2.10
Total Project Cost Estimate	7.05	7.85

7.4 Cost Escalation

Cost escalation has been excluded in this cost estimate.

7.5 Cost Summary

Refer to Appendix B for breakdown of costs

8. Risk Assessment

8.1 General

A risk register has been developed for the project and is included in Appendix C. The register was developed and updated throughout the concept design process and included input from the Design Workshops with the Department's Internal Working Group on 3 February 2020 and 30 April 2020. The risks included in the register have been used to inform the inherent and contingent risk components of the cost estimate.

Figure 6: Risk Likelihood Evaluation Criteria

Risk Likelihood Evaluation Criteria

The likelihood that a risk event will occur is based on the following contributing factors:

- Complexity – evaluated in the context of the complexity of a process or activity
- Susceptibility – evaluated in the context of people, processes, stakeholders involved or the rate of change within industry.
- History – evaluated in the context of the history of previous incidents directly within the organisation, industry or more broadly.

Some events happen once in a lifetime. Other cans happen almost every day. Analysing risk requires an assessment of their frequency of occurrence. This following table provides broad descriptions used to support likelihood ratings. The occurrence will be evaluated without reference to known management practices since these are at a later stage of the risk assessment process.

RISK ASSESSMENT MATRIX		LIKELIHOOD (Refer to Definitions right)				
		A. Rare	B. Unlikely	C. Possible	D. Likely	E. Almost Certain
CONSEQUENCES (Refer to Definitions Overleaf)	5 - Catastrophic	M	H	H	VH	VH
	4 – Major	M	M	H	H	VH
	3 – Moderate	L	M	M	H	H
	2 – Minor	L	L	M	M	H
	1 - Notable	L	L	L	M	M

	Risk Action Levels
VH - Very High	▪ Minister/Secretary decision/direction may be required ▪ Provide memorandum to Manager Project Services ▪ Include in Project Monthly Report
H – High	▪ Take immediate action to further control the risk ▪ Include in Project Monthly Report ▪ Consider providing supplementary advice to Manager Project Services
M – Medium	▪ Proactively manage risks ▪ Report to Project Steering Committee through risk register ▪ Review for improvement opportunities
L – Low	▪ Monitor risk, reduce if practicable

Likelihood Definitions
What is the likelihood of the selected consequences occurring?

Likelihood Rating	Description
5 - Almost Certain	▪ Over 90% probability; or ▪ "Happens Often"; or ▪ "Unlikely that it won't happen"
4 - Likely	▪ Greater than 50% probability; or ▪ "Could easily happen"
3 - Possible	▪ Greater than 10% probability; or ▪ "Could happen, has occurred before".
2 - Unlikely	▪ Greater than 1% probability; or ▪ "Hasn't happened yet but could".
1 - Rare	▪ Less than 1% probability; or ▪ Conceivable, but only as a result of combination of unusual events.

Figure 7: Risk Consequence Evaluation Criteria

Risk Consequence Evaluation Criteria

In the context of the risk assessment, risks are assessed in terms of their impact on the achievement of business strategies and operational outcomes. Risk evaluation criteria may be based on operational, technical, financial, legal, social, environmental or other criteria. Each consequence can be rated, in terms of its severity, from notable to catastrophic as follows:

Consequence Definitions What is the likely consequences in the event of a failure?

Rating	Community	Environment & Heritage	Legal & Compliance	Reputation	Management Impact	Financial Impact	Program Impact
5 – Catastrophic	• Complete loss of trust by affected community leading to social unrest & outrage.	• Unacceptable impact on environmental values with high significance. • Unacceptable impact on heritage values with high significance.	• Major litigation with significant damages costs • Potential Prosecution by authorities. • Court or Non-Government Organisation (NGO) imposed fine	• Reputation and standing of DIER affected locally, national and internationally • Catastrophic loss of confidence by key stakeholders.	• Requires management at Ministerial Level • Requires new or amended legislation	• Project unable to proceed • Loss of Federal funding • Election commitment projects cancelled or deferred to balance budget	• Project is never able to proceed
4 – Major	• Prolonged community outrage	• Serious long term environmental impact • Partial loss of significant heritage values	• Major Litigation • Class action • Possibility of custodial sentence for Senior Management	• Major embarrassment for DIER locally and nationally. • Significant loss of confidence of key stakeholders	• Critical event that requires considerable Secretarial and General Manager time to manage over many months	• Additional Federal Government funding required at project level • Additional State funding required to program budget	• Project is delayed indefinitely
3 – Moderate	• Sustained community disruption leading to actions requiring continual management attention	• Moderate impact but not affecting ecosystem function • Moderate impact on heritage values	• Major breach of regulation with punitive fine • Significant litigation involving many weeks of senior management time	• Community and stakeholder concern on a number of issues suggesting an inability to deliver results.	• Significant event that can be managed with careful management attention • Will take some branch-level Management time over several weeks	• Other projects cancelled or deferred (internal budget reallocation) • Scope reduced on other projects in the program	• Critical timeframe for delivery cannot be met
2 – Minor	• Short-term community outrage or sustained but localised community disruption	• Minor impacts on environmental values • Minor impact on heritage values	• Serious breach of regulation with investigation or report to authority with prosecution and/or moderate fine possible	• Issues raised by community and stakeholders • Negative perception of DIER in parts of the community or with key stakeholders.	• Will require Group Manager attention over several days	• Scope reduced on other projects in program • Internal budget reallocation	• Moderate delay against non-critical timeframe for delivery
1 – Notable	• Insignificant localised community disruption	• No impact values	• Minor breach of regulation	• Some isolated impact on DIER reputation at any level.	• Impact of event absorbed in normal management activity.	• Use of contingency funds is required	• Minor delay to program

8.2 Options

High-level design options were considered to develop the functional specifications of the street as described in Section 4. Due to the constrained nature of Davey and Macquarie Street and the desire to accommodate a number of competing modes, each block was assessed progressively with the cross-section optimised according to the hierarchy outlined in Table 1 in Section 3. These were then balanced against the need to ensure the lateral shifts were safely achieved.

8.3 Discussion and Analysis

8.3.1 Risk Implications and Mitigation Factors.

Throughout the concept design process and during the design workshop, risks associated with the following criteria were discussed and recorded:

- Implementation
- Scope
- Stakeholder
- Design
- Approvals
- Construction

The likelihood and consequence of the risks identified for the above criteria was discussed considering general project management treatments, with a resultant risk level identified. The same procedure was again undertaken considering project specific treatment that can be introduced to reduce the identified risk level to a more manageable or acceptable level. The residual risk of a number of items remained high following this process Table 4 sets out these high-risk items, the full risk assessment is included in Appendix C.

Table 4 – High Risk Level Residual Risks

Risk Category	Risk
Implementation	• Extent of pavement rehabilitation on existing carriageway
Stakeholder	• Project is poorly received by the community. Negative press. • Stakeholders and public not engaged in project • Dissatisfied stakeholders results in media attention

8.3.2 Environmental and Statutory Risks

A few project risks were identified by the project team that have the potential to dictate aspects of the final design and project delivery timeframe, such as environmental, heritage, stakeholder and statutory risks. Investigation of the potential impacts of these constraints was not included in the project scope.

Table 5 – Environmental & Statutory Risks

Environmental and Statutory Risks	Mitigation
Heritage risk	If any works are required on any State listed place of heritage significance or any places of archaeological sensitivity, a rigorous heritage impact assessment must be undertaken. Works beyond resurfacing or lane reconfiguration (e.g. like-for-like works) within any Place of Archaeological Potential are to be preceded by a statement of archaeological potential, and if necessary, an archaeological impact assessment and archaeological method statement. A Heritage Impact Assessment on the Concept Designs has been undertaken and found unlikely that any mitigation strategies will be required. A search of the Aboriginal Heritage Register should be undertaken to determine if any sites are present. If sites are present an assessment may be required. If none are recorded an Unanticipated Discovery Plan may need to be implemented
Noise	A noise assessment will be required to determine the need for noise mitigation and to confirm compliance with the planning scheme.
Public and stakeholder engagement risk	Public and stakeholder consultation will be undertaken prior to further design work being undertaken.

8.4 Summary

A preliminary risk assessment has been undertaken and has identified major risks to the project. Several risks were identified, with the likelihood and consequence of these risks determined and outlined in the Risk Register (Appendix C). A few of these risks remain in the high-risk category following consideration of perceived project management and project specific treatment. It is recommended that these high category risks are quantified further in the delivery phase of the project, with mitigation measures introduced in the detailed design phase to continue to reduce these risks.

9. Program – Development and Delivery Phases

9.1 General

The project program is developed for each stage of the project, including scoping, development and delivery phase.

9.2 Program

A summary of the overarching project timeframes is shown in Table 4 below.

Additional concept design work is currently underway for the section of Macquarie Street between the Southern Outlet and Molle Street. This work is expected to be completed in Early 2021 before commencing Detailed design.

Table 6 Proposed timeframe

Milestone	Date
Concept design complete	Early 2021
Detailed design commences	2021
Construction commences	2022

Appendix A Concept Design Drawings

Appendix B Cost Estimate

Appendix C Risk Register

Appendix D Traffic Impact Assessment Report

Appendix E Planning and Environment Report

Appendix F Road Safety Audit

Appendix G Heritage Impact Assessment


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